

FCC Test Firm Designation Number: FR0014  
Industry Canada Test Firm Number: Site# 9545A-1 / 9545A-2

**Matériel testé :**  
*Equipment under test:*

**NEMEUS / MM002-LS-US**  
(Trademark / Marketing name or product reference)

**Client / Demandeur:**  
*Customer / Applicant :* **NEMEUS**  
Mr. Gilles Ronco  
13 rue de la vallée  
35220 SAINT DIDIER France

**Fabricant :**  
*Manufacturer:* **NEMEUS**  
13 rue de la vallée  
35220 SAINT DIDIER France

**Numéro d'affaire :**  
*Work number :* 11845

**Référence de la proposition :**  
*Proposal number:* 112016-22265

**Date de l'essai :**  
*Date of test:* 10 et 11 décembre 2018  
December 10<sup>th</sup> and 11<sup>th</sup>, 2018

**Objectif des essais :**  
*Test purpose:* EMC qualification accordingly to following standards:  
- CFR 47, FCC Part 15, Subpart C  
(Chapter 15.247 - Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz)  
- ISSED RSS-247, Issue 2  
(Digital Transmission Systems Operating in the Bands 902–928 MHz)

**Lieu du test:**  
*Test location:* SMEE, Rue de Taille  
38500 VOIRON - France

**Test réalisé par :**  
*Test realized by:* Laurent CHAPUS

**Conclusion :**  
*Conclusion:* L'équipement satisfait aux prescriptions des normes citées en référence.  
The appliance complies with requirements of above mentioned standards.

| Ed. | Date              | Modifications<br>Pages | Written by :<br>Visa | Approved by:<br>Visa |
|-----|-------------------|------------------------|----------------------|----------------------|
| 1   | February 18, 2019 | Initial Edition        | Laurent Chapus       | Régis ANCEL          |

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## Contents

|                                                                                     |    |
|-------------------------------------------------------------------------------------|----|
| 1. NORMATIVES REFERENCES .....                                                      | 3  |
| 2. TEST SYNTHESIS.....                                                              | 4  |
| 3. EQUIPMENT UNDER TEST (EUT).....                                                  | 6  |
| 4. TEST CONDITIONS.....                                                             | 6  |
| 5. MODIFICATIONS OF THE EUT.....                                                    | 6  |
| 6. SPECIAL ACCESSORY .....                                                          | 7  |
| 7. MEASUREMENT UNCERTAINTY .....                                                    | 7  |
| 8. FIELD STRENGTH CALCULATION.....                                                  | 7  |
| 9. CONDUCTED EMISSION MEASUREMENT (150KHZ-30MHZ).....                               | 8  |
| 10. DTS BANDWIDTH (6DB) .....                                                       | 11 |
| 11. CHANNEL SEPARATION.....                                                         | 13 |
| 12. NUMBER OF HOPPING CHANNELS.....                                                 | 15 |
| 13. AVERAGE TIME OF OCCUPANCY .....                                                 | 17 |
| 14. FUNDAMENTAL EMISSION OUTPUT POWER.....                                          | 19 |
| 15. MAXIMUM POWER SPECTRAL DENSITY LEVEL IN THE FUNDAMENTAL EMISSION.....           | 23 |
| 16. UNWANTED SPURIOUS EMISSIONS (CONDUCTED EMISSIONS) .....                         | 27 |
| 17. UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS (RADIATED EMISSIONS) ..... | 32 |
| 18. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS.....                           | 37 |
| 19. OCCUPIED BANDWIDTH (99%).....                                                   | 49 |

## 1. Normatives References

| FCC qualification according to: |         |                                                                                                                                                                      |
|---------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards                       | Applied | Title                                                                                                                                                                |
| ANSI C63.4<br>(2014)            | X       | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
| ANSI C63.10<br>(2013)           | X       | American National Standard for Testing Unlicensed Wireless Devices                                                                                                   |
| CFR47, Part 15                  | X       | Telecommunication – Federal Communication Commission – Radio frequency devices,<br>Sections 15.109 / 15.209 / 15.247                                                 |

| ISED qualification according to: |         |                                                                                                                              |
|----------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------|
| Standards                        | Applied | Title                                                                                                                        |
| ICES-003<br>(Issue 6/2016)       | X       | Information Technology Equipment (ITE) – Limits and methods of measurement                                                   |
| RSS-Gen<br>(Issue 5/2018)        | X       | General Requirements and Information for the Certification of Radio Apparatus                                                |
| RSS-247<br>(Issue2/2017)         | X       | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |

**Note:** Following guidance are used

- DTS Measurement Guidance 558074 D01 v05
- Determining ERP and EIRP Guidance 412172 D01 v01r01

Deviation from standard: None

## 2. Test synthesis

### Requirement for Systems using digital modulation techniques (DTS)

| TEST                                                   | Paragraph number<br>FCC Part 15 /<br>IC RSS-247 / RSS-GEN                                 | Spec.<br>FCC Part 15 /<br>IC RSS-247 / RSS-GEN                                                                                                                                                                                                                | RESULTS<br>(comments) |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Conducted emissions test                               | 15.207 (a)<br>RSS-Gen § 8.8                                                               | Table 15.107 (a)<br>Table 4 / RSS-Gen                                                                                                                                                                                                                         | <b>PASS</b>           |
| 6dB Bandwidth                                          | 15.247 (a) (2)<br>RSS-247 § 5.2 (a)                                                       | At least 500kHz                                                                                                                                                                                                                                               | <b>PASS</b>           |
| Maximum Conducted Output Power                         | 15.247 (b) (3)<br>RSS-247 § 5.4 (d)                                                       | 1W max / 30dBm (Conducted)<br>4W max / 36dBm (EIRP)                                                                                                                                                                                                           | <b>PASS</b>           |
| Maximum Power Spectral Density                         | 15.247 (e)<br>RSS-247 § 5.2 (b)                                                           | 8dBm in a 3kHz band segment                                                                                                                                                                                                                                   | <b>PASS</b>           |
| Unwanted emissions into Non Restricted Frequency Bands | 15.247 (d) /<br>RSS-247 § 5.5                                                             | -30dBc in any 100kHz outside frequency band.                                                                                                                                                                                                                  | <b>PASS</b>           |
| Unwanted emissions into Restricted Frequency Bands     | 15.209 (a) / 15.247 (d) /<br>15.205 (a)<br>RSS-GEN § 7.1, §8.9, §<br>8.10 / RSS-247 § 5.5 | Measure at 300m<br>9-490kHz: 2400µV/m/F(kHz)<br>Measure at 30m<br>0.490-1.705: 24000µV/m/F(kHz)<br>1.705-30MHz: 30µV/m<br>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 | <b>PASS</b>           |
| Occupied Bandwidth                                     | RSS-GEN § 6.7                                                                             | BW at 99%                                                                                                                                                                                                                                                     | <b>PASS</b>           |

## Requirement for Hybrid systems (DSS)

| TEST                                                   | Paragraph number<br>FCC Part 15 /<br>IC RSS-247 / RSS-GEN                                 | Spec.<br>FCC Part 15 /<br>IC RSS-247 / RSS-GEN                                                                                                                                                                                                                | RESULTS<br>(comments) |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Conducted emissions test                               | 15.207 (a)<br>RSS-Gen § 8.8                                                               | Table 15.107 (a)<br>Table 4 / RSS-Gen                                                                                                                                                                                                                         | PASS                  |
| 20dB Bandwidth                                         | 15.247 (a) (1)<br>RSS-247 § 5.1                                                           | No requirements                                                                                                                                                                                                                                               | PASS                  |
| Hopping channel separation                             | 15.247 (a) (1) / RSS-247<br>5.1 a) b)                                                     | Minimum separation<br>25kHz or the two-third 20dB<br>bandwidth whichever is greater                                                                                                                                                                           | PASS                  |
| Number of hopping frequencies                          | 15.247 (a) (1) / RSS-247<br>5.1 c)                                                        | No requirements for hybrid systems                                                                                                                                                                                                                            | PASS                  |
| Time of occupancy                                      | 15.247 (f) /<br>RSS-247 5.3 a)                                                            | Maximum 400ms per channel within<br>25.6s (64 channels used)                                                                                                                                                                                                  | PASS                  |
| Maximum Conducted Output Power                         | 15.247 (b) (3)<br>RSS-247 § 5.4 (d)                                                       | 1W max / 30dBm (Conducted)<br>4W max / 36dBm (EIRP)                                                                                                                                                                                                           | PASS                  |
| Maximum Power Spectral Density                         | 15.247 (e)<br>RSS-247 § 5.2 (b)                                                           | 8dBm in a 3kHz band segment                                                                                                                                                                                                                                   | PASS                  |
| Unwanted emissions into Non Restricted Frequency Bands | 15.247 (d) /<br>RSS-247 § 5.5                                                             | -30dBc in any 100kHz outside<br>frequency band.                                                                                                                                                                                                               | PASS                  |
| Unwanted emissions into Restricted Frequency Bands     | 15.209 (a) / 15.247 (d) /<br>15.205 (a)<br>RSS-GEN § 7.1, §8.9, §<br>8.10 / RSS-247 § 5.5 | Measure at 300m<br>9-490kHz: 2400µV/m/F(kHz)<br>Measure at 30m<br>0.490-1.705: 24000µV/m/F(kHz)<br>1.705-30MHz: 30µV/m<br>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                  |
| Occupied Bandwidth                                     | RSS-GEN § 6.7                                                                             | BW at 99%                                                                                                                                                                                                                                                     | PASS                  |

### • General conclusion:

Measures and tests performed on the sample of the product **NEMEUS / MM002-LS-US**, in configuration and description presented in this test report, show compliance with standards FCC CFR 47, PART 15, Subpart C and ISSED RSS-Gen & RSS-247.

## 3. Equipment Under Test (EUT)

Nom /  
Identification

**NEMEUS / MM002-LS-US**  
(Trademark / Marketing name or product reference)

Sn: Proto1

FCC ID:

FCC ID: 2AKSYMM002XUS

IC:

IC: 22302-MM002XUS

Model:

HVIN: MM002-LS-US

Alimentation /  
Power supply

3V DC (RF module via test board)

Auxiliaires /  
Auxiliaries

- Laptop ASUS, Model : F200M (with its power supply adapter)  
- DC power supply (3V)

Entrées-Sorties /  
Input / Output

|                        | Câbles pour essai /<br>Cables for test | Blindé /<br>Shielded | Prévu pour >3m /<br>Intended for >3m |
|------------------------|----------------------------------------|----------------------|--------------------------------------|
| USB cable (Test board) | USB2.0 / 1m                            | Yes                  | Yes                                  |
| DC input (Test board)  | 2 wires / 1m                           | No                   | No                                   |

Version programme /  
Firmware version

Mode de fonctionnement /  
Running mode

The tested sample is able to:

- Transmit a carrier frequency on low, middle and high channels with all modulation schemes (LORA 500kHz (DTS) & LORA 125kHz (DSS) / SF 7 to 12).
- Frequency hopping for hybrid system can be enabled or disabled

Programme de test /  
Test program /

None

Fréquence max interne EST /  
Max internal EUT frequency

50MHz (Except RF frequency)

Information sur l'équipement /  
Equipment information

- Frequency band: 902 to 928MHz (Tx & Rx)
- Operating channel: 902.3 to 914.9MHz (125kHz channel width, Hybrid mode)  
903.0 to 914.2MHz (500kHz channel width, DTS mode)
- Spreading factor: Hybrid mode: SF7 to SF10 (Worst case is taken as SF10)  
DTS mode: SF7 to SF12 (Worst case is taken as SF12)
- Number of channels: Hybrid mode: 64 channels  
DTS mode: 8 channels
- Channel spacing: Hybrid mode: 200kHz  
DTS mode: 1.6MHz
- Power Setting: Power is set at its maximum rated output power (20dBm)
- Modulation: LORA
- Antenna type: External (Dipole antenna, max antenna gain is 2.2dBi)
- Module powered by 3V DC from test board

## 4. Test conditions

Power supply voltage:

Equipment under test:

Auxiliaries:

3V DC

230V/50Hz (Radiated emission)

110V/60Hz (Conducted emission)

## 5. Modifications of the EUT

None

## 6. Special accessory

None

## 7. Measurement Uncertainty

| Test Description                                    | Expanded uncertainty |
|-----------------------------------------------------|----------------------|
| Conducted emissions test (150k-30MHz, AC mains)     | ± 3.5dB              |
| Radiated emission test (9kHz-30MHz, electric field) | ± 4.0dB              |
| Radiated emission test (30-300MHz, OATS)            | ± 5.6dB              |
| Radiated emission test (300-1000MHz, OATS)          | ± 5.3dB              |
| Radiated emission test (1-40GHz, OATS / FAC)        | ± 5.6dB              |
| Conducted RF output power at antenna port           | ± 1.6dB              |
| Radiated RF output power (Peak, Power density)      | ± 5.6dB              |
| DTS Bandwidth, 99% OBW                              | ±4%                  |
| Temperature                                         | ± 1°C                |
| Time and duty cycle calculation                     | ±1%                  |
| AC and DC voltage                                   | ±1%                  |

Note: Expanded uncertainty at 95% confidence (k=2)

## 8. Field Strength Calculation

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

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

Where FS = Field Strength (Level)

RA = Receiver Amplitude (Meter Reading)

AF = Antenna Factor

CF = Cable Factor

AG = Amplifier Gain

Margin value = Emission level – Limit value

Example:

RA: 14.0dBμV / AF: 16.5 dBm<sup>-1</sup> / CF: 3.5dB / AG: 15dB

→ Total factor: 5dBm<sup>-1</sup>

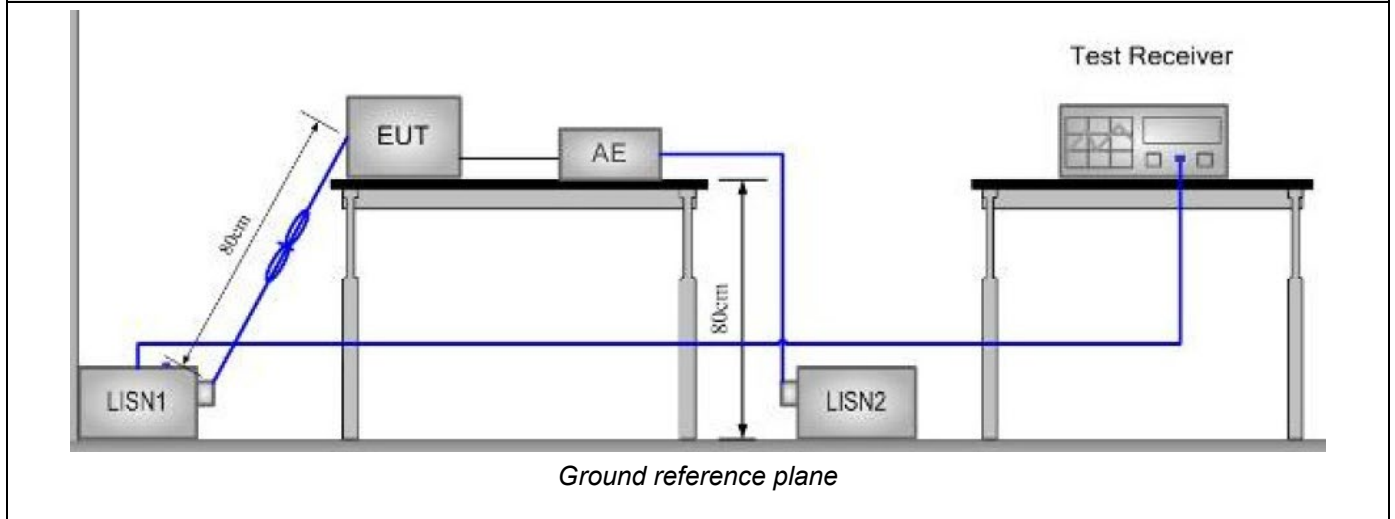
→ Field level: 19.0dBμV/m (-21.0dB for margin if limit is 40dBμV/m)

## 9. Conducted Emission Measurement (150kHz-30MHz)

| TEST: Limits for conducted disturbance 150kHz – 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |        |                      | Verdict |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|----------------------|---------|
| Method: The LISN is placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on lines were made at the output of the LISN. The EUT is 80cm above the ground reference plane and 40cm from the vertical ground plane. The AC power cable is 1m length. |                                      |        |                      | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Required prior to the test           |        | During the test      |         |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20 to 30 °C                          |        | 22°C ± 2             |         |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 25 to 70 %                           |        | 40% ± 5              |         |
| Fully configured sample scanned over the following frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Frequency range on each side of line |        | Measurement Point    |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 150kHz to 30MHz                      |        | AC input port (110V) |         |
| Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |        |                      |         |
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Limit dB (µV)                        |        |                      |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Quasi-Peak                           | Result | Average              | Result  |
| 0.15 – 0.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 66 \ 56                              | PASS   | 56 \ 46              | PASS    |
| 0.50 - 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 56                                   | PASS   | 46                   | PASS    |
| 5 – 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 60                                   | PASS   | 50                   | PASS    |
| Supplementary information:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |        |                      |         |
| Test location: SMEE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |        |                      |         |
| Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |        |                      |         |
| Power supply voltage: AC mains 110V/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                      |        |                      |         |

| Test Equipment Used       |               |              |             |           |          |
|---------------------------|---------------|--------------|-------------|-----------|----------|
| Description               | Manufacturer  | Model        | Identifier  | Cal. Date | Cal. Due |
| Attenuator / limiter      | SMEE          | ATT#2        | ATT-171-010 | 2018/6    | 2019/6   |
| Cable RF                  | Div           | 1m           | CAB-101-021 | 2018/4    | 2019/4   |
| LISN (50Ω / 50µH) (Meas.) | AFJ           | LS16C        | RSI-101-001 | 2017/6    | 2019/6   |
| Measuring receiver        | Rohde&Schwarz | ESRP         | REC-151-002 | 2017/5    | 2019/5   |
| EMC Software              | NEXIO         | BAT EMC V3.8 | SOF-101-001 | -         | -        |
| AC power supply           | PACIFIC POWER | AMX-125      | ALI-101-002 | -         | -        |

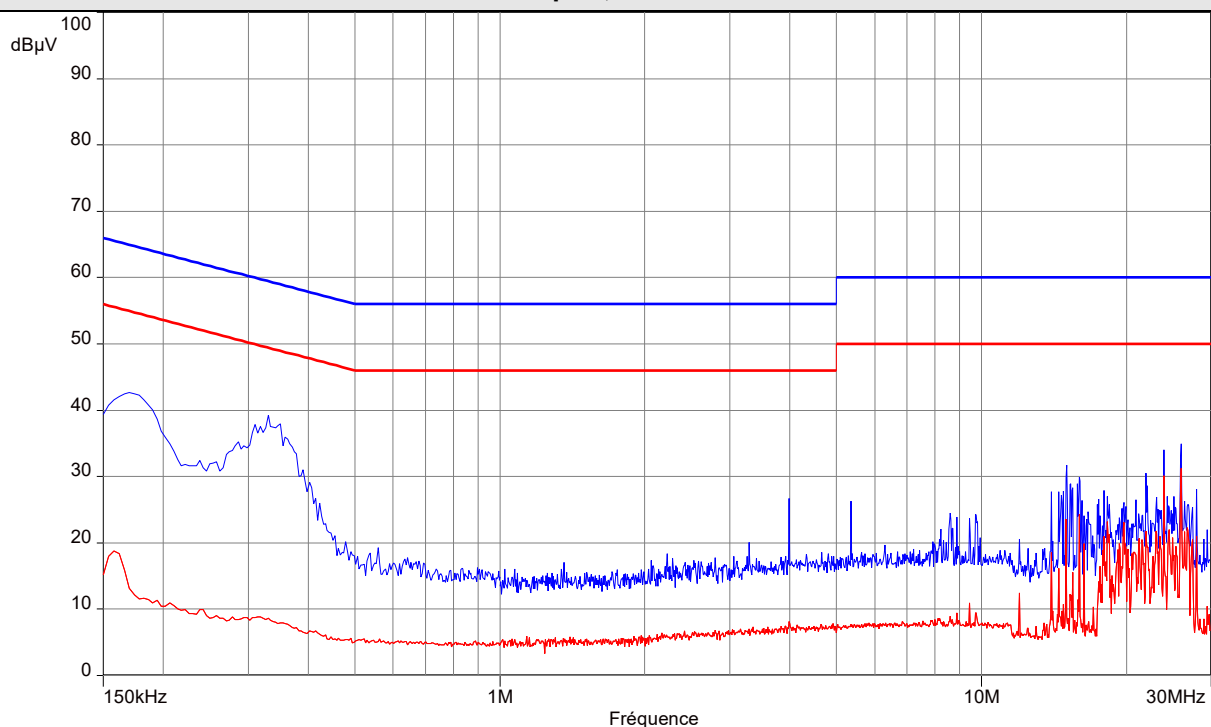
## Test Setup for conducted emission



## Tabulated Results for Mains Terminal Disturbance Voltage on AC port

| FREQ<br>(MHz)                         | Meas. PK<br>(dBμV) | Mes. QP<br>(dBμV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | LIMIT QP<br>(dBμV) | Margin QP<br>(dB) | Mes. AV<br>(dBμV) | LIMIT AV<br>(dBμV) | Margin AV<br>(dB) | Line   |
|---------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|-------------------|--------------------|-------------------|--------|
| Levels are at least 20dB below limits |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                   |                    |                   | L1 / N |
| <b>Frequency band investigated:</b>   |                    | 150kHz-30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                   |                   |                    |                   |        |
| <b>RBW:</b>                           |                    | 9kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                   |                   |                    |                   |        |
| <b>Voltage:</b>                       |                    | 110V/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                   |                   |                    |                   |        |
| <b>Limit:</b>                         |                    | FCC Part 15.209 a) / RSS-Gen: Issue 5, §8.8 Table 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                   |                   |                    |                   |        |
| <b>Final measurement detector:</b>    |                    | Quasi-Peak and CISPR Average (AV)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |                   |                   |                    |                   |        |
| <b>RESULT:</b>                        |                    | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |                   |                   |                    |                   |        |
| <b>Measured value calculation:</b>    |                    | <p>The measured value (level) is calculated by adding the Cable Factor, the Transient suppressor attenuation and LISN attenuation from the receiver amplitude reading. The basic equation is as follow:</p> $\text{Meas.} = \text{RA} + \text{CF} + \text{ATT}_{\text{TRAN}} + \text{ATT}_{\text{LISN}}$ <p>Where    Meas. = Level (dBμV)<br/>                   RA = Receiver Amplitude<br/>                   CF = Cable Factor<br/>                   ATT<sub>TRAN</sub> = Transient suppressor attenuation<br/>                   ATT<sub>LISN</sub> = LISN attenuation</p> <p>Margin value = Emission level – Limit value (A negative margin shows compliance to limit)</p> |                    |                   |                   |                    |                   |        |

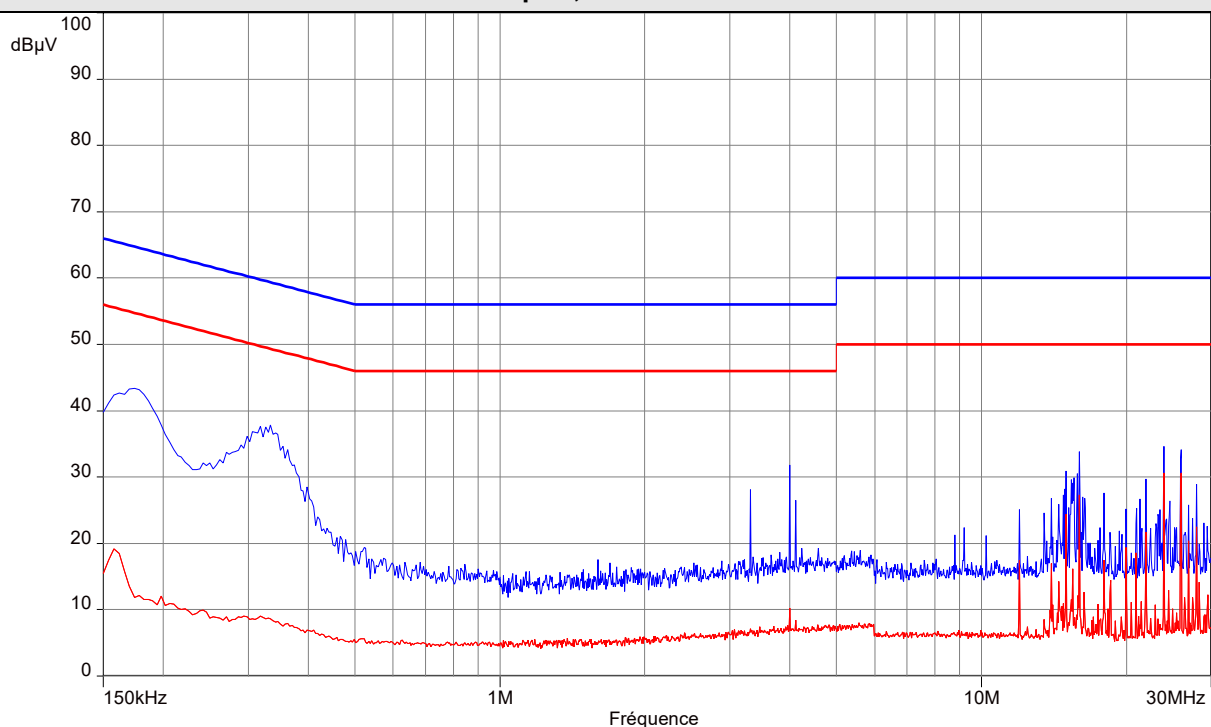
## Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line L1



----: Peak

----: Average

## Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line Neutral



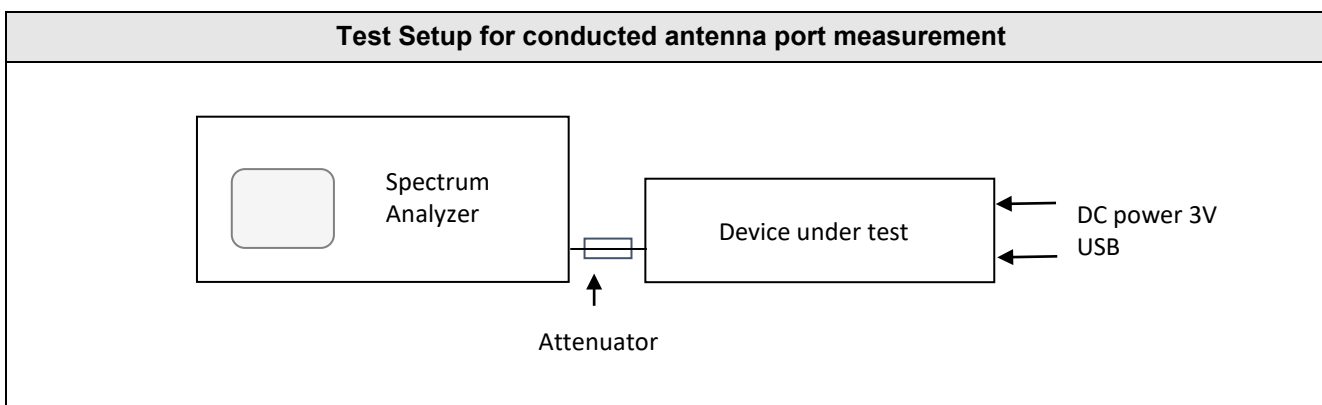
----: Peak

----: Average

## 10. DTS Bandwidth (6dB)

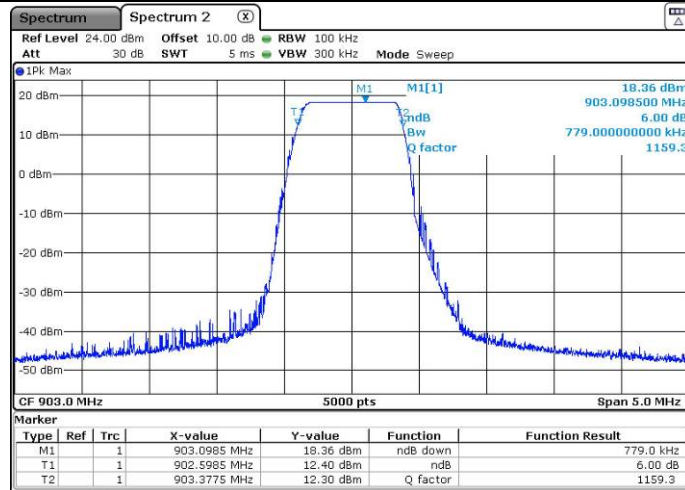
| TEST: 6dB Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                    | Verdict         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------|
| <u>Method:</u> The setup is in an anechoic chamber. The spectrum analyzer is connected to the antenna port of the device under test. A conducted measurement is performed.<br>The RBW is 100kHz, with VBW ≥ 3 x RBW. Sweep time is set to Auto couple.<br>The SPAN is wide enough to capture all products of the modulation process.<br>A MaxHold Peak detector is used. Automatic function of the spectrum analyser is used.<br>The tested equipment is set to transmit operation with modulation on low, mid and high channels. |                                    | Pass            |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Required prior to the test         | During the test |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20 to 30 °C                        | 22°C ± 2        |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 25 to 70 %                         | 40% ± 5         |
| Limits – FCC Part 15.247 (a) / RSS-247 §5.2 (a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    |                 |
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Level for Bandwidth                | Limit           |
| 903.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6dB below the maximum output power | At least 500kHz |
| 907.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                    |                 |
| 914.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                    |                 |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                                                                                                                                                                                                                                                                            |                                    |                 |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |

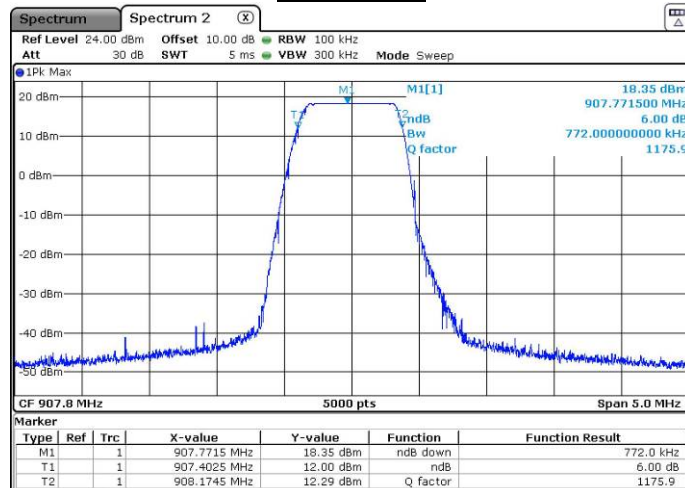


| Tabulated Results for Occupied Bandwidth |                     |        |
|------------------------------------------|---------------------|--------|
| Frequency (MHz)                          | 6dB Bandwidth (kHz) | Result |
| 903.0                                    | 779.0               | Pass   |
| 907.8                                    | 772.0               | Pass   |
| 914.2                                    | 771.0               | Pass   |

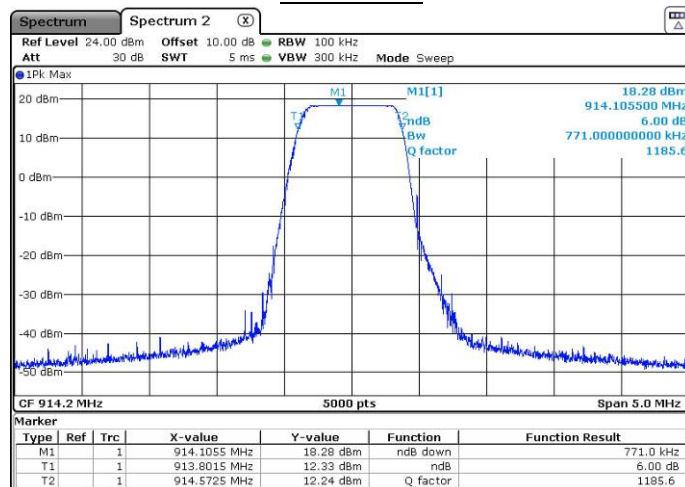
## Graphical representation of 6dB Bandwidth



### Low channel



### Mid channel



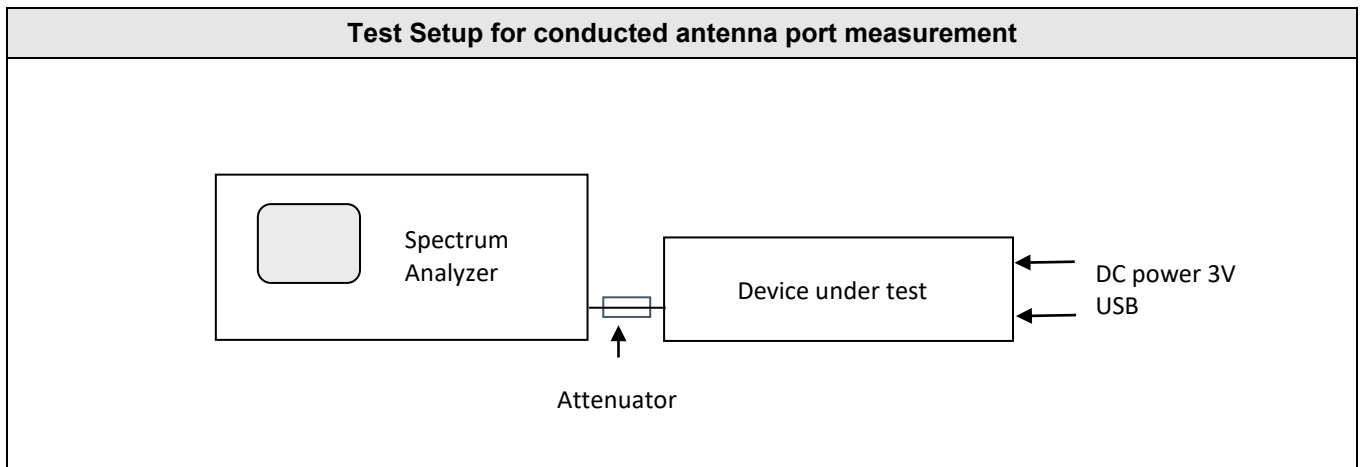
### High channel

|                              |                                          |
|------------------------------|------------------------------------------|
| Frequency band investigated: | 903 / 907.8 / 914.2MHz (DTS 500kHz mode) |
| RBW :                        | 100kHz                                   |
| Measurement detector :       | Peak / Max hold                          |

## 11. Channel Separation

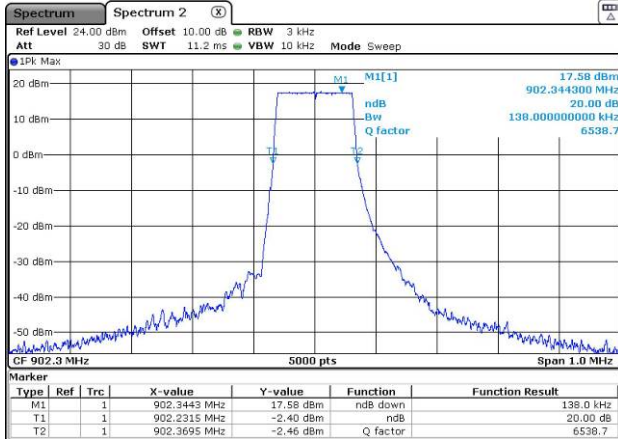
| TEST: Hopping channel measurement (Separation)                                                                                                                                                                                                                                                                                                                                                   |                            |                 | Verdict |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|---------|
| <p><b>Method:</b> The Equipment under test is connected to the measuring receiver with suitable mean. The SPAN is wide enough to capture the peaks of two adjacent channels. The channel separation is measured with the hopping function enable on the EUT.</p> <p><b>Limits:</b> Minimum separation between channels shall be 25kHz or the two-third 20dB bandwidth, whichever is greater.</p> |                            |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                           | Required prior to the test | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                              | 20 to 30 °C                | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                | 25 to 70 %                 | 40% ± 5         |         |
| <p>Supplementary information:<br/> Test location: SMEE.<br/> Test date: December 10<sup>th</sup>, 2018. Tested by L. CHAPUS</p>                                                                                                                                                                                                                                                                  |                            |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |

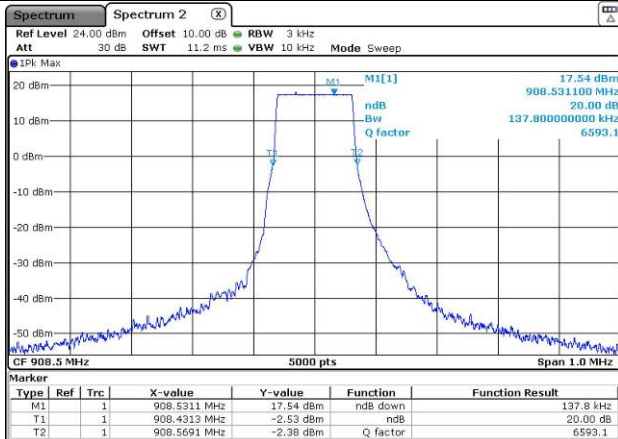


| Tabulated Results for Hopping Channel Separation (Hybrid mode) |                             |                |               |        |
|----------------------------------------------------------------|-----------------------------|----------------|---------------|--------|
| Channel frequency                                              | Adjacent channel separation | 20dB Bandwidth | Minimum limit | Result |
| (MHz)                                                          | (kHz)                       | (kHz)          | (kHz)         |        |
| 902.3                                                          | 200.0                       | 138.0          | 92.000        | PASS   |
| 908.5                                                          |                             | 137.8          | 91.867        | PASS   |
| 914.9                                                          |                             | 138.2          | 92.133        | PASS   |

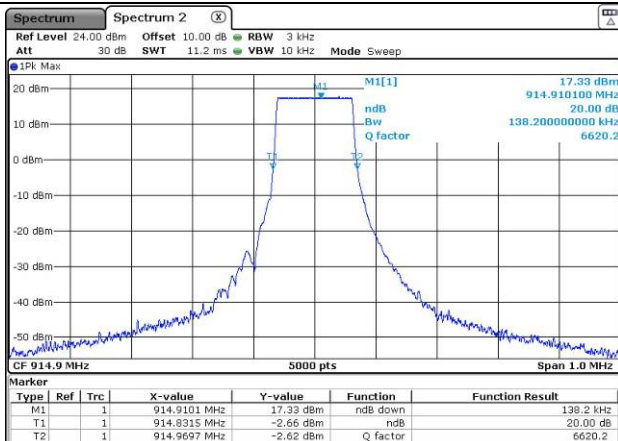
## Graphical representation of 20dB Bandwidth & Hopping channel separation



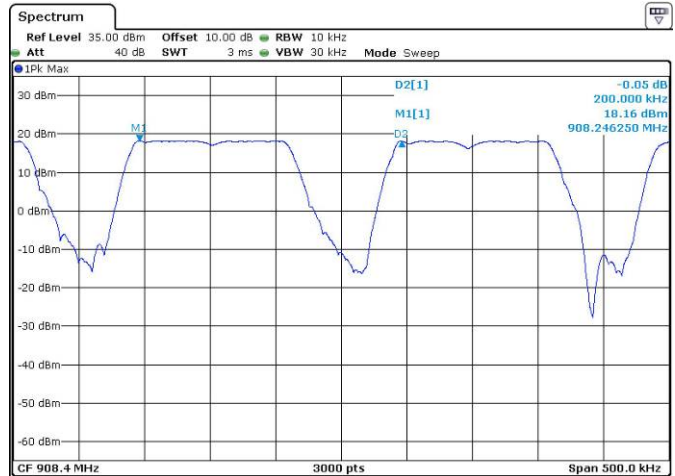
Low channel



Mid channel



High channel

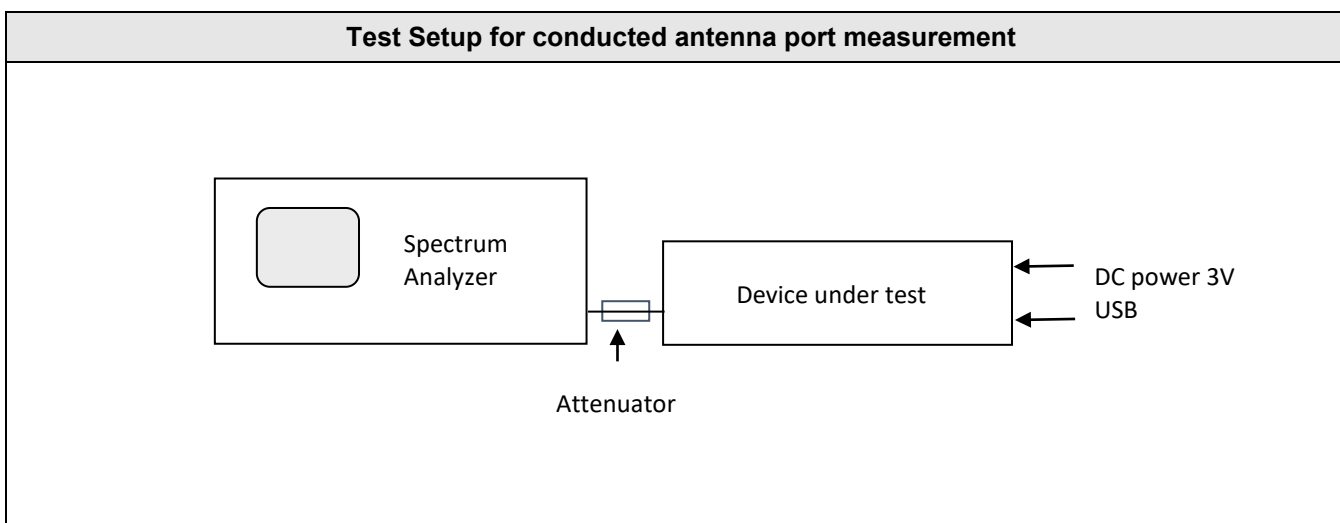


Channel separation

## 12. Number of hopping channels

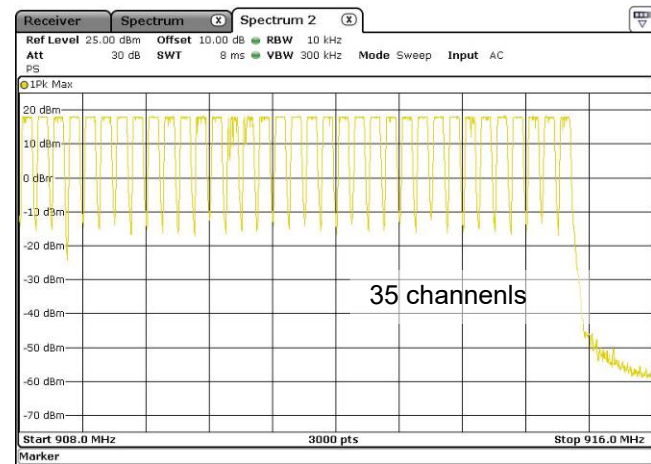
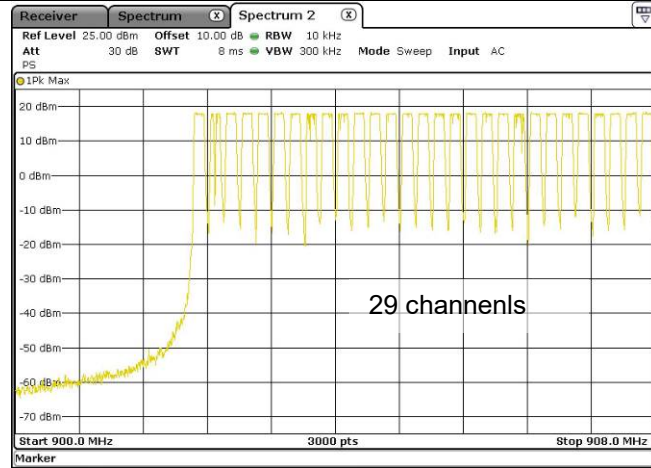
| TEST: Number of hopping channels                                                                                                                                                                                                                                                                                                                                                               |                            |                 | Verdict |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|---------|
| <p><b>Method:</b> The Equipment under test is connected to the measuring receiver with suitable mean.<br/>The SPAN is adapted to see the frequency band of operation. The spectrum analyzer RBW was 10kHz and VBW was 100kHz.<br/>The EUT has its hopping function enable.<br/><b>Limits:</b> At least 15 channels frequencies shall be used and equally spaced, in the band 2400-2483MHz.</p> |                            |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                         | Required prior to the test | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                            | 20 to 30 °C                | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                              | 25 to 70 %                 | 40% ± 5         |         |
| <p>Supplementary information:<br/>Test location: SMEE.<br/>Test date: December 10<sup>th</sup>, 2018. Tested by L. CHAPUS</p>                                                                                                                                                                                                                                                                  |                            |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |



| Tabulated Results for Number of Hopping Channel |                            |        |
|-------------------------------------------------|----------------------------|--------|
| Number of channels                              | Minimum number of channels | Result |
| 64                                              | -                          | PASS   |

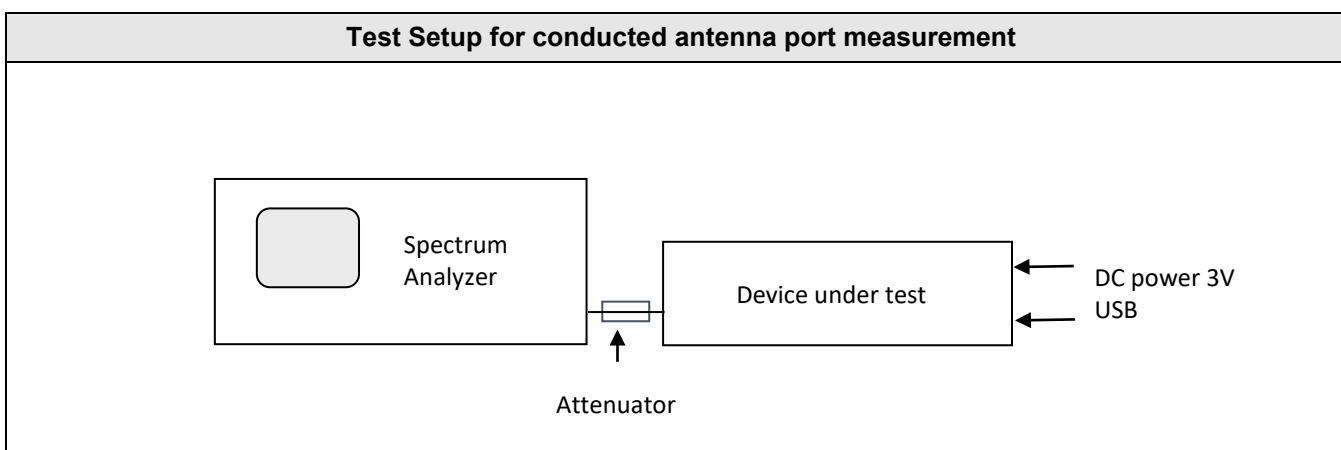
## Graphical representation for Number of Hopping Channel



## 13. Average Time of occupancy

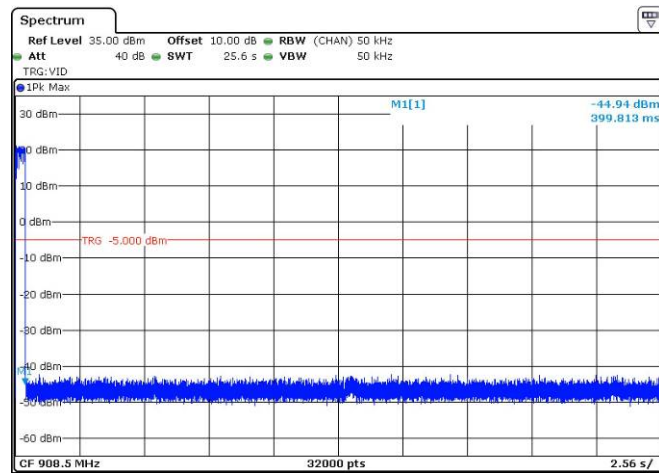
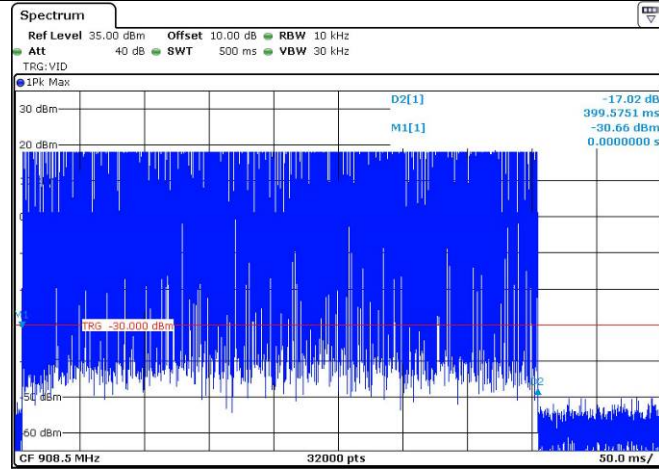
| TEST: Time of occupancy                                                                                                                                                                                                                                              |                            |                 | Verdict |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|---------|
| Method: The Equipment under test is connected to the measuring receiver with suitable mean.<br>The spectrum analyser is set to zero-span. The EUT has its hopping function enable.<br>Limits: 400ms of transmission by channel on a period 25.6s. (64 channels used) |                            |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                               | Required prior to the test | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                  | 20 to 30 °C                | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                    | 25 to 70 %                 | 40% ± 5         |         |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                               |                            |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |



| Tabulated Results for Dwell time                                                                       |                        |                                |            |        |
|--------------------------------------------------------------------------------------------------------|------------------------|--------------------------------|------------|--------|
| Number of pulses per 25.6s period                                                                      | Length of 1 pulse (ms) | Average Time of occupancy (ms) | Limit (ms) | Result |
| 1                                                                                                      | 399.5751               | 399.5751                       | 400ms      | PASS   |
| <p>Additional information:<br/>Results for the worst case<br/>Period of 25.6s (0.4s x 64 channels)</p> |                        |                                |            |        |

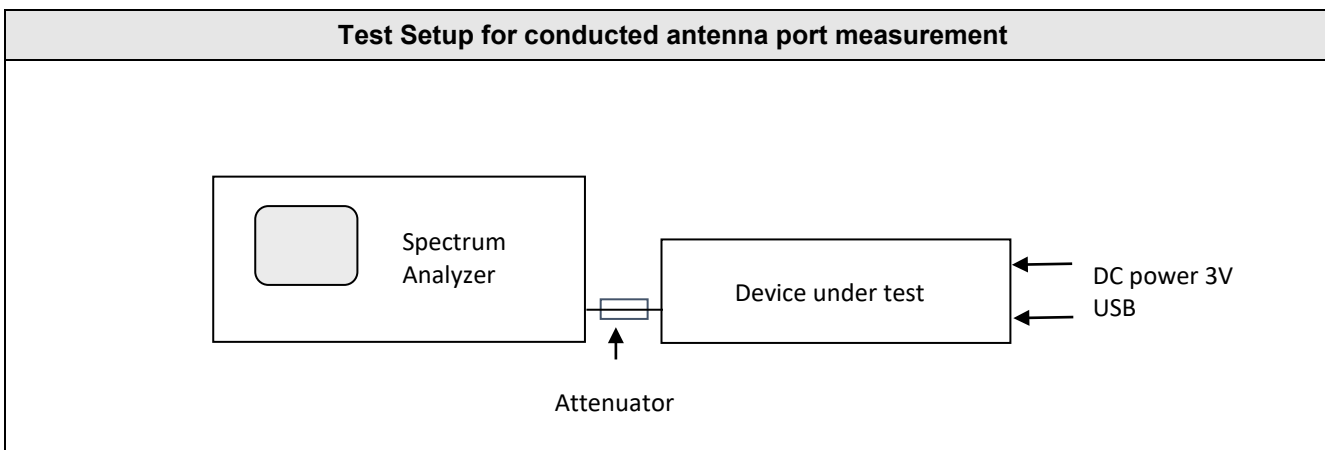
## Graphical representation for dwell time



## 14. Fundamental emission output power

| TEST: Maximum conducted (Average) output power                                                                                                                                                                                                                          |                                   |                 | Verdict |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------|---------|
| Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the antenna port of the device under test. A conducted measurement is performed.<br>The tested equipment is set to transmit operation with modulation on low, mid and high channels. |                                   |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                  | Required prior to the test        | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                     | 20 to 30 °C                       | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                       | 25 to 70 %                        | 40% ± 5         |         |
| Limits – FCC Part 15.247 (b) / RSS-247 §5.4                                                                                                                                                                                                                             |                                   |                 |         |
| Frequency (MHz)                                                                                                                                                                                                                                                         | Limits (dBµV/m)                   |                 |         |
|                                                                                                                                                                                                                                                                         | Level / Detector / Distance       | Results         |         |
| 902.3 to 914.9                                                                                                                                                                                                                                                          | 36 dBm / Pk / 3m (Radiated, EIRP) | Pass            |         |
| 902.3 to 914.9                                                                                                                                                                                                                                                          | 30 dBm / Pk (Conducted)           | Pass            |         |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                  |                                   |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | ESRP      | REC-151-002 | 2017/5    | 2019/5   |



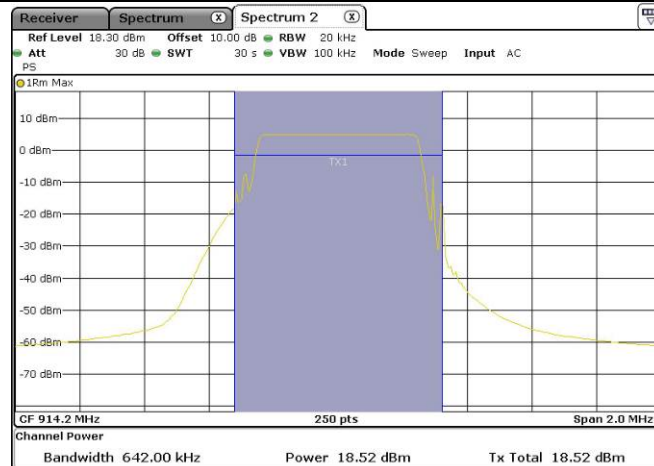
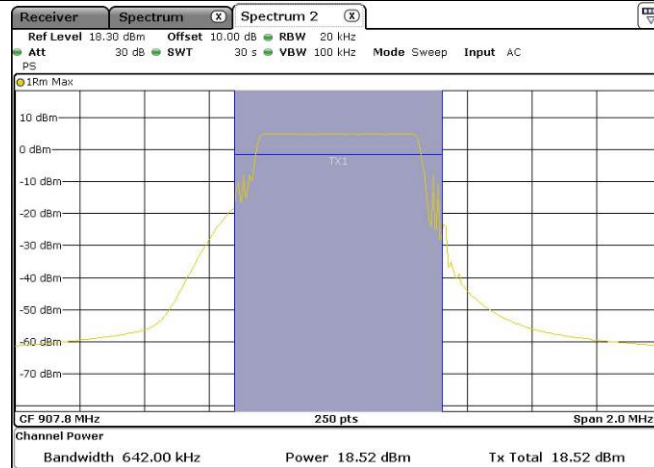
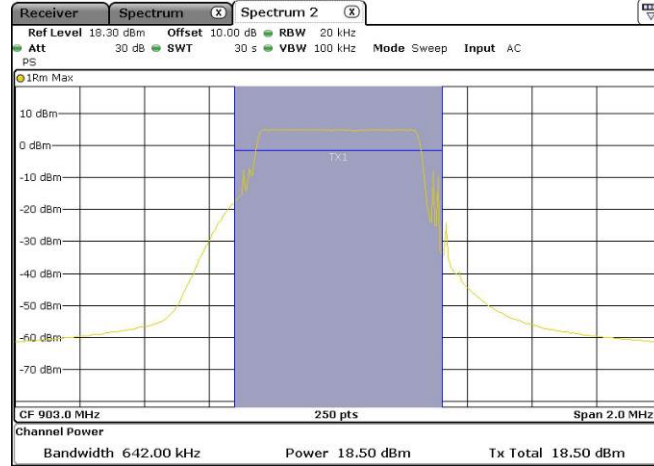
## Tabulated Results for Maximum (Average) output power (Conducted)

| FREQ<br>(MHz)  | Measured<br>conducted<br>power<br>(dBm) | Duty cycle<br>factor<br>(dB)                                                                      | Maximum<br>output power<br>(dBm) | Limit<br>(dBm) | Result |
|----------------|-----------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------|----------------|--------|
| 903.0 / DTS    | 18.5                                    | NA                                                                                                | 18.5                             | 30.0           | Pass   |
| 907.8 / DTS    | 18.5                                    | NA                                                                                                | 18.5                             | 30.0           | Pass   |
| 914.2 / DTS    | 18.5                                    | NA                                                                                                | 18.5                             | 30.0           | Pass   |
| 902.3 / Hybrid | 18.6                                    | NA                                                                                                | 18.6                             | 30.0           | Pass   |
| 908.5 / Hybrid | 18.5                                    | NA                                                                                                | 18.5                             | 30.0           | Pass   |
| 914.9 / Hybrid | 18.5                                    | NA                                                                                                | 18.5                             | 30.0           | Pass   |
| <b>RESULT:</b> |                                         | PASS                                                                                              |                                  |                |        |
| <b>Note:</b>   |                                         | - Method used is AVGSA-3<br>- Duty cycle factor is $10 \cdot \log(1/x)$ where x is the duty cycle |                                  |                |        |

## Tabulated Results for Maximum (Average) output power (Radiated)

| FREQ<br>(MHz)  | Maximum<br>output power<br>Conducted<br>(dBm) | Antenna Gain<br>(dBi) | Maximum<br>output power<br>Radiated<br>(dBm) | Limit<br>(dBm) | Result |
|----------------|-----------------------------------------------|-----------------------|----------------------------------------------|----------------|--------|
| 903.0 / DTS    | 18.5                                          | 2.2                   | 20.7                                         | 36.0           | Pass   |
| 907.8 / DTS    | 18.5                                          | 2.2                   | 20.7                                         | 36.0           | Pass   |
| 914.2 / DTS    | 18.5                                          | 2.2                   | 20.7                                         | 36.0           | Pass   |
| 902.3 / Hybrid | 18.6                                          | 2.2                   | 20.8                                         | 36.0           | Pass   |
| 908.5 / Hybrid | 18.5                                          | 2.2                   | 20.7                                         | 36.0           | Pass   |
| 914.9 / Hybrid | 18.5                                          | 2.2                   | 20.7                                         | 36.0           | Pass   |
| <b>RESULT:</b> |                                               | PASS                  |                                              |                |        |

## Graphical representation of output power (DTS / 500kHz mode)

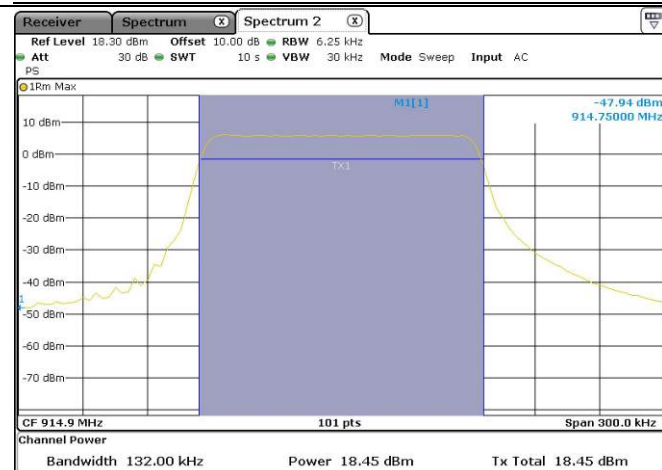
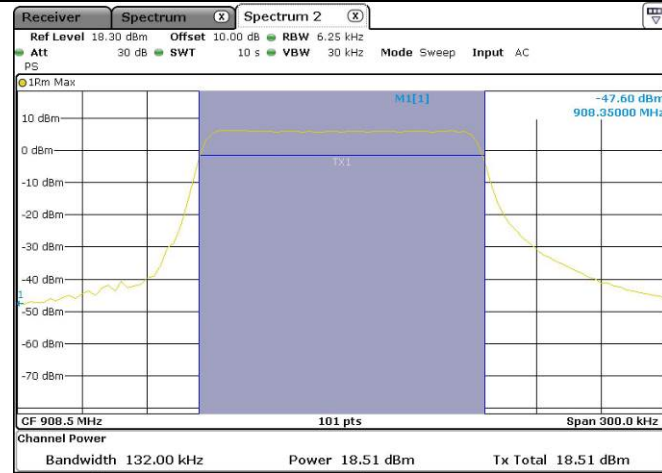
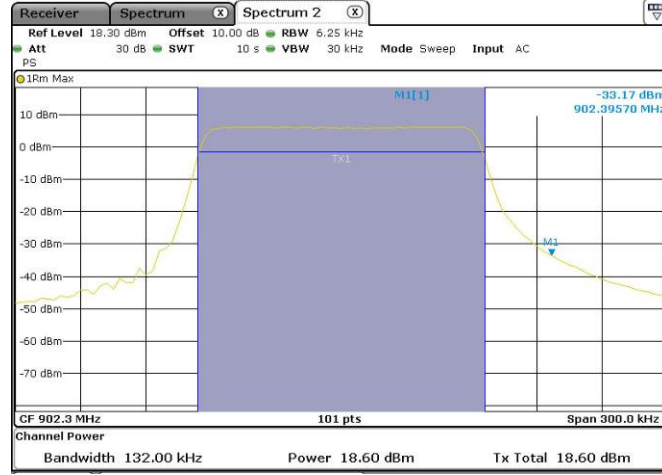


**Note:**

Method used: AVGSA-3

Channel power function of the spectrum analyser used.

## Graphical representation of output power (Hybrid / 125kHz mode)



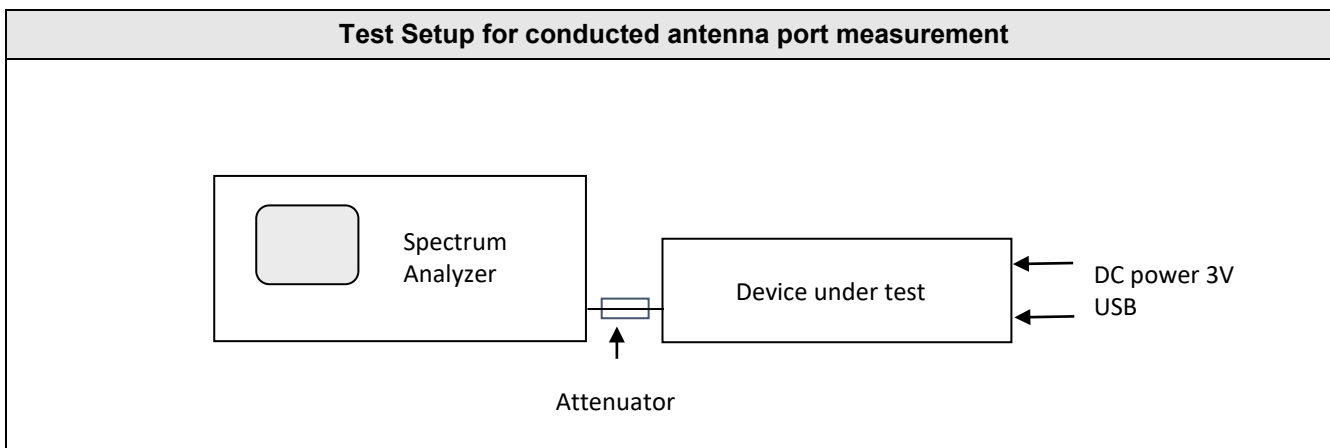
**Note:**

Method used: AVGSA-3  
 Channel power function of the spectrum analyser used.

## 15. Maximum Power Spectral Density Level in the fundamental emission

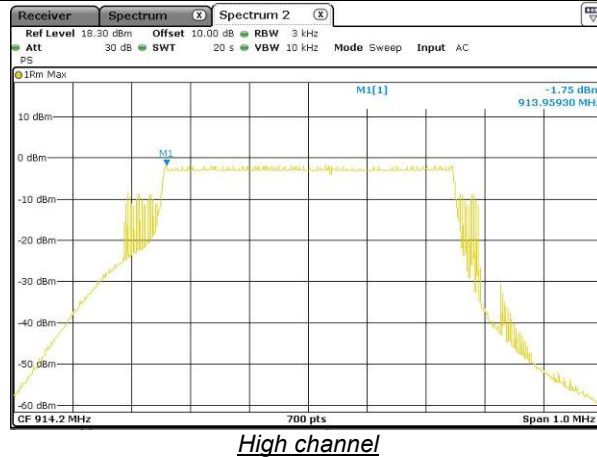
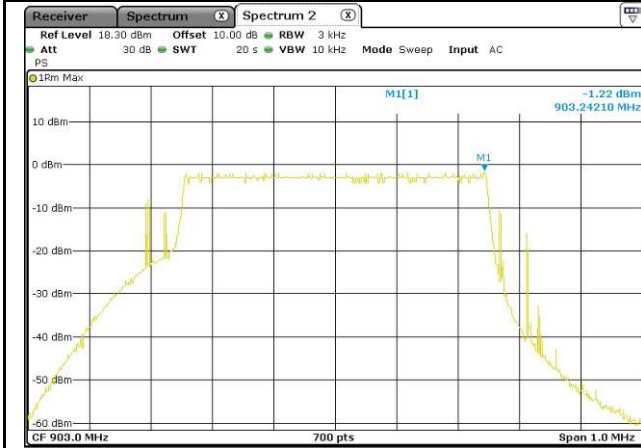
| TEST: Maximum Peak Power Spectral Density                                                                                                                                                                                                                               |                            |                 | Verdict |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|---------|
| Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the antenna port of the device under test. A conducted measurement is performed.<br>The tested equipment is set to transmit operation with modulation on low, mid and high channels. |                            |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                  | Required prior to the test | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                     | 20 to 30 °C                | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                       | 25 to 70 %                 | 40% ± 5         |         |
| Limits – FCC Part 15.247 (e) / RSS-247 §5.2 (b)                                                                                                                                                                                                                         |                            |                 |         |
| Frequency (MHz)                                                                                                                                                                                                                                                         | Level                      | Limit           |         |
| 902.3 to 914.9                                                                                                                                                                                                                                                          | 8 dBm/3kHz                 | Pass            |         |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                  |                            |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | ESRP      | REC-151-002 | 2017/5    | 2019/5   |



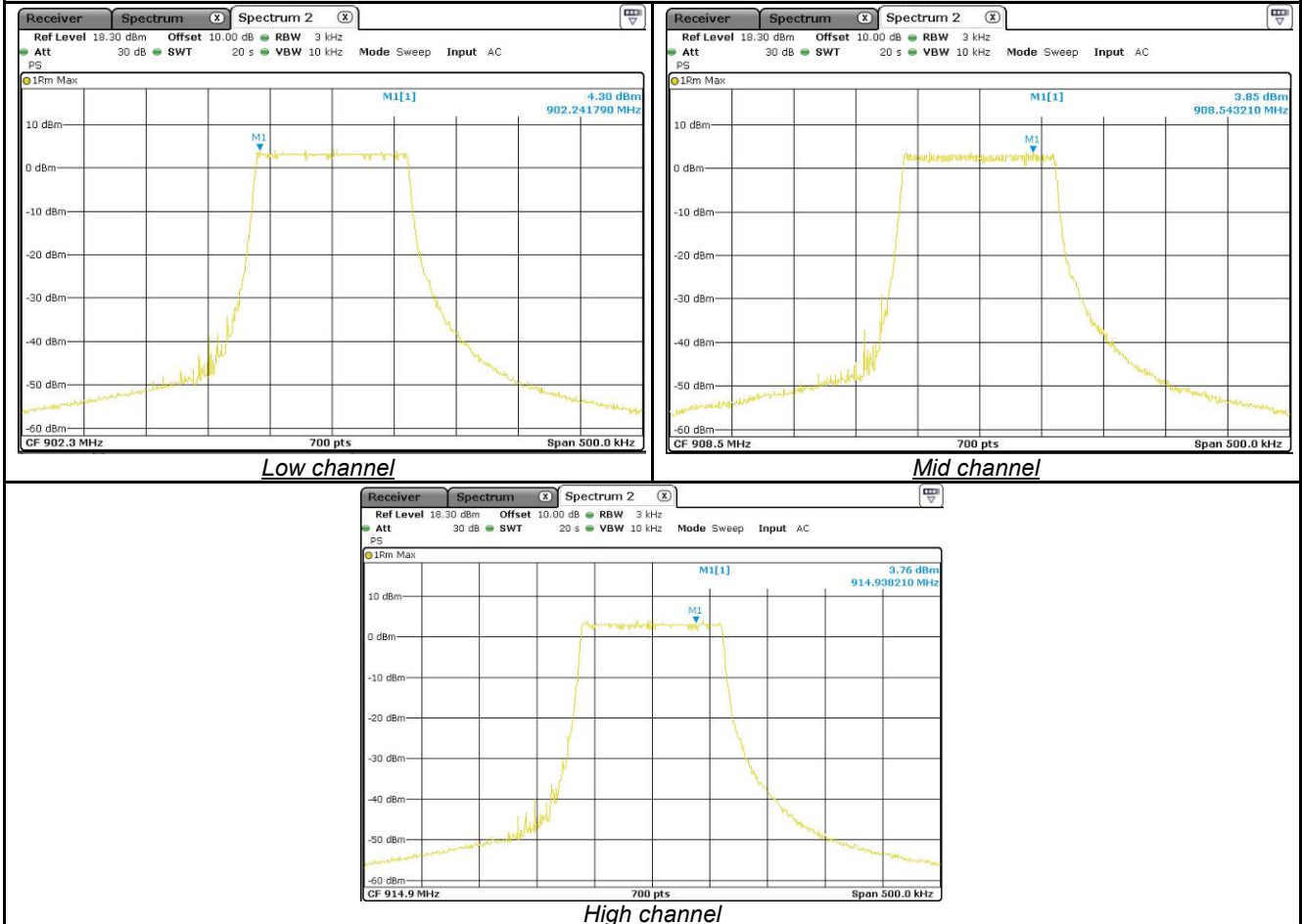
| Tabulated Results for Maximum Conducted Power Spectral Density |                   |                           |        |
|----------------------------------------------------------------|-------------------|---------------------------|--------|
| Frequency<br>(MHz)                                             | PSD<br>(dBm/3kHz) | Limit                     | Result |
| 903.0 / DTS                                                    | -1.2              | 8dBm/3kHz                 | Pass   |
| 907.8 / DTS                                                    | -2.0              | 8dBm/3kHz                 | Pass   |
| 914.2 / DTS                                                    | -1.7              | 8dBm/3kHz                 | Pass   |
| 902.3 / Hybrid                                                 | 4.3               | 8dBm/3kHz                 | Pass   |
| 908.5 / Hybrid                                                 | 3.9               | 8dBm/3kHz                 | Pass   |
| 914.9 / Hybrid                                                 | 3.8               | 8dBm/3kHz                 | Pass   |
| <b>RBW:</b>                                                    |                   | 3kHz                      |        |
| <b>Limit:</b>                                                  |                   | FCC Part 15.247 / RSS-247 |        |
| <b>RESULT:</b>                                                 |                   | PASS                      |        |
| <b>Note:</b>                                                   |                   | - Method used is AVGPSD-3 |        |

## Graphical representation for Maximum Power Spectral Density (DTS / 500kHz mode)



|         |                           |
|---------|---------------------------|
| RBW:    | 3kHz                      |
| Limit:  | FCC Part 15.247 / RSS-247 |
| RESULT: | PASS                      |

## Graphical representation for Maximum Power Spectral Density (Hybrid / 125kHz mode)

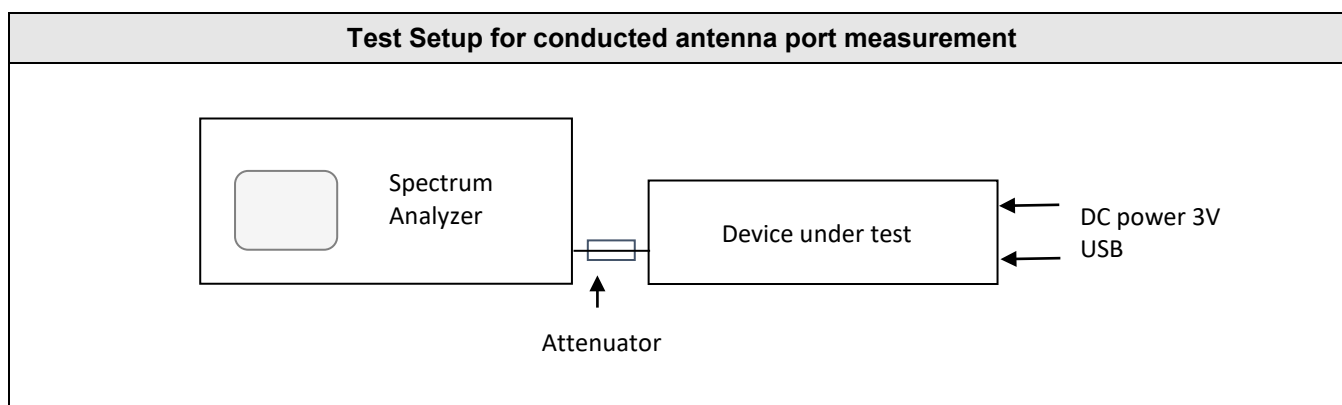


|         |                           |
|---------|---------------------------|
| RBW:    | 3kHz                      |
| Limit:  | FCC Part 15.247 / RSS-247 |
| RESULT: | PASS                      |

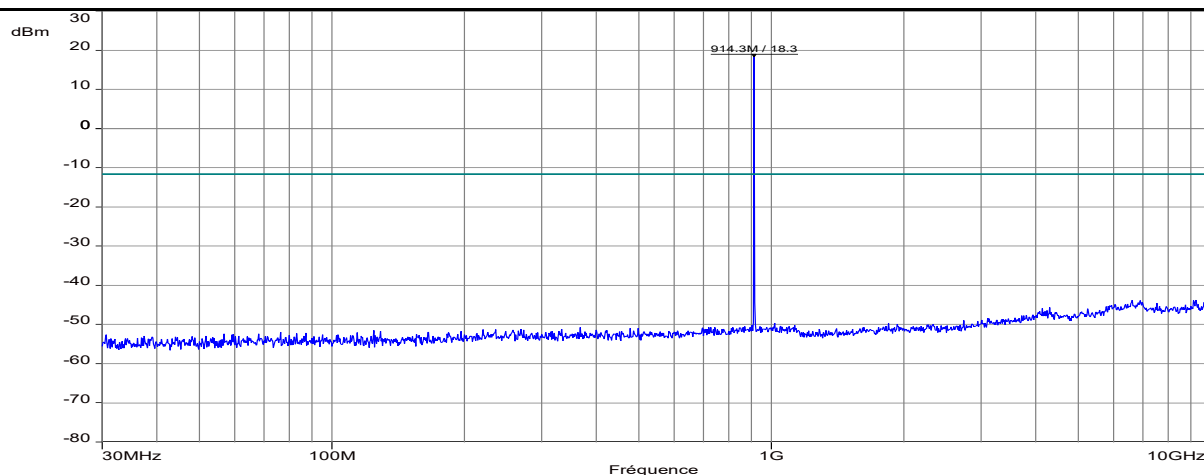
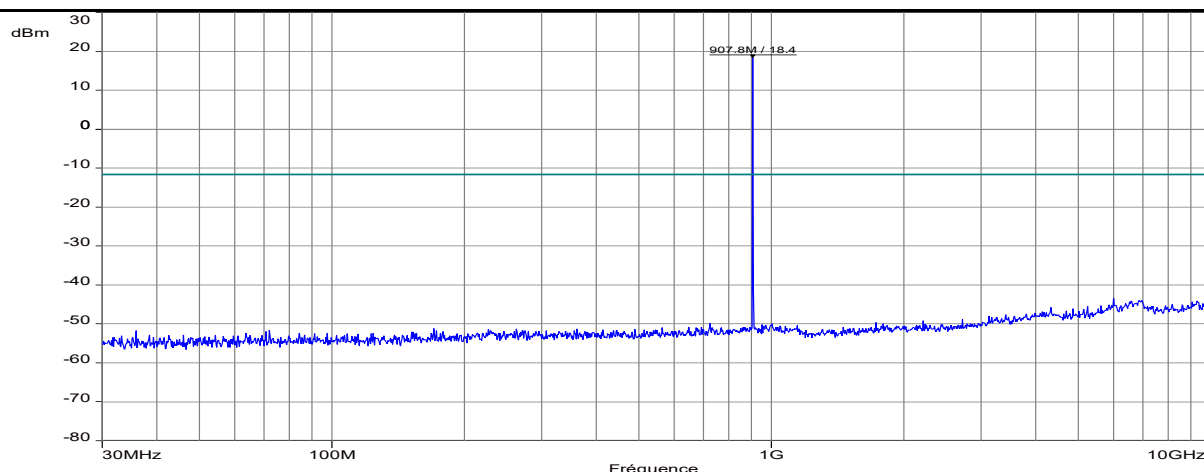
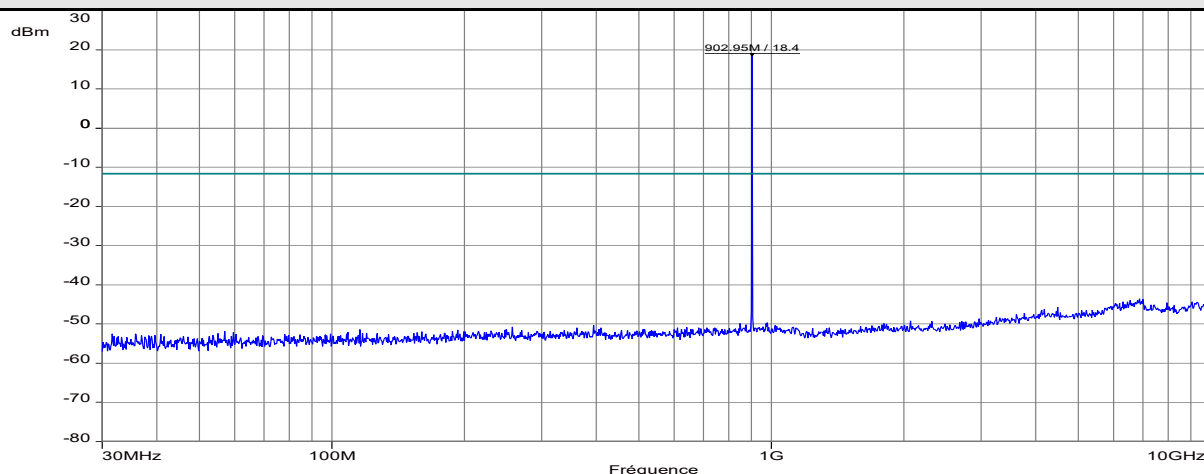
## 16. Unwanted Spurious Emissions (Conducted emissions)

| TEST: Conducted Spurious emissions                                                                                                                                                                                                                                             |                                      |                                   | Verdict           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------|-------------------|
| <u>Method:</u> The setup is in an anechoic chamber. The spectrum analyzer is connected to the antenna port of the device under test. A conducted measurement is performed.<br>The tested equipment is set to transmit operation with modulation on low, mid and high channels. |                                      |                                   | Pass              |
| Laboratory Parameters:                                                                                                                                                                                                                                                         | Required prior to the test           |                                   | During the test   |
| Ambient Temperature                                                                                                                                                                                                                                                            | 20 to 30 °C                          |                                   | 22°C ± 2          |
| Relative Humidity                                                                                                                                                                                                                                                              | 25 to 70 %                           |                                   | 40% ± 5           |
| Fully configured sample scanned over the following frequency range                                                                                                                                                                                                             | Frequency range on each side of line |                                   | Measurement Point |
|                                                                                                                                                                                                                                                                                | 30MHz – 10GHz                        |                                   | Antenna port      |
| Limits – FCC Part 15.247 (d) / RSS-247 § 5.5                                                                                                                                                                                                                                   |                                      |                                   |                   |
| Frequency (MHz)                                                                                                                                                                                                                                                                | Limits (dBµV/m)                      |                                   |                   |
|                                                                                                                                                                                                                                                                                | Detector / Analyser RBW              | Limit                             | Results           |
| 30 to 10000                                                                                                                                                                                                                                                                    | Pk / 100kHz                          | 30dB below the maximum Peak level | Pass              |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                         |                                      |                                   |                   |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |

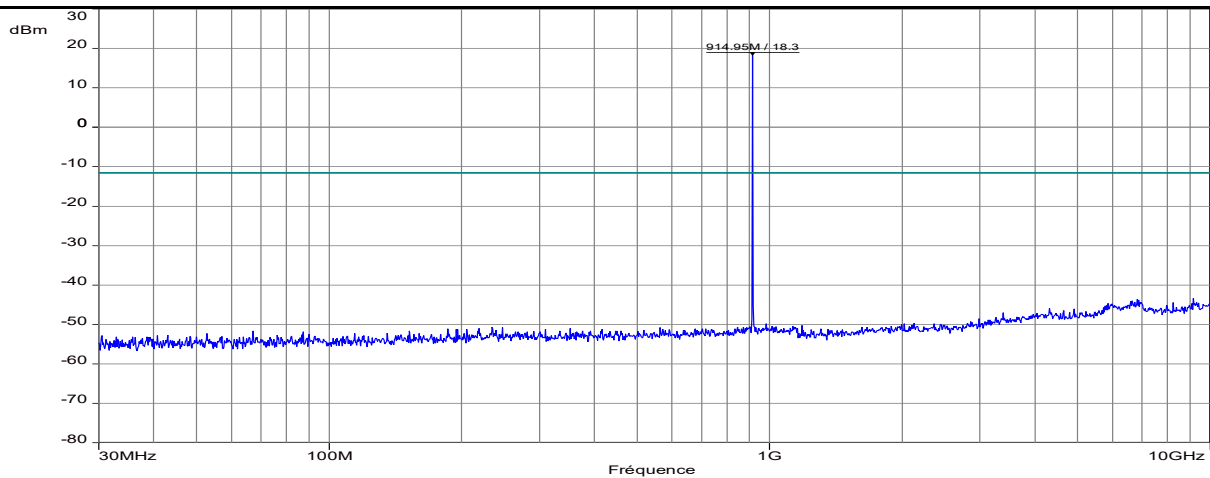
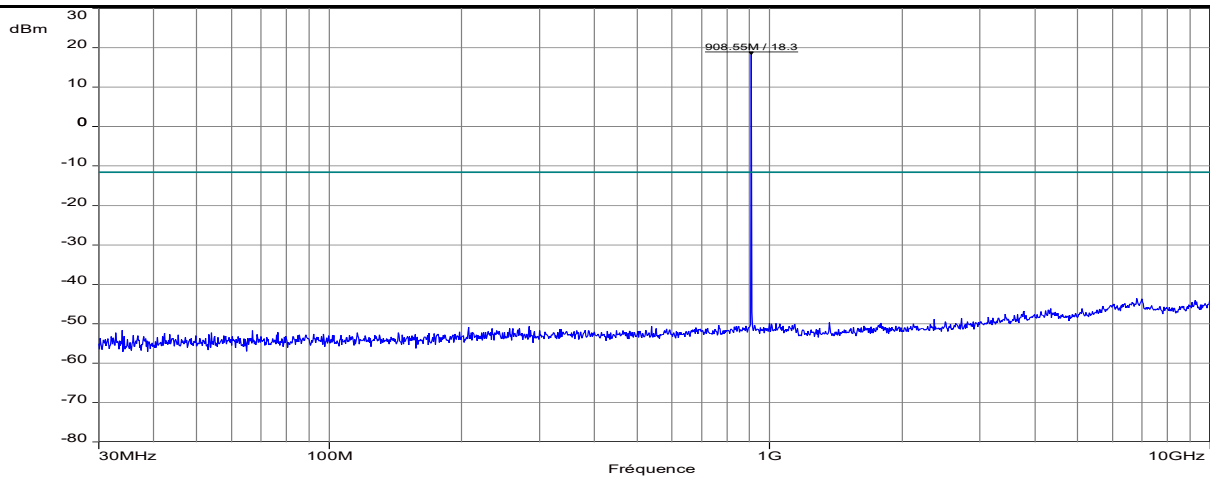
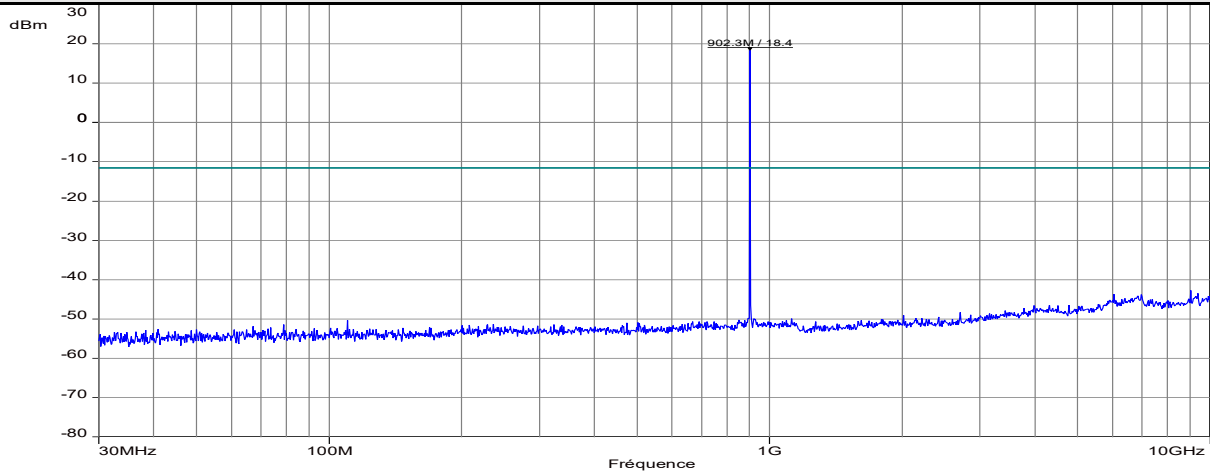


## Graphical representation of Conducted Spurious emissions (DTS / 500kHz mode / Low, Mid, High channels)



|                              |                               |
|------------------------------|-------------------------------|
| Frequency band investigated: | 30MHz-10GHz                   |
| Unit :                       | dBm                           |
| RBW :                        | 100kHz (Frequency step 50kHz) |
| Measurement detector:        | Peak                          |
| Limit:                       | -11.6dBm                      |

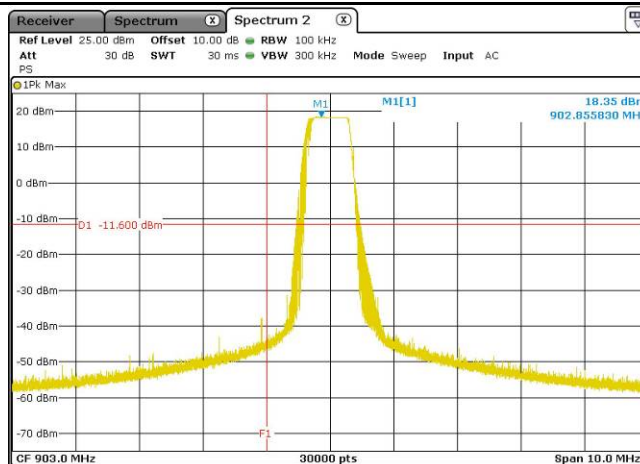
## Graphical representation of Conducted Spurious emissions (Hybrid / 125kHz mode / Low, Mid, High channels)



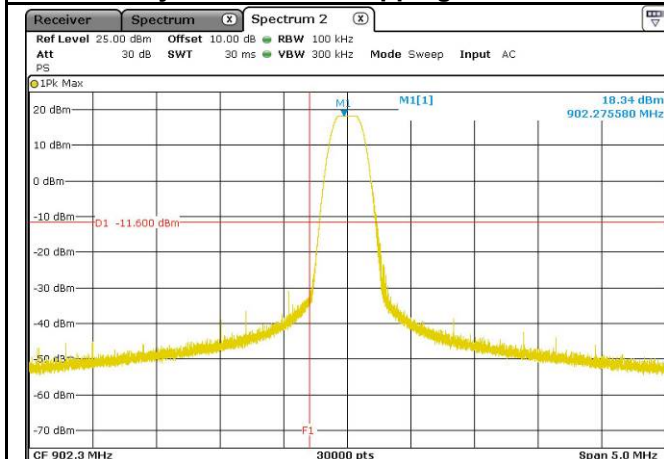
|                              |                               |
|------------------------------|-------------------------------|
| Frequency band investigated: | 30MHz-10GHz                   |
| Unit :                       | dBm                           |
| RBW :                        | 100kHz (Frequency step 50kHz) |
| Measurement detector:        | Peak                          |
| Limit:                       | -11.6dBm                      |

## Graphical representation of Band-edge compliance (LOW)

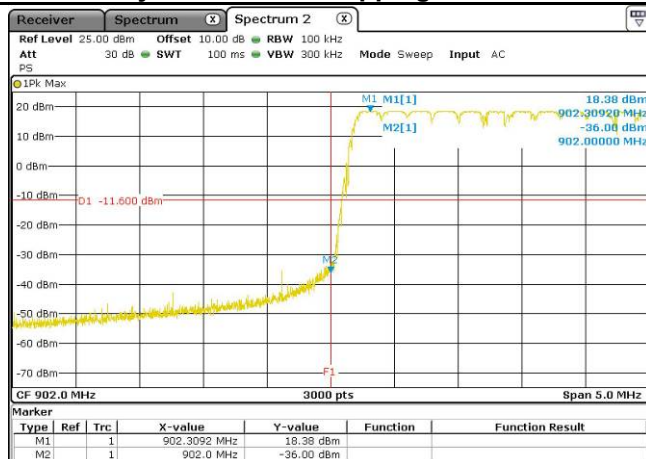
### DTS / 500kHz mode



### Hybrid 125kHz / Hopping Disable



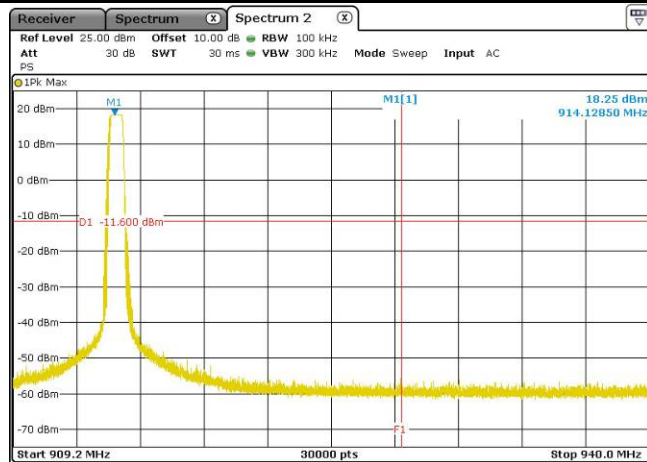
### Hybrid 125kHz / Hopping Enabled



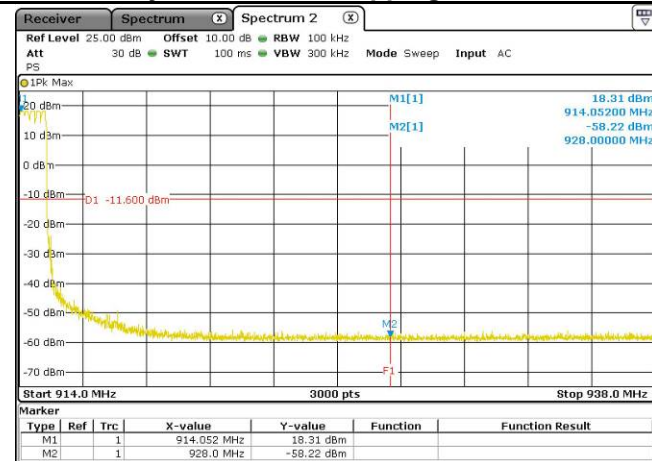
|                       |              |
|-----------------------|--------------|
| Unit :                | dBm          |
| RBW :                 | 100kHz       |
| Measurement detector: | Peak         |
| Limit:                | -11.6dBm     |
| Note:                 | F1 is 902MHz |

## Graphical representation of Band-edge compliance (HIGH)

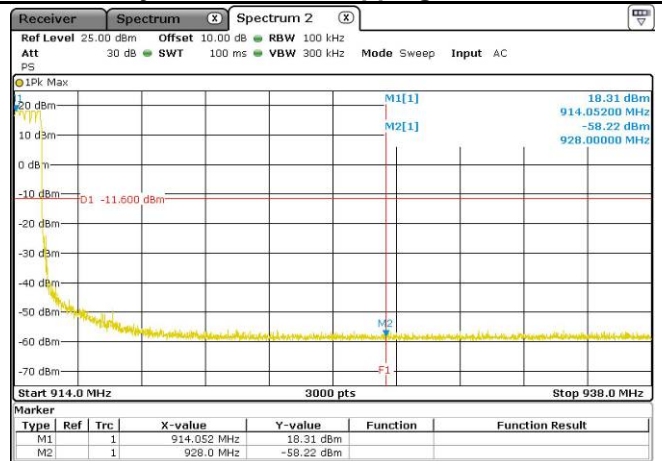
### DTS / 500kHz mode



### Hybrid 125kHz / Hopping Disable



### Hybrid 125kHz / Hopping Enabled



|                       |              |
|-----------------------|--------------|
| Unit :                | dBm          |
| RBW :                 | 100kHz       |
| Measurement detector: | Peak         |
| Limit:                | -11.6dBm     |
| Note:                 | F1 is 928MHz |

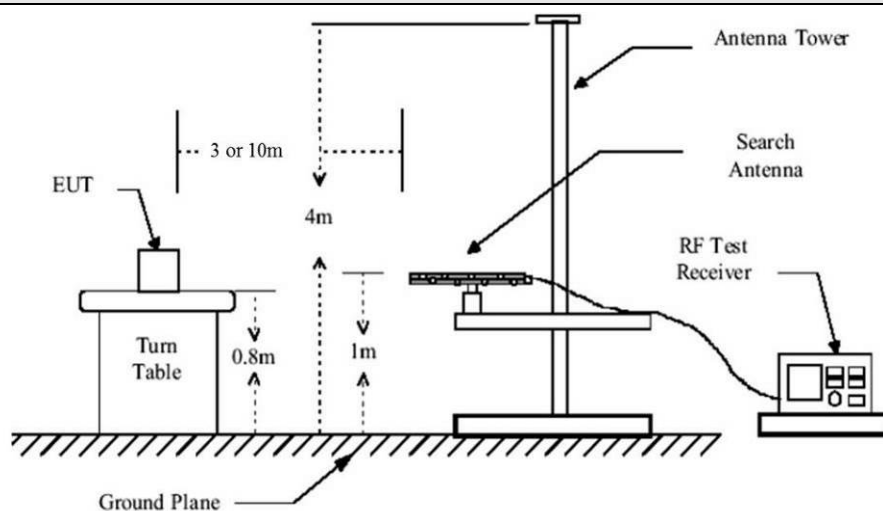
## 17. Unwanted emissions in Non-Restricted Frequency bands (Radiated emissions)

| TEST: Unwanted emissions in Non-Restricted Frequency Bands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |                                   | Verdict |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------|---------|
| <p><u>Method:</u> Measurements were performed on a 3-meter Open Area Test Site (OATS) for frequency below 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak) were then performed by rotating the EUT on 360° and adjusting the receive antenna height from 1 to 4 m</p> <p>For frequency above 1GHz, final measurements were made at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. Measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna in horizontal and vertical polarities.</p> <p>Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with 60° rotation on each axis. (Clause 6.6.5 of ANSI C63.10).</p> <p>A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed (or corrected) at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection with 360° continuous rotation of the device under test.</p> |                                      |                                   | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Required prior to the test           | During the test                   |         |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20 to 30 °C                          | 22°C ± 2                          |         |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 25 to 70 %                           | 40% ± 5                           |         |
| Fully configured sample scanned over the following frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range on each side of line | Measurement Point                 |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30MHz – 10GHz                        | 3 m measurement distance          |         |
| Limits – FCC Part 15.247 (d) / RSS-247 § 5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |                                   |         |
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Limits (dBµV/m)                      |                                   | Results |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Detector / Analyser RBW              | Limit                             |         |
| 30 to 10000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Pk / 100kHz                          | 30dB below the maximum Peak level | Pass    |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 11 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                      |                                   |         |

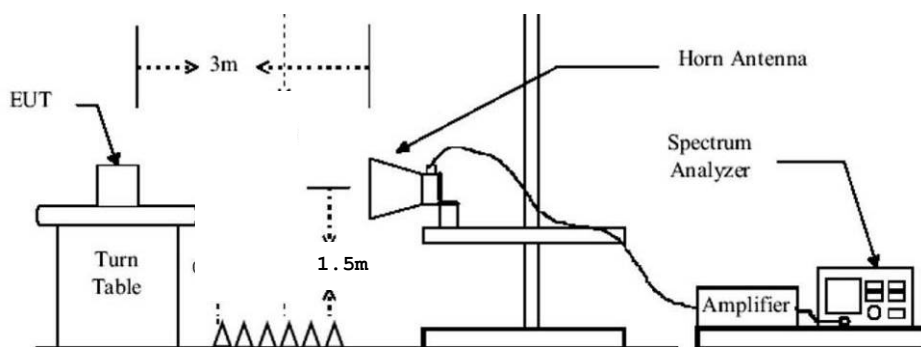
| Test Equipment Used  |               |           |             |           |          |
|----------------------|---------------|-----------|-------------|-----------|----------|
| Description          | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Log-periodic antenna | TDK           | PLP3003   | ANT-101-001 | 2017/5    | 2019/5   |
| Biconnic antenna     | COM-POWER     | AB- 900   | ANT-101-003 | 2017/5    | 2019/5   |
| BiConiLog antenna    | EMCO          | 3142B     | ANT-101-010 | 2017/7    | 2019/7   |
| Horn antenna         | ETS-LINDGREN  | 3115      | ANT-141-013 | 2018/10   | 2021/10  |
| Spectrum analyzer    | Rohde&Schwarz | FSV40     | ASP-171-004 | 2017/5    | 2019/5   |
| RF cable             | Div           | OATS/25m  | CAB-101-017 | 2018/4    | 2019/4   |
| RF cable             | Pasternack RF | PE302-120 | CAB-131-024 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER  | RG214U    | CAB-141-026 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER  | RG214U    | CAB-141-029 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER  | SF104     | CAB-141-030 | 2018/4    | 2019/4   |
| Anechoic chamber     | COMTEST       | 214263    | CAG-141-001 | 2017/6    | 2020/6   |

| Test Equipment Used |                |              |             |           |          |
|---------------------|----------------|--------------|-------------|-----------|----------|
| Description         | Manufacturer   | Model        | Identifier  | Cal. Date | Cal. Due |
| Antenna mast        | Innco- Systems | MA4000EP     | MAT-101-001 | -         | -        |
| Turntable           | Innco- Systems | DS1200S      | PLA-101-001 | -         | -        |
| Turntable           | Innco- Systems | CT0800       | PLA-141-001 |           |          |
| Pre-amplifier       | Pasternack RF  | 1524         | PRE-101-002 | 2018/4    | 2019/4   |
| Measuring receiver  | Rohde&Schwarz  | ESRP         | REC-151-003 | 2017/5    | 2019/5   |
| OATS                | Div            | 10m          | SIT-101-001 | 2017/7    | 2020/7   |
| EMC Software        | NEXIO          | BAT EMC V3.8 | SOF-101-001 | -         | -        |

## Test Setup for radiated emission



Test setup for 30-1000MHz



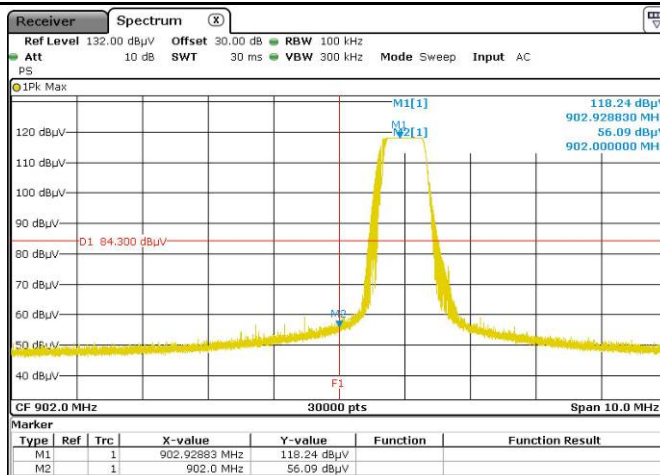
Test setup for 1-25GHz

| Tabulated Results for Peak Output Radiated level |                                                                                                                                                                                                   |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FREQ<br>(MHz)                                    | Field Strength 3m<br>(dBμV/m)                                                                                                                                                                     |
| 903.0 / DTS                                      | 118.2                                                                                                                                                                                             |
| 907.8 / DTS                                      | 118.2                                                                                                                                                                                             |
| 914.2 / DTS                                      | 117.8                                                                                                                                                                                             |
| 902.3 / Hybrid                                   | 118.2                                                                                                                                                                                             |
| 908.5 / Hybrid                                   | 118.2                                                                                                                                                                                             |
| 914.9 / Hybrid                                   | 117.8                                                                                                                                                                                             |
| <b>RBW:</b>                                      | 100kHz                                                                                                                                                                                            |
| <b>Measurement distance:</b>                     | 3m                                                                                                                                                                                                |
| <b>Limit:</b>                                    | Ref. level only – For 15.247 (d) / RSS-247 § 5.5                                                                                                                                                  |
| <b>Final measurement detector:</b>               | Peak                                                                                                                                                                                              |
| <b>Note:</b>                                     | (1): Only for identification of limit in non-restricted band<br>Limit is <b>87.8 dBμV/m</b> Peak for out-of-band frequencies in Non-Restricted bands (with a 100kHz RBW on the spectrum analyser) |

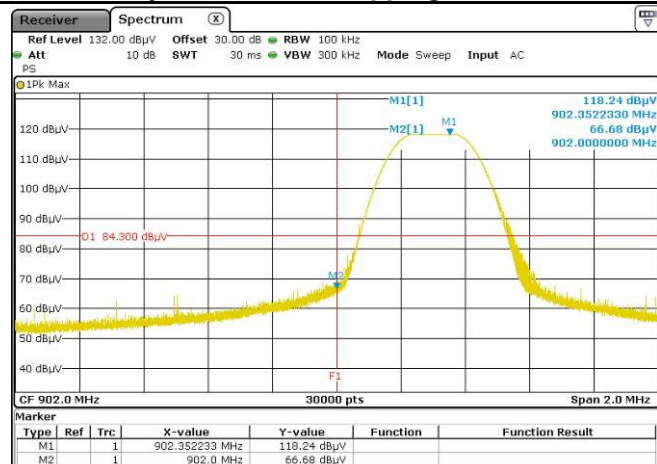
| Tabulated Results for Unwanted emissions in Non-Restricted bands |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |                    |                    |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|--------------------|
| FREQ<br>(MHz)                                                    | Field Strength 3m<br>(dBμV/m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Limit<br>(dBμV/m) | Margin<br>(dBμV/m) | Result<br>(dBμV/m) |
| Levels are at least 10dB below the 87.8dBμV/m limit              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |                    |                    |
| <b>RBW:</b>                                                      | 100kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                    |                    |
| <b>Measurement distance:</b>                                     | 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                    |                    |
| <b>Limit:</b>                                                    | 15.247 / RSS-247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |                    |                    |
| <b>Final measurement detector:</b>                               | Peak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                    |                    |
| <b>RESULT:</b>                                                   | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                    |                    |
| <b>Note:</b>                                                     | <p>(1): The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow:<br/> <math>FS = RA + AF + CF - AG</math><br/>           Where FS = Field Strength<br/>           RA = Receiver Amplitude<br/>           AF = Antenna Factor<br/>           CF = Cable Factor<br/>           AG = Amplifier Gain<br/>           Total factor (dB) is <math>AF + CF - AG</math><br/>           Margin value = Emission level – Limit value<br/>           (2): Peak pre-scans not performed at 3-meters distance are corrected as follow:<br/> <math>M@3m = M@D_m + 20 \times \log(D_m / 3m)</math><br/>           Where D is the measurement distance in meter<br/>           (3): All frequencies not specified have margin &lt; -10dB<br/>           (4): Worst case between charge mode and normal used mode<br/>           (5): 3-axis measurement performed for device under test.</p> |                   |                    |                    |

## Graphical representation of Band-edge compliance (LOW)

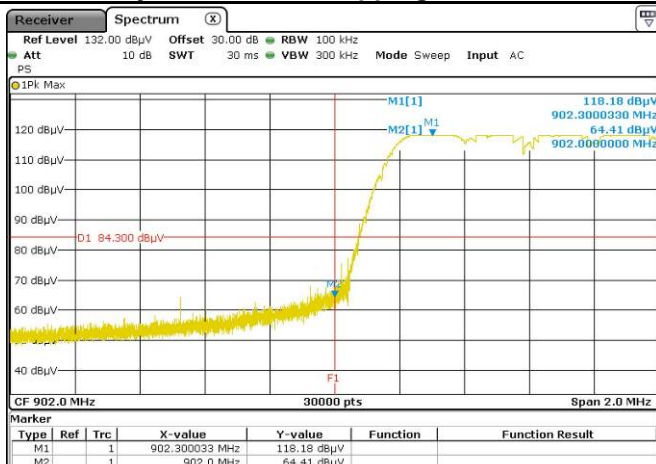
### DTS / 500kHz mode



### Hybrid 125kHz / Hopping Disable



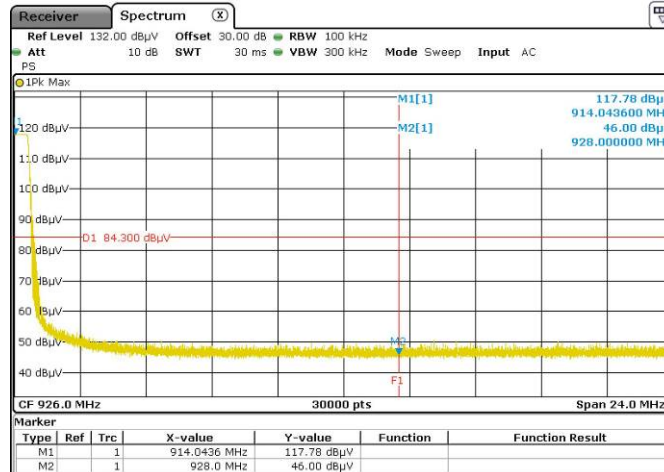
### Hybrid 125kHz / Hopping Enabled



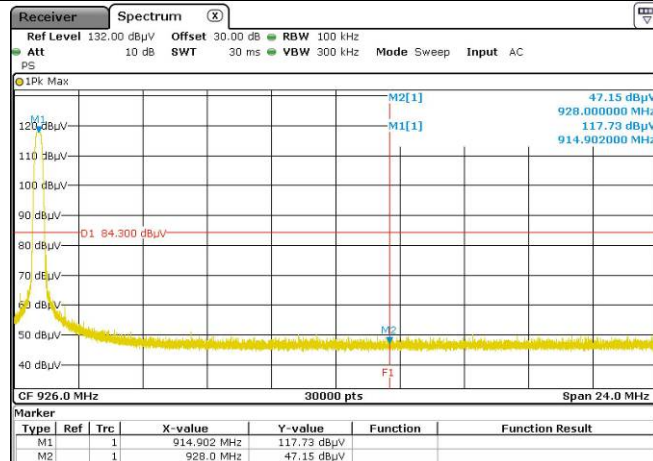
|                       |              |
|-----------------------|--------------|
| Unit :                | dBμV/m       |
| RBW :                 | 100kHz       |
| Measurement detector: | Peak         |
| Limit:                | 87.8 dBμV/m  |
| Note:                 | F1 is 902MHz |

## Graphical representation of Band-edge compliance (HIGH)

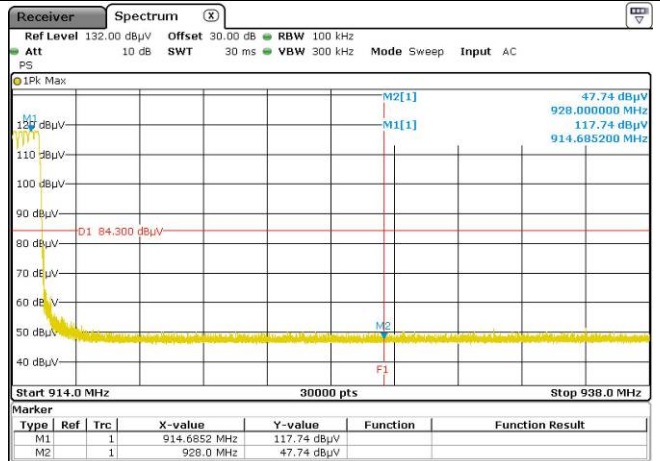
### DTS / 500kHz mode



### Hybrid 125kHz / Hopping Disable



### Hybrid 125kHz / Hopping Enabled



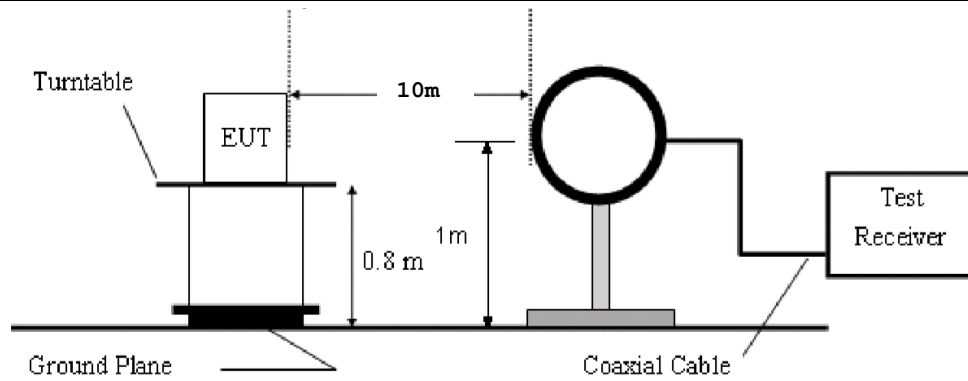
|                       |              |
|-----------------------|--------------|
| Unit :                | dBm          |
| RBW :                 | 100kHz       |
| Measurement detector: | Peak         |
| Limit:                | 87.8 dBμV/m  |
| Note:                 | F1 is 928MHz |

## 18. Unwanted emissions in Restricted Frequency bands

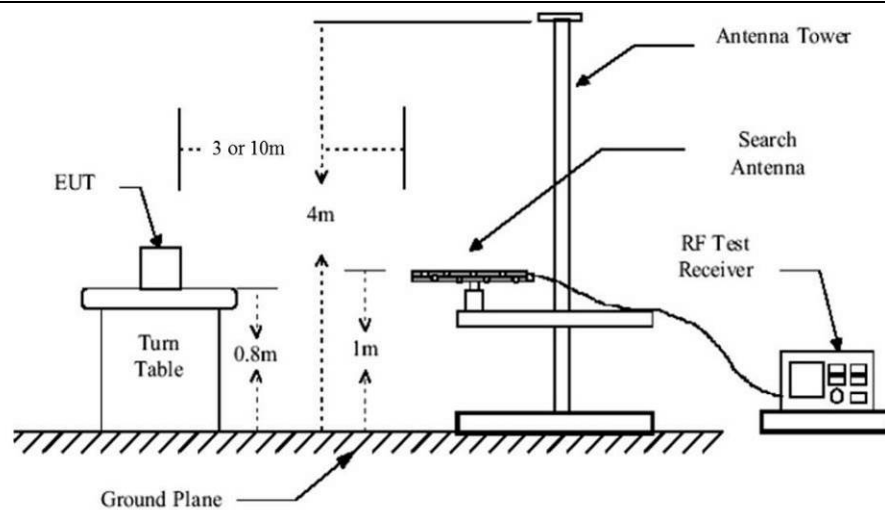
| TEST: Unwanted emissions into Restricted Frequency Bands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     |                           | Verdict |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------|---------|
| <p><u>Method:</u> Measurements were performed on a 10 or 3-meter Open Area Test Site (OATS) for frequency below 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak) were then performed by rotating the EUT on 360° and adjusting the receive antenna height from 1 to 4 m for frequency between 30MHz to 1GHz. For frequency above 1GHz, final measurements were made at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. Measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna in horizontal and vertical polarities.</p> <p>Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with 60° rotation on each axis.(Clause 6.6.5 of ANSI C63.10).</p> <p>A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed (or corrected) at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection with 360° continuous rotation of the device under test.</p> |                                                     |                           | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Required prior to the test                          | During the test           |         |
| Ambient Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20 to 30 °C                                         | 22°C ± 2                  |         |
| Relative Humidity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 25 to 70 %                                          | 40% ± 5                   |         |
| Fully configured sample scanned over the following frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Frequency range on each side of line                | Measurement Point         |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 9kHz – 30MHz                                        | 10 m measurement distance |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 30MHz – 10GHz                                       | 3 m measurement distance  |         |
| Limits – FCC Part 15.205, 15.209 (a), 15.247 (d) / RSS-GEN §8.9, §8.10, RSS-247 §5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                     |                           |         |
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Limits (dBµV/m)                                     |                           |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Level / Detector / Distance                         | Results                   |         |
| 0.009 to 0.090                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 107.6 – 87.6 / AV / 10m<br>127.6 – 107.6 / PK / 10m | Pass                      |         |
| 0.090 to 0.110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 87.6 – 85.9 / QP / 10m                              | Pass                      |         |
| 0.110 to 0.490                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 85.7 – 72.9 / AV / 10m<br>105.7 – 92.9 / PK / 10m   | Pass                      |         |
| 0.490 to 1.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 52.9 – 42.1 / QP / 10m                              | Pass                      |         |
| 1.705 to 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 48.6 / QP / 10m                                     | Pass                      |         |
| 30 to 88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 40.0 / QP / 3m                                      | Pass                      |         |
| 88 to 216                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 43.5 / QP / 3m                                      | Pass                      |         |
| 216 to 960                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 46.0 / QP / 3m                                      | Pass                      |         |
| 960-1000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 54.0 / QP / 3m                                      | Pass                      |         |
| Above 1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 54.0 / AV / 3m<br>74.0 / PK / 3m                    | Pass                      |         |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 11 <sup>th</sup> , 2018. Tested by L. CHAPUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                     |                           |         |

| Test Equipment Used  |                |              |             |           |          |
|----------------------|----------------|--------------|-------------|-----------|----------|
| Description          | Manufacturer   | Model        | Identifier  | Cal. Date | Cal. Due |
| Log-periodic antenna | TDK            | PLP3003      | ANT-101-001 | 2017/5    | 2019/5   |
| Biconnic antenna     | COM-POWER      | AB- 900      | ANT-101-003 | 2017/5    | 2019/5   |
| Loop antenna         | EMCO           | 6502         | ANT-101-009 | 2017/8    | 2019/8   |
| BiConiLog antenna    | EMCO           | 3142B        | ANT-101-010 | 2017/7    | 2019/7   |
| Horn antenna         | ETS-LINDGREN   | 3115         | ANT-141-013 | 2018/10   | 2021/10  |
| Horn antenna         | ETS-LINDGREN   | 3116         | ANT-161-014 | 2017/12   | 2022/12  |
| Spectrum analyzer    | Rohde&Schwarz  | FSV40        | ASP-171-004 | 2017/5    | 2019/5   |
| RF cable             | Div            | OATS/25m     | CAB-101-017 | 2018/4    | 2019/4   |
| RF cable             | Pasternack RF  | PE302-120    | CAB-131-024 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER   | RG214U       | CAB-141-026 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER   | RG214U       | CAB-141-029 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER   | SF104        | CAB-141-030 | 2018/4    | 2019/4   |
| RF cable             | HUBER+SUHNER   | SF102 (K/2m) | CAB-171-034 | 2017/5    | 2019/5   |
| RF cable             | HUBER+SUHNER   | SF102 (K/3m) | CAB-171-034 | 2017/5    | 2019/5   |
| Anechoic chamber     | COMTEST        | 214263       | CAG-141-001 | 2017/6    | 2020/6   |
| Antenna mast         | Innco- Systems | MA4000EP     | MAT-101-001 | -         | -        |
| Turntable            | Innco- Systems | DS1200S      | PLA-101-001 | -         | -        |
| Turntable            | Innco- Systems | CT0800       | PLA-141-001 |           |          |
| Pre-amplifier        | Pasternack RF  | 1524         | PRE-101-002 | 2018/4    | 2019/4   |
| Pre-amplifier        | SMEE           | 18-40GHz     | PRE-171-004 | 2017/12   | 2018/12  |
| Measuring receiver   | Rohde&Schwarz  | ESRP         | REC-151-003 | 2017/5    | 2019/5   |
| OATS                 | Div            | 10m          | SIT-101-001 | 2017/7    | 2020/7   |
| EMC Software         | NEXIO          | BAT EMC V3.8 | SOF-101-001 | -         | -        |

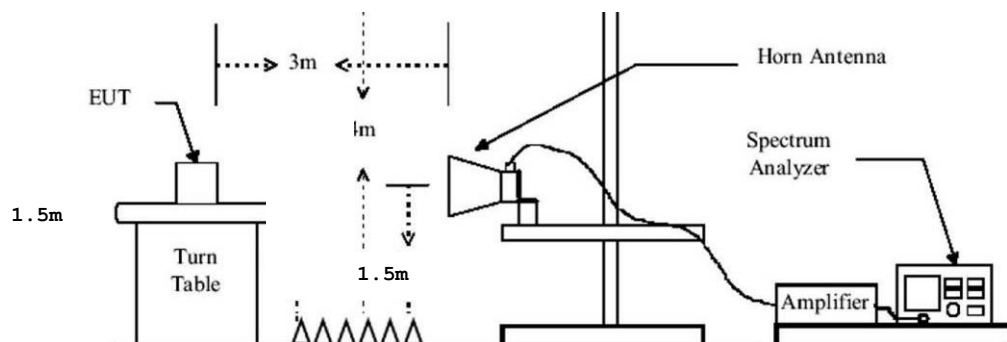
## Test Setup for radiated emission



Test setup for 9k-30MHz



Test setup for 30-1000MHz



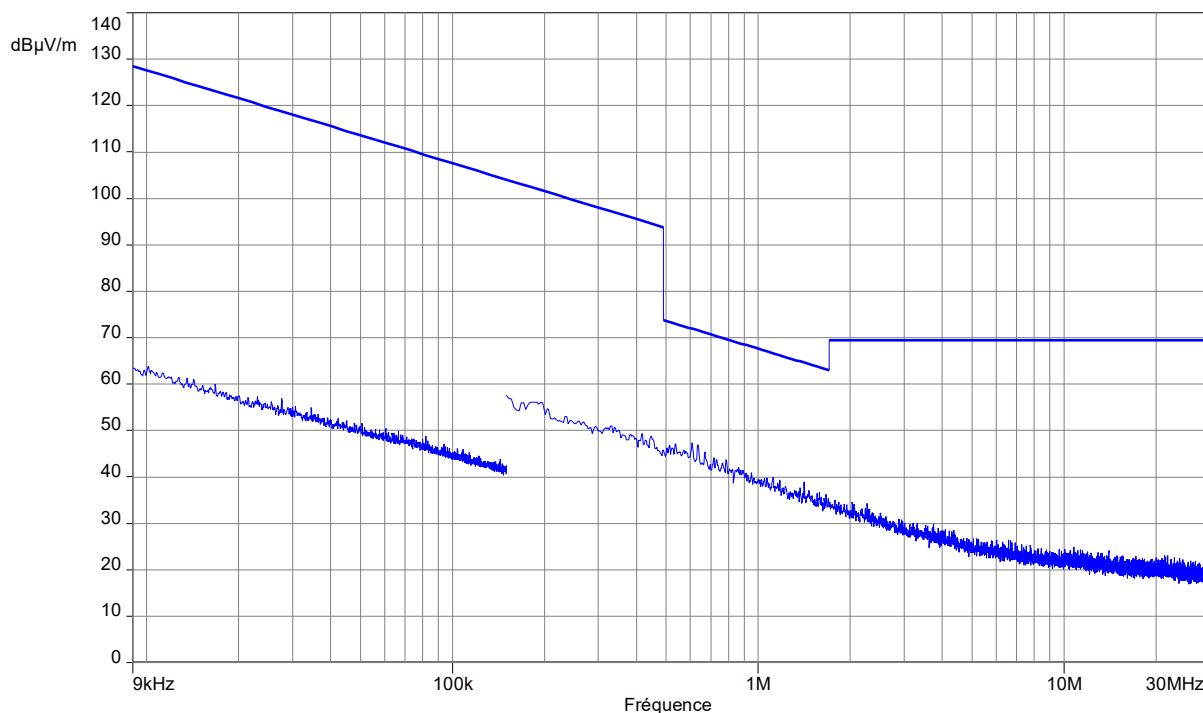
Test setup for 1-10GHz

| Tabulated Results for Unwanted emissions (9kHz-30MHz)                                                                    |                |                                                                                                                                                                                  |        |               |             |                    |
|--------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|-------------|--------------------|
| FREQ                                                                                                                     | RF field @ 30m | Limit @ 30m                                                                                                                                                                      | Margin | Antenna angle | Table angle | Correc. Fact. (CF) |
| MHz                                                                                                                      | (QP) dBμV/m    | (QP) dBμV/m                                                                                                                                                                      | dB     | Degree        | Degree      | dB                 |
| Margin < -10dB                                                                                                           |                |                                                                                                                                                                                  |        |               |             |                    |
| Supplementary information:<br>Frequency list measured on the Open Area Test Site has been created with pre-scan results. |                |                                                                                                                                                                                  |        |               |             |                    |
| <b>Frequency band investigated:</b>                                                                                      |                | 9kHz-30MHz                                                                                                                                                                       |        |               |             |                    |
| <b>RBW:</b>                                                                                                              |                | 200Hz (9kHz-150kHz)                                                                                                                                                              |        |               |             |                    |
|                                                                                                                          |                | 9kHz (150kHz-30MHz)                                                                                                                                                              |        |               |             |                    |
| <b>Measurement distance:</b>                                                                                             |                | 10m                                                                                                                                                                              |        |               |             |                    |
| <b>Limit:</b>                                                                                                            |                | FCC Part 15.205 - 15.209 / RSS-GEN                                                                                                                                               |        |               |             |                    |
| <b>Final measurement detector:</b>                                                                                       |                | Peak / Quasi-Peak / Average                                                                                                                                                      |        |               |             |                    |
| <b>Note:</b>                                                                                                             |                | CF: Correction factor = Antenna factor + Cable loss<br>*1: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)<br>(M@30m = M@10m-19.1dB) |        |               |             |                    |

| Tabulated Results for Unwanted emissions (30MHz-1GHz)                                                                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |             |     |                |             |             |        |
|--------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|-------------|-----|----------------|-------------|-------------|--------|
| FREQ                                                                                                                     | Meter reading | Meter reading                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Total factor | Field level | Field level | Pol | Antenna height | Table angle | Limit       | Margin |
| MHz                                                                                                                      | (QP) dBμV     | (Pk) dBμV                                                                                                                                                                                                                                                                                                                                                                                                                                                        | dB           | (QP) dBμV/m | (Pk) dBμV/m |     | cm             | Degré       | (QP) dBμV/m | dB     |
| Margin < -10dB                                                                                                           |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |             |     |                |             |             |        |
| Supplementary information:<br>Frequency list measured on the Open Area Test Site has been created with pre-scan results. |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |             |     |                |             |             |        |
| <b>Frequency band investigated:</b>                                                                                      |               | 30MHz-1GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |             |             |     |                |             |             |        |
| <b>RBW:</b>                                                                                                              |               | 120kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |             |             |     |                |             |             |        |
| <b>Measurement distance:</b>                                                                                             |               | 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |             |             |     |                |             |             |        |
| <b>Limit:</b>                                                                                                            |               | FCC Part 15.205 - 15.209 / RSS-GEN                                                                                                                                                                                                                                                                                                                                                                                                                               |              |             |             |     |                |             |             |        |
| <b>Final measurement detector:</b>                                                                                       |               | Quasi-Peak                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |             |             |     |                |             |             |        |
| <b>RESULT:</b>                                                                                                           |               | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |             |             |     |                |             |             |        |
| <b>Field Strength Calculation:</b>                                                                                       |               | <p>The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow:</p> $FS = RA + AF + CF - AG$ <p>Where FS = Field Strength<br/> RA = Receiver Amplitude<br/> AF = Antenna Factor<br/> CF = Cable Factor<br/> AG = Amplifier Gain</p> <p>Total factor (dB) is AF + CF – AG<br/> Margin value = Emission level – Limit value</p> |              |             |             |     |                |             |             |        |

| Tabulated Results for Unwanted emissions<br>(1GHz-10GHz) |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                    |        |
|----------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|--------|
| FREQ<br>(MHz)                                            | Field Strength 3m<br>(dBμV/m) | Detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Limit<br>(dBμV/m) | Margin<br>(dBμV/m) | Result |
| <b>DTS TEST MODE (500kHz)</b>                            |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                    |        |
| 9030.0                                                   | 59.7                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -14.3              | Pass   |
| 9030.0                                                   | 46.0                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -8.0               | Pass   |
| 9078.0                                                   | 59.7                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -14.3              | Pass   |
| 9078.0                                                   | 46.0                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -8.0               | Pass   |
| 9142.0                                                   | 59.6                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -14.4              | Pass   |
| 9142.0                                                   | 46.0                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -8.0               | Pass   |
| <b>HYBRID TEST MODE (125kHz)</b>                         |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |                    |        |
| 9023.0                                                   | 60.1                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -13.9              | Pass   |
| 9023.0                                                   | 51.2                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -2.8               | Pass   |
| 9085.0                                                   | 60.1                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -13.9              | Pass   |
| 9085.0                                                   | 51.2                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -2.8               | Pass   |
| 9149.0                                                   | 60.0                          | Pk                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 74                | -14.0              | Pass   |
| 9149.0                                                   | 50.8                          | Avg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 54                | -3.2               | Pass   |
| <b>RBW / VBW</b>                                         |                               | 1MHz / 3MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |                    |        |
| <b>Measurement distance:</b>                             |                               | 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                    |        |
| <b>Limit:</b>                                            |                               | FCC Part 15.205, 15.209, 15.247 / RSS-Gen, RSS-247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                    |        |
| <b>Final measurement detector:</b>                       |                               | Peak / CISPR Average                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                    |        |
| <b>RESULT:</b>                                           |                               | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                    |        |
| <b>Notes:</b>                                            |                               | <p>(1): The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow:<br/> <math>FS = RA + AF + CF - AG</math><br/>           Where FS = Field Strength<br/>           RA = Receiver Amplitude<br/>           AF = Antenna Factor<br/>           CF = Cable Factor<br/>           AG = Amplifier Gain<br/>           Total factor (dB) is <math>AF + CF - AG</math><br/>           Margin value = Emission level – Limit value<br/>           (2): All frequencies not specified have margin &lt; -10dB (for peak and average detector)</p> |                   |                    |        |

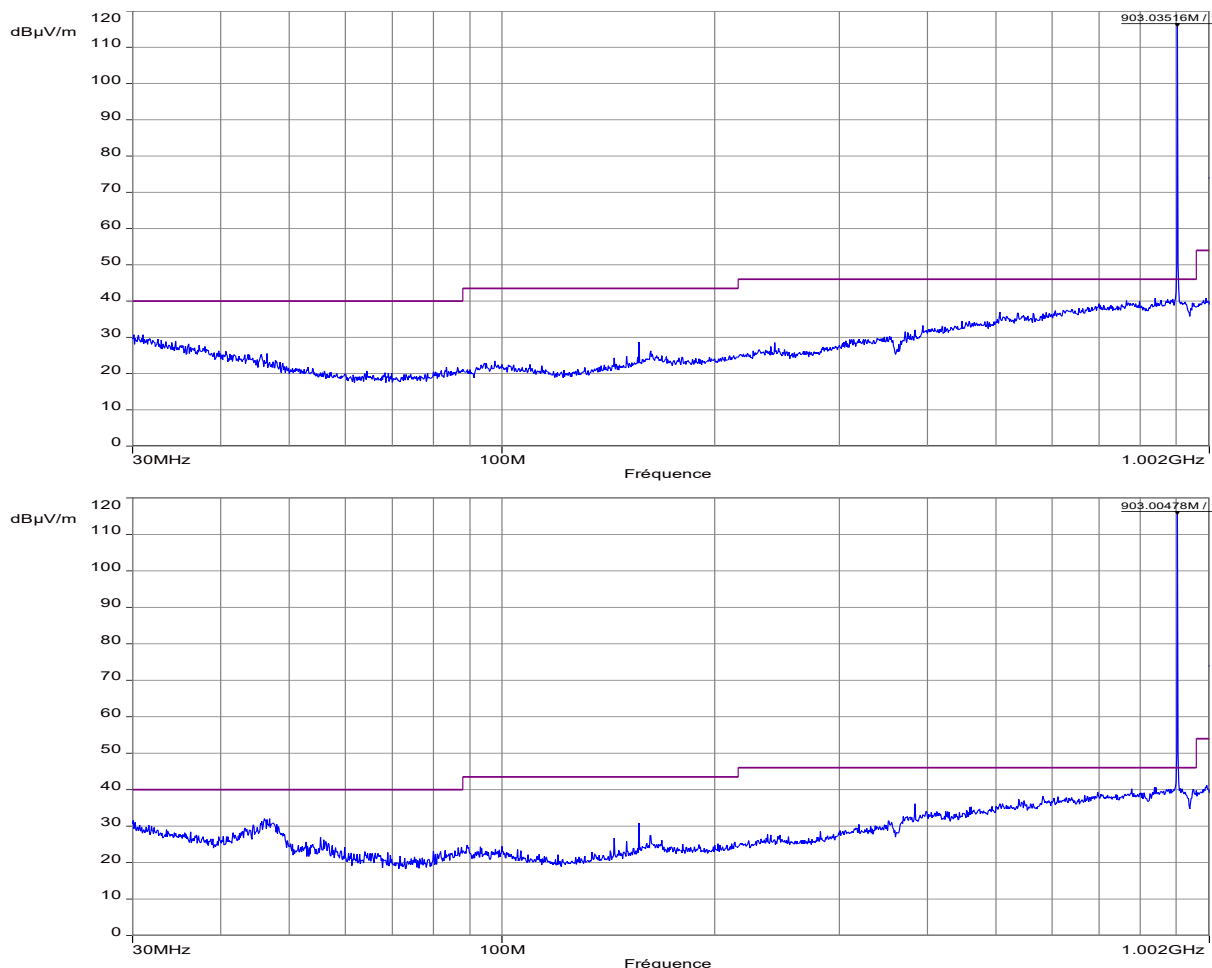
**Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 9kHz-30MHz / 3m / Parallel & Perpendicular antenna position / Transmit mode)**



Notes: Pre-scan graph only for identification purpose.  
Same result for transmit mode on all channels.

|                                     |                                              |
|-------------------------------------|----------------------------------------------|
| <b>Frequency band investigated:</b> | 9kHz-30MHz                                   |
| <b>Unit :</b>                       | dBμV/m                                       |
| <b>RBW :</b>                        | 200Hz (9kHz-150kHz)<br>9kHz (150kHz-30MHz)   |
| <b>Antenna polarization :</b>       | Parallel / Perpendicular to measurement axis |
| <b>Measurement detector:</b>        | Peak                                         |

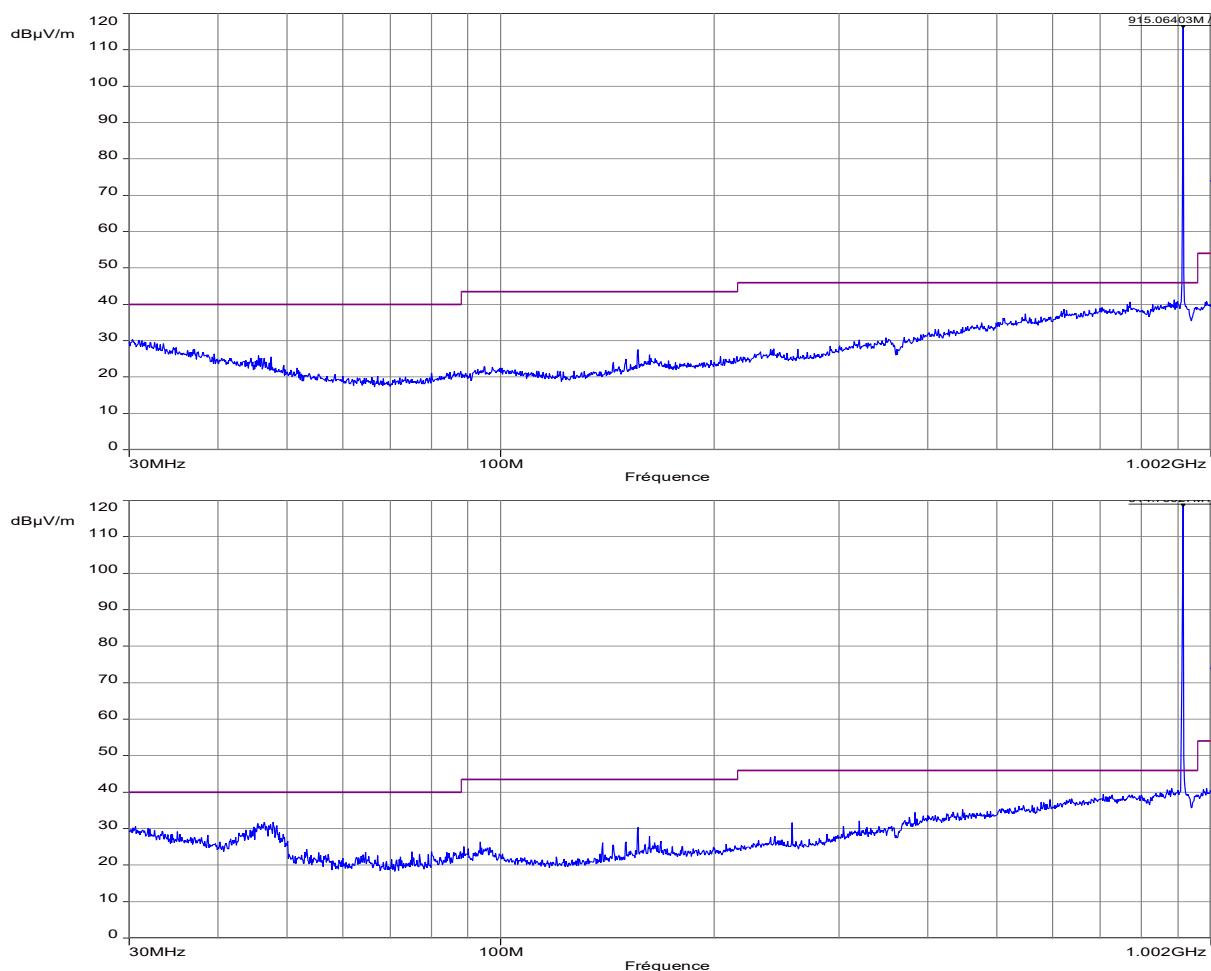
## Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal & Vertical / Low channel / DTS & Hybrid mode



Note: Pre-scan graph only for identification purpose.  
Same results for DTS or Hybrid modes

|                              |                     |                       |                |              |          |
|------------------------------|---------------------|-----------------------|----------------|--------------|----------|
| Frequency band investigated: |                     | 30MHz-1GHz            |                |              |          |
| Unit :                       |                     | dBµV/m                |                |              |          |
| RBW :                        |                     | 100kHz                |                |              |          |
| Antenna polarization :       |                     | Horizontal & Vertical |                |              |          |
| Limit:                       |                     | FCC 15.247 / RSS-247  |                |              |          |
| Measurement detector:        |                     | Peak                  |                |              |          |
| PEAK LIST FROM PRE-SCAN      |                     |                       |                |              |          |
| Frequency (MHz)              | Peak Level (dBµV/m) | Angle (°)             | Limit (dBµV/m) | Polarization | Comments |
|                              |                     |                       |                |              |          |

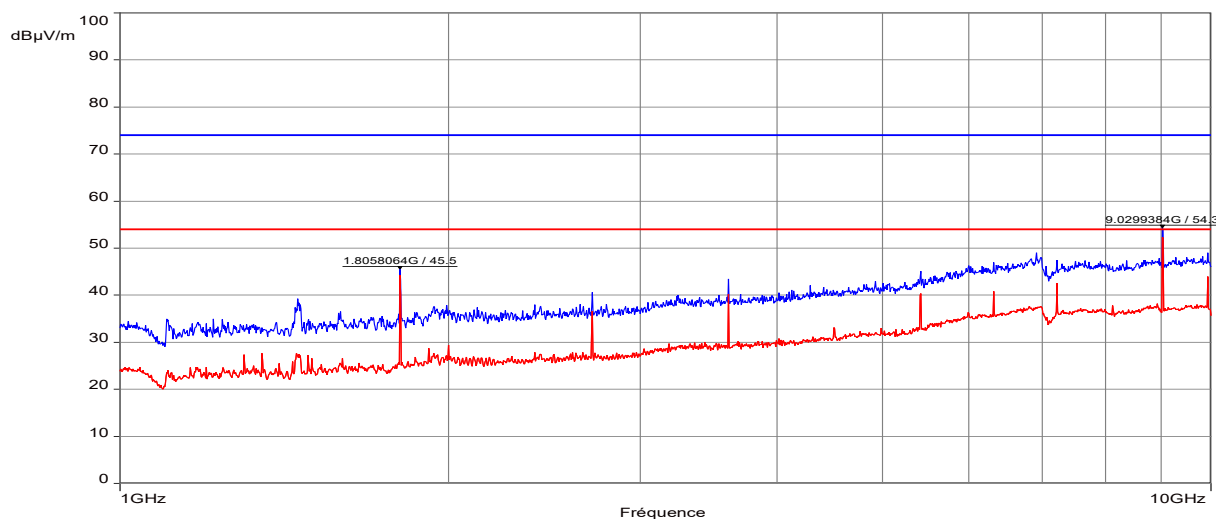
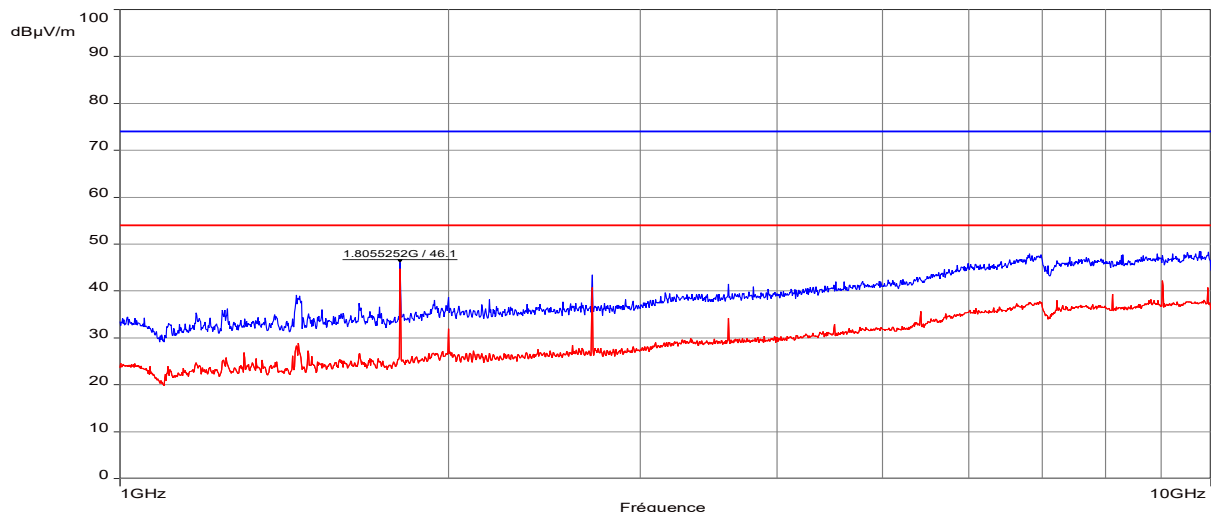
## Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal & Vertical / High channel / DTS & Hybrid mode



Note: Pre-scan graph only for identification purpose.  
Same results for DTS or Hybrid modes

|                              |                     |                       |                |              |          |
|------------------------------|---------------------|-----------------------|----------------|--------------|----------|
| Frequency band investigated: |                     | 30MHz-1GHz            |                |              |          |
| Unit :                       |                     | dBμV/m                |                |              |          |
| RBW :                        |                     | 100kHz                |                |              |          |
| Antenna polarization :       |                     | Horizontal & Vertical |                |              |          |
| Limit:                       |                     | FCC 15.247 / RSS-247  |                |              |          |
| Measurement detector:        |                     | Peak                  |                |              |          |
| PEAK LIST FROM PRE-SCAN      |                     |                       |                |              |          |
| Frequency (MHz)              | Peak Level (dBμV/m) | Angle (°)             | Limit (dBμV/m) | Polarization | Comments |
|                              |                     |                       |                |              |          |

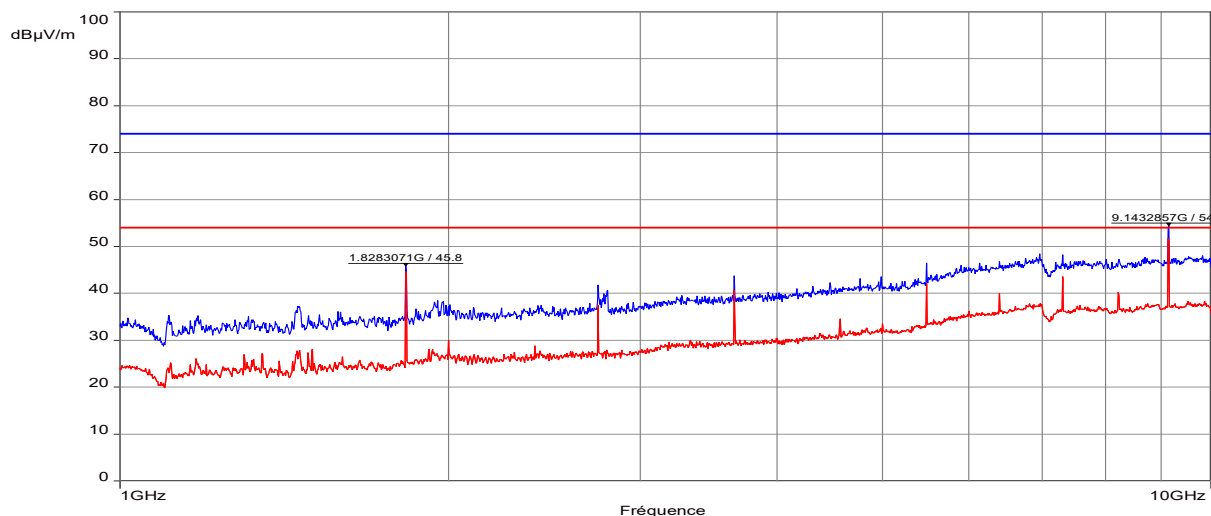
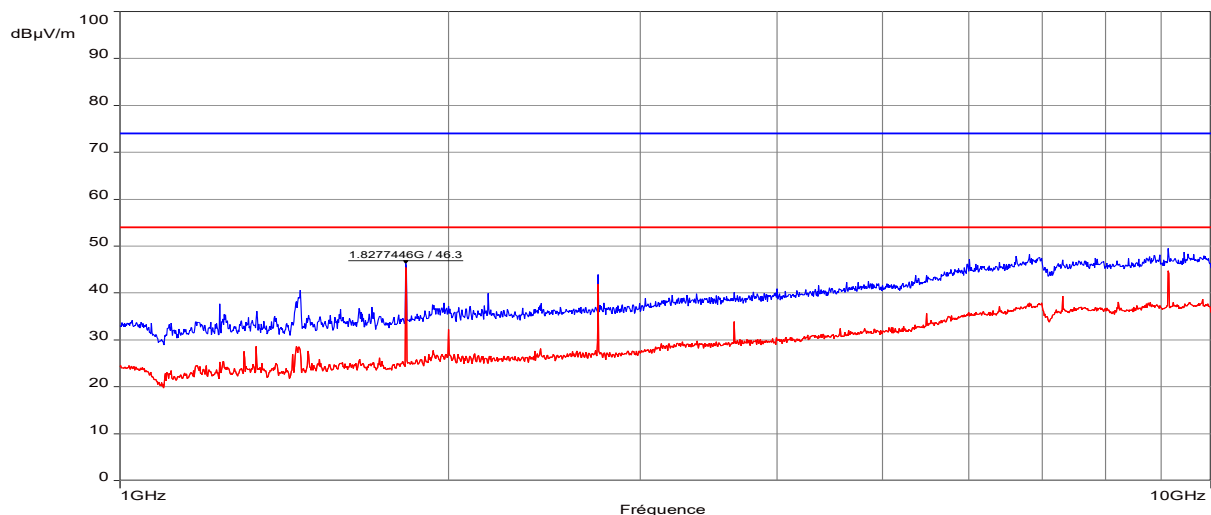
## Graphical representation of Radiated Disturbance Measurement (Anechoic chamber pre-scan, 1GHz-10GHz / 3m / Horizontal & Vertical) – Low channel / DTS 500kHz mode



Note: Pre-scan graph only for identification purpose.

|                              |                         |
|------------------------------|-------------------------|
| ----- : Peak measure         | ----- : Average measure |
| Frequency band investigated: | 1GHz-10GHz              |
| Unit :                       | dBμV/m                  |
| RBW :                        | 1MHz                    |
| Antenna polarization :       | Horizontal & Vertical   |
| Limit:                       | FCC 15.247 / RSS-247    |
| Measurement detector:        | Peak / Average          |

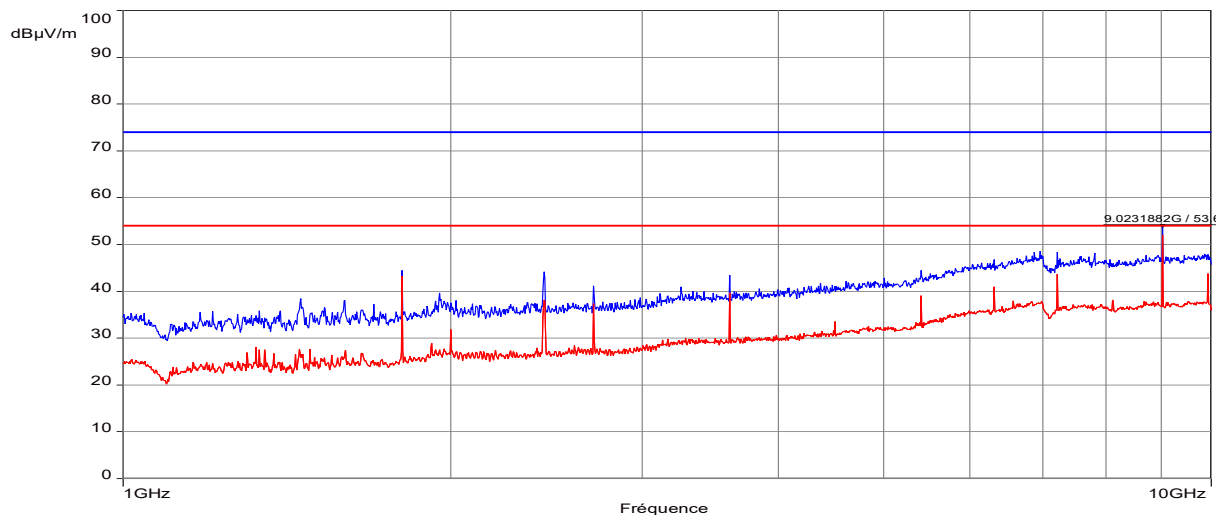
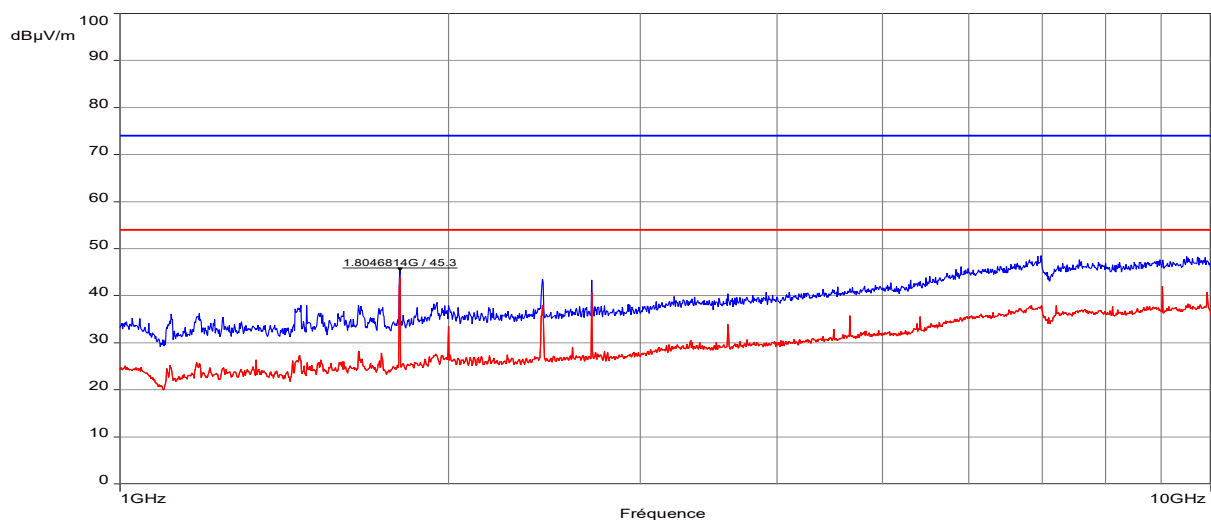
## Graphical representation of Radiated Disturbance Measurement (Anechoic chamber pre-scan, 1GHz-10GHz / 3m / Horizontal & Vertical) – High channel / DTS 500kHz mode



Note: Pre-scan graph only for identification purpose.

|                                     |                         |
|-------------------------------------|-------------------------|
| ----- : Peak measure                | ----- : Average measure |
| <b>Frequency band investigated:</b> | 1GHz-10GHz              |
| <b>Unit :</b>                       | dBμV/m                  |
| <b>RBW :</b>                        | 1MHz                    |
| <b>Antenna polarization :</b>       | Horizontal & Vertical   |
| <b>Limit:</b>                       | FCC 15.247 / RSS-247    |
| <b>Measurement detector:</b>        | Peak / Average          |

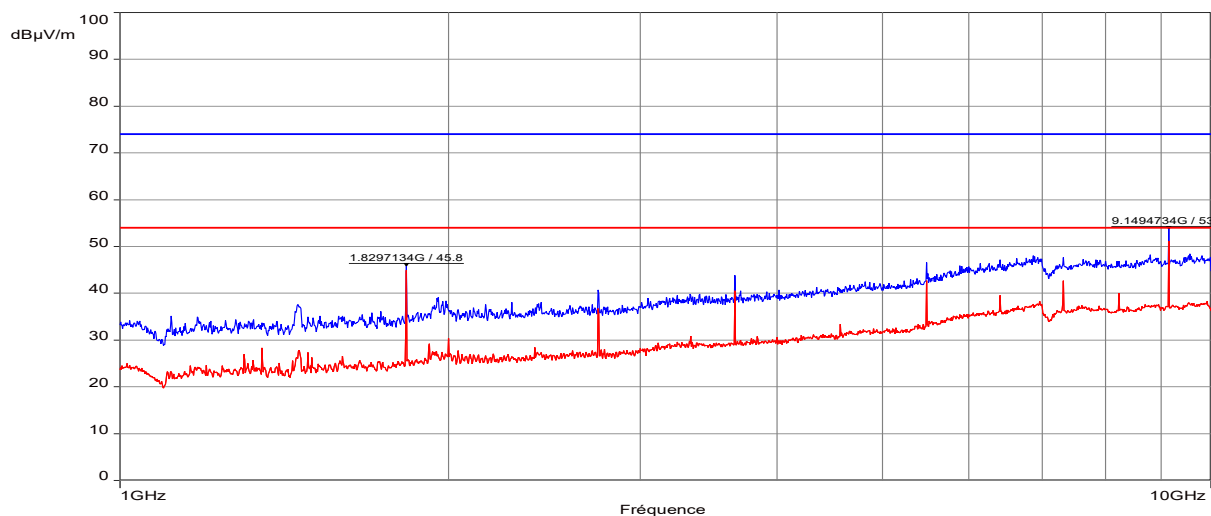
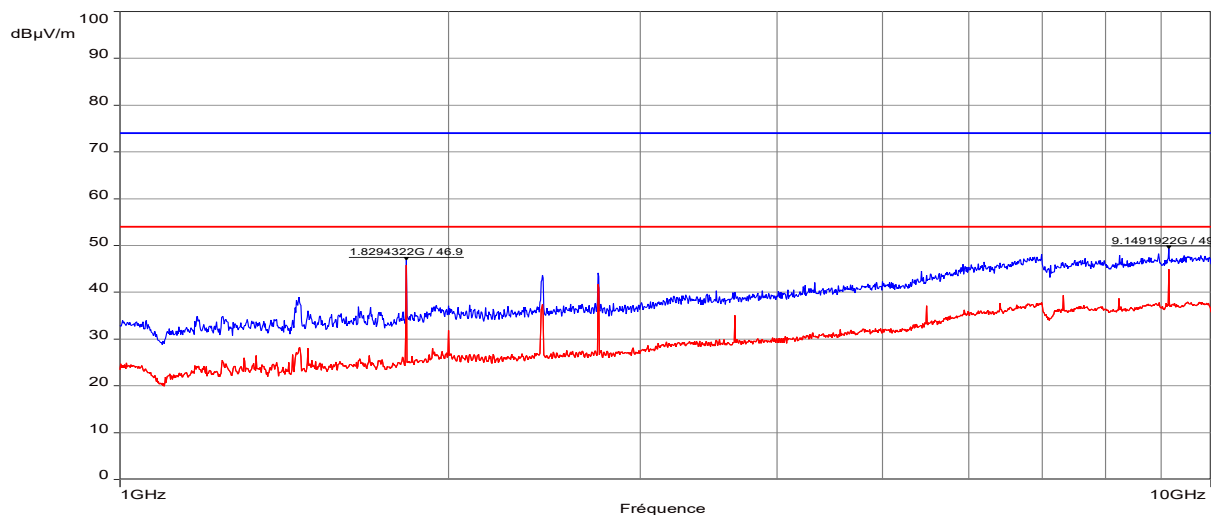
## Graphical representation of Radiated Disturbance Measurement (Anechoic chamber pre-scan, 1GHz-10GHz / 3m / Horizontal & Vertical) – Low channel / Hybrid 125kHz mode



Note: Pre-scan graph only for identification purpose.

|                                     |                         |
|-------------------------------------|-------------------------|
| ----- : Peak measure                | ----- : Average measure |
| <b>Frequency band investigated:</b> | 1GHz-10GHz              |
| <b>Unit :</b>                       | dBμV/m                  |
| <b>RBW :</b>                        | 1MHz                    |
| <b>Antenna polarization :</b>       | Horizontal & Vertical   |
| <b>Limit:</b>                       | FCC 15.247 / RSS-247    |
| <b>Measurement detector:</b>        | Peak / Average          |

## Graphical representation of Radiated Disturbance Measurement (Anechoic chamber pre-scan, 1GHz-10GHz / 3m / Horizontal & Vertical) – High channel / Hybrid 125kHz mode



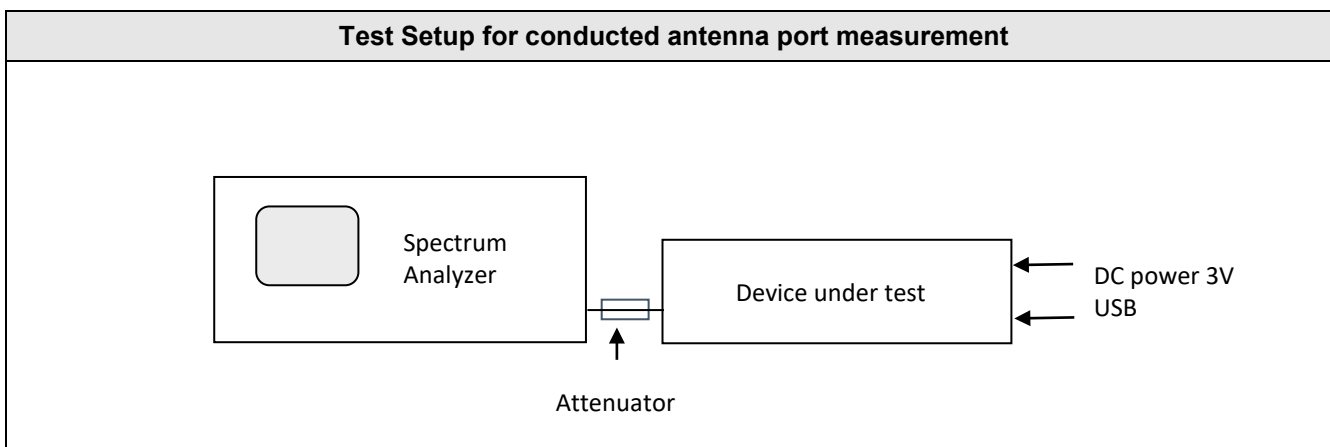
Note: Pre-scan graph only for identification purpose.

|                                     |                         |
|-------------------------------------|-------------------------|
| ----- : Peak measure                | ----- : Average measure |
| <b>Frequency band investigated:</b> | 1GHz-10GHz              |
| <b>Unit :</b>                       | dBμV/m                  |
| <b>RBW :</b>                        | 1MHz                    |
| <b>Antenna polarization :</b>       | Horizontal & Vertical   |
| <b>Limit:</b>                       | FCC 15.247 / RSS-247    |
| <b>Measurement detector:</b>        | Peak / Average          |

## 19. Occupied bandwidth (99%)

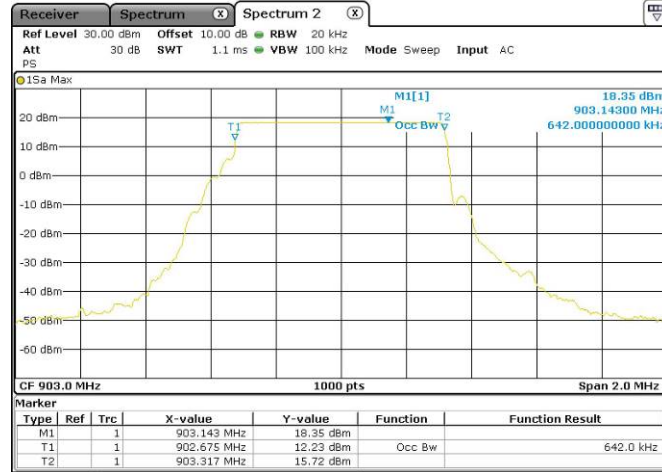
| TEST: Occupied bandwidth (99%) / RSS-GEN                                                                                                                                                                                                                                |                            |                 | Verdict |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------|---------|
| Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the antenna port of the device under test. A conducted measurement is performed.<br>The tested equipment is set to transmit operation with modulation on low, mid and high channels. |                            |                 | Pass    |
| Laboratory Parameters:                                                                                                                                                                                                                                                  | Required prior to the test | During the test |         |
| Ambient Temperature                                                                                                                                                                                                                                                     | 20 to 30 °C                | 22°C ± 2        |         |
| Relative Humidity                                                                                                                                                                                                                                                       | 25 to 70 %                 | 40% ± 5         |         |
| Supplementary information:<br>Test location: SMEE.<br>Test date: December 10 <sup>th</sup> . 2018. Tested by L. CHAPUS                                                                                                                                                  |                            |                 |         |

| Test Equipment Used |               |           |             |           |          |
|---------------------|---------------|-----------|-------------|-----------|----------|
| Description         | Manufacturer  | Model     | Identifier  | Cal. Date | Cal. Due |
| Attenuator          | Mini-Circuit  | BW-N10W5+ | ATT-171-008 | 2018/4    | 2019/4   |
| Spectrum analyzer   | Rohde&Schwarz | ESRP      | REC-151-002 | 2017/5    | 2019/5   |

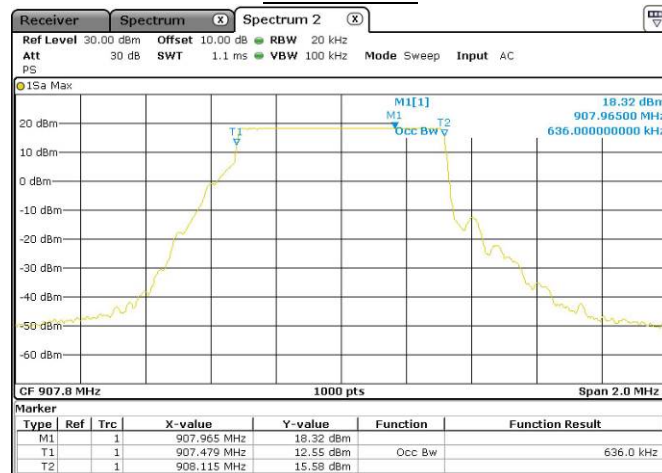


| Tabulated Results for Occupied Bandwidth |                              |
|------------------------------------------|------------------------------|
| Frequency (MHz)                          | 99% Occupied Bandwidth (kHz) |
| 903.0 / DTS                              | 642.0                        |
| 907.8 / DTS                              | 636.0                        |
| 914.2 / DTS                              | 638.0                        |
| 902.3 / Hybrid                           | 131.5                        |
| 908.5 / Hybrid                           | 132.0                        |
| 914.9 / Hybrid                           | 132.0                        |

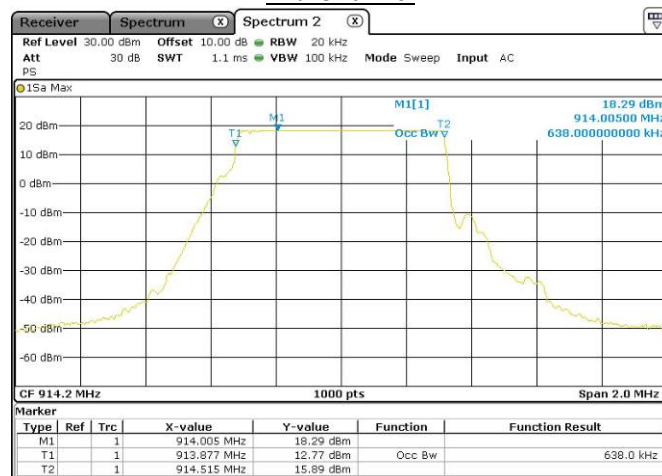
## Graphical representation of Occupied Bandwidth (DTS / 500kHz mode)



### Low Channel

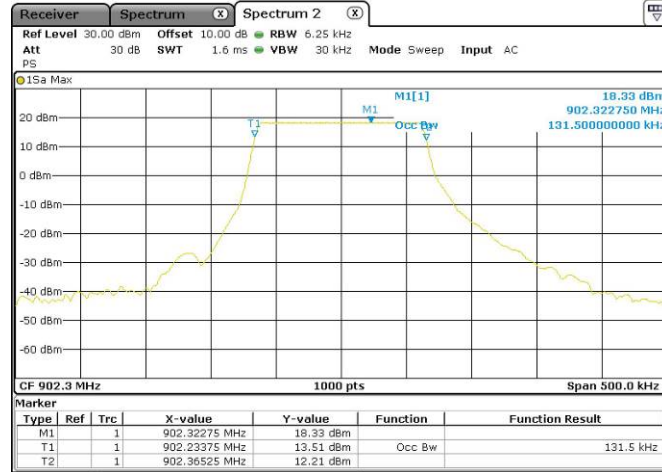


### Mid Channel

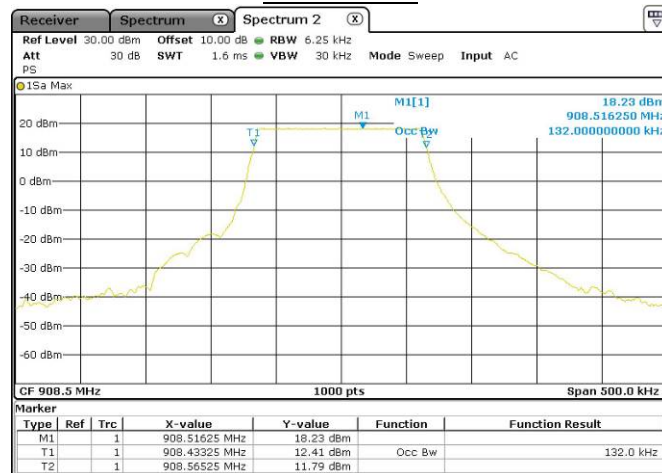


### High Channel

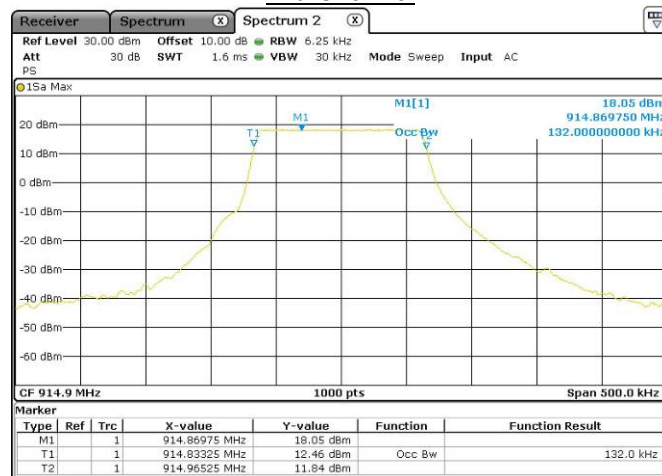
## Graphical representation of Occupied Bandwidth (Hybrid 125kHz)



### Low Channel



### Mid Channel



### High Channel