**Test report issued under the responsibility of:**
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006
IC Assigned Code: FR0003

# RADIO TEST REPORT

**RSS-210**
**FCC part 15.225**

| | |
|---|---|
| **Company** | **STMICROELECTRONICS SAS** |
| Address | 190 AVENUE CELESTIN COQ<br>13106 ROUSSET<br>FRANCE |

| | |
|---|---|
| **Test item description** | **NFC card reader evaluation board based on ST25R3916 integrated circuit** |
| Trade Mark | STMICROELECTRONICS SAS |
| Manufacturer | STMICROELECTRONICS (ROUSSET) SAS |
| Model/Type reference | X-NUCLEO-NFC06A1 |
| FCC ID | YCPNFC06A1 |
| IC | 8976A-NFC06A1 |
| Ratings | 5Vdc +/-5% |

| | |
|---|---|
| **Testing Laboratory** | **EMITECH MONTPELLIER laboratory** |
| Address | 145 rue de Massacan<br>34740 VENDARGUES<br>FRANCE |

| | |
|---|---|
| **Report Reference No** | **R412-18-106619-5A** |
| Test procedure | FCC IC Certification |
| Diffusion | Mr ROMAN |
| Applicant's name | STMICROELECTRONICS SAS |
| Date of issue | 25/10/2019 |
| Total number of pages | 57 |
| Revision | 0 |
| Modified page(s) | Creation |
| Compiled by | Morgan PATEY |
| Approved by (+ signature) | David MONTAULON (Technical Manager) |

REPORT INDEX:

# 1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **NFC card reader evaluation board based on ST25R3916 integrated circuit** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

| **TESTING PROCEDURE AND TESTING LOCATION:** | |
|---|---|
| **Testing Laboratory** | EMITECH MONTPELLIER laboratory & Open Area Test Site in SALINELLES (30) |
| Address | 145 rue de Massacan<br>34740 VENDARGUES<br>FRANCE |
| Test procedure | FCC IC Certification |
| Tested by | Morgan PATEY |
| Test supervisor | David MONTAULON |
| Date of receipt of test item | N/A |
| Date (s) of performance of tests | Between April, 10th and June 3th of 2019 |
| **APPLICANT'S GENERAL INFORMATIONS:** | |
| **Company name** | STMICROELECTRONICS SAS |
| Company address | 190 Avenue Celestin Coq<br>13106 Rousset<br>FRANCE |
| Person(s) present during the tests | M. ROMAN |
| Responsible | M. ROMAN |

**GENERAL REMARKS:**

**The test results presented in this report relate only to the object tested.**
**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
Throughout this report the decimal separator is point.

**POSSIBLE TEST CASE VERDICTS:**

| | |
|---|---|
| Test case does not apply to the test object | N/A |
| Information not communicated | N/C |
| Test case not performed | N/P |
| Test object does meet the requirement | P (Pass) |
| Test object does not meet the requirement | F (Fail) |
| Test object was not subjected to all tests | I (Inconclusive) |

**DEFINITIONS AND ABBREVIATIONS:**

| | | | |
|---|---|---|---|
| E.U.T. | Equipement under test | AE | Ancillary equipment |
| RBW | Resolution bandwidth | VBW | Video bandwidth |
| OATS | Open area test site | FAR | Full anechoic room |
| RF | Radio frequency | NTR | Nothing to report |
| SRD | Short Range Device | GPS | Global Positioning System |

## 2. REFERENCE DOCUMENT(S)

| NORMATIVE REFERENCES: |
|---|
| The following referenced documents are necessary for the application of the present test report.<br><br>**FCC part 15, 2018**<br>Code of federal regulations. Title 47- Telecommunication Chapter 1- Federal Communication Commission. Part 15- Radio frequency devices Subpart B- Unintentional Radiators. Limits and methods of measurement of radio disturbance. Characteristic of information technology equipment.<br><br>**FCC part 15.225**<br>Operation within the bands 13.553-13.567MHz<br><br>**RSS-210, Issue 9, August 2016, Amendment November 2017**<br>Licence-Exempt Radio Apparatus: Category I Equipment<br><br>**RSS/CNR-Gen, Issue 5, March 2019, Amendment 1**<br>General Requirements for Compliance of Radio Apparatus<br><br>**ANSI C 63.10:2013**<br>American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices<br><br>**ANSI C 63.4:2014**<br>American National Standard for Methods of measurement of Radio-Noise from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| **INFORMATIVE REFERENCES:** |
| The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area. |

# 3. EQUIPMENT TECHNICAL DESCRIPTION

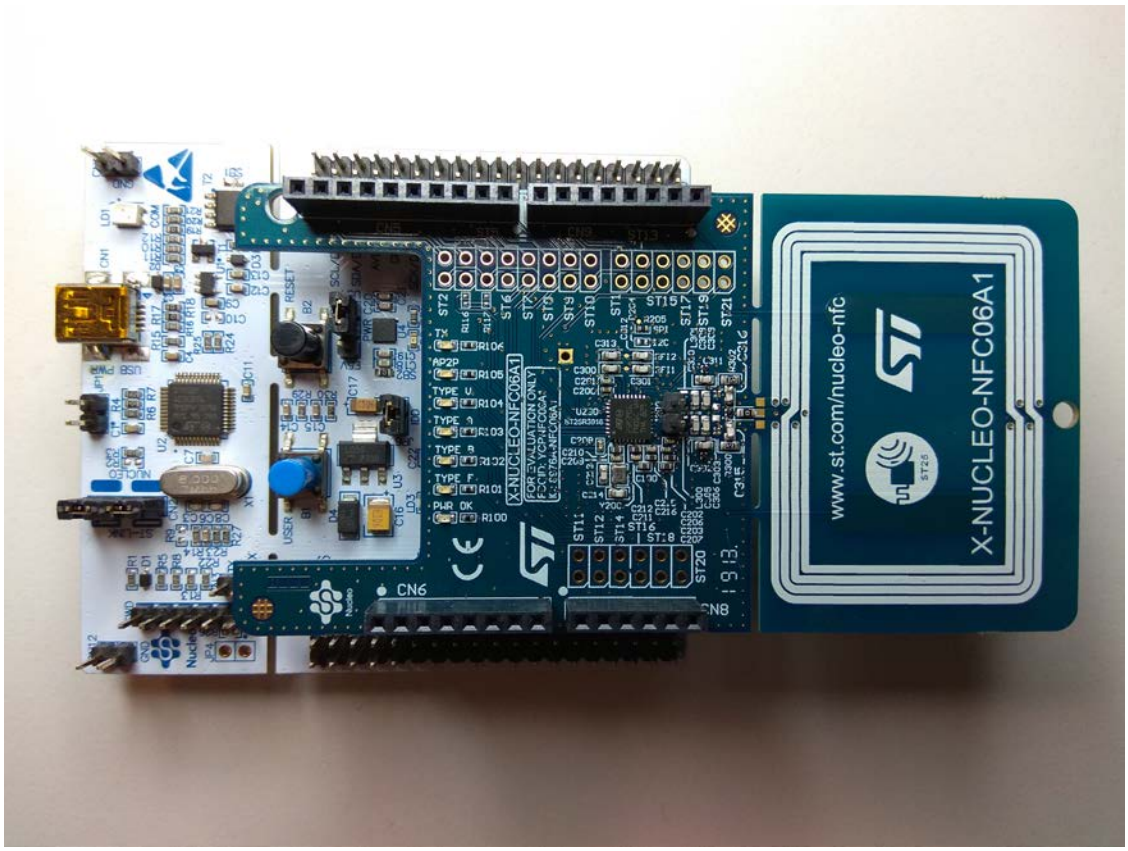
## 3.1. Test Conditions

| | | |
|---|---|---|
| Test item description. | : | NFC card reader evaluation board based on ST25R3916 integrated circuit |
| Model/Type reference. | : | X-NUCLEO-NFC06A1 |
| Trade Mark. | : | STMICROELECTRONICS SAS |
| FCC ID. | : | YCPNFC06A1 |
| IC. | : | 8976A-NFC06A1 |
| Serial number (S/N). | : | Not communicated |
| Part number (P/N). | : | Not communicated |
| Software version. | : | N/A |
| Firmware version. | : | N/A |
| Type of sample. | : | Prototype |
| Function(s). | : | The X-NUCLEO-NFC06A1 is a ready-to-use development kit to evaluate the features and functionality in reader/writer and card emulation modes of the high-performance NFC universal device ST25R3916 for contactless applications.<br>The ST25R3916 is a card reader IC for contact-less applications that provides the 13.56MHz air interface and that communicates with the host through dedicated interface.<br>This expansion board has to be plugged into the Arduino R3 connector of STM32 Nucleo board. |
| Manufacturer name. | : | STMICROELECTRONICS SAS |
| Address. | : | 190 Avenue Celestin Coq<br>13106 Rousset<br>FRANCE |

**General product information:**

N/A

## 3.2. EUT general view



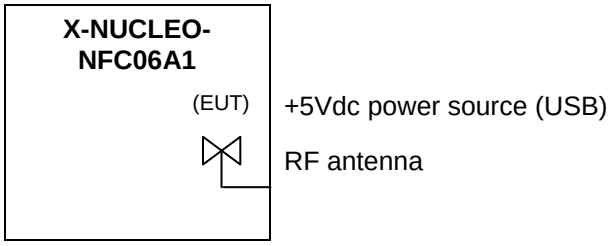
## 3.3. EUT Mechanical and Electrical Design

Power supply. ..... : 5Vdc
Power supply range. ..... : 5Vdc +/-5%
Power type. ..... : USB
Power (W). ..... : 0.8
Nominal current (A). ..... : 0.1
Dimensions (L x W x H) (m). ..... : 0.105 x 0.056 x 0.01
Weight (kg). ..... : 0.05
Temperature range (°C). ..... : 0 to 35
Ground bounding strap. ..... : No

**Comments:**

N/A

## 3.4. EUT Input/Output ports




| PORT | NAME | TYPE | LENGHT | CABLE TYPE | COMMENTS |
|---|---|---|---|---|---|
| 0 | Main frame | N/E | N/A | PCB | N/A |
| 1 | DC power source | DC | N/C | USB | 5Vdc |
| 2 | RF antenna | RF | N/A | N/A | 13.56 MHz |

AC/DC : AC/DC Converter port
I/O..... : Input or Output port
N/E ..... : Non Electrical port
AC..... : Alternative current port
TP ..... : Telecommunication port
DC ..... : Discontinuous current port
RF..... : Radio frequency port

## 3.5. EUT Radio Specifications

### a) General Informations

According to manufacturer's declarations :

| | | |
|---|---|---|
| EUT type | : | Transceiver |
| Technology | : | RFID |
| Environmental profile | : | Data transmissions |
| Temperature range | : | 0 to +35 |
| Antenna type | : | Integral |
| Antenna Gain | : | N/A |

**Comments:**

N/A

### b) Transmitter Paramitters (Tx)

| | | |
|---|---|---|
| Frequency bands | : | 13.553 MHz to 13.567 MHz |
| RF Power | : | <1 W |
| Number of channels / Separation | : | 1 |
| Modulation type | : | NFC-A / ISO14443A, NFC-B / ISO14443B, NFC-F / Felica™, NFC-V / ISO15693 up to 53 kb/s<br>NFC-A / ISO14443A and NFC-F / FeliCa™ card emulation<br>A test mode allow to test all modulations at the same time. |
| Duty cycle | : | Not communicated |
| Tested frequency | : | 13.56 MHz |

### c) Receiver Parameters (Rx)

| | | |
|---|---|---|
| Frequency bands | : | 13.553 MHz to 13.567 MHz |
| Category/Class | : | Not communicated |
| Bandwidth | : | Not communicated |

## 4. RESULT SUMMARY

| TEST DESIGNATION | SEVERITY | VERDICT | COMMENTS |
|---|---|---|---|
| **GENERAL** | | | |
| **Labeling requirements** | | N/P | See certification documents |
| **Information to user** | | N/P | See certification documents |
| **Home-built devices** | | N/A | |
| **Kits** | | N/A | |
| **Special Accessories** | | N/P | See certification documents |
| **Inspection by the Commission** | | N/A | |
| **Measurement standards** | | PASS | |
| **Test procedure for CPU boards and computer power supplies** | | N/A | |
| **Frequency range of radiated measurements** | | PASS | |
| **Measurement detector functions and bandwidths** | | PASS | |
| **Transition provisions for compliance with the rules** | | N/P | See certification documents |
| **UNINTENTIONAL RADIATORS** | | | |
| **Equipment authorization** | | | |
| - Verification | | N/A | |
| - Declaration of Conformity | | N/A | |
| **CPU boards and power supplies used in personal computers** | | N/A | |
| **Exempted device** | | N/A | |
| **Information to the user** | | N/P | See certification documents |
| **Conducted limits** | | PASS | |
| **Radiated emission limits** | Class B | PASS | |
| **Antenna power conduction limits for receivers** | | N/A | |
| **Power line carrier systems** | | N/A | |
| **TV interface devices, including cable system terminal devices** | | N/A | |
| **TV broadcast receivers** | | N/A | |
| **Cable ready consumer electronics equipment** | | N/A | |
| **Program blocking technology requirements for TV receivers** | | N/A | |
| **Scanning receivers and frequency converters used with scanning receivers** | | N/A | |
| **Labeling of digital cable ready products** | | N/A | |
| **INTENTIONAL RADIATORS** | | | |

| TEST DESIGNATION | SEVERITY | VERDICT | COMMENTS |
|---|---|---|---|
| **Equipment authorization requirement** | | PASS | Transmitter part is subject to Certification procedure |
| **Certified operating frequency range** | | N/A | |
| **Antenna requirement** | | PASS | Dedicated integral antenna |
| **External radio frequency power amplifiers and antenna modifications** | | N/A | |
| **Restricted bands of operation** | | PASS | |
| **Conducted limits** | Class B | PASS | |
| **Radiated emission limits; general requirements** | Class B | PASS | |
| **Tunnel radio systems** | | N/A | |
| **Modular transmitters** | | N/A | |
| **Cable locating equipment** | | N/A | |
| **Cordless telephones** | | N/A | |
| **Additional provisions to the general radiated emission limits** | | PASS | |
| **Operation within the band 13.110-14.010 MHz.** | | PASS | |
| - **Field strength in the band 13.553-13.567 MHz** | | PASS | |
| - **Field strength in the band 13.410-13.553 MHz and 13.567-13.710 MHz** | | PASS | |
| - **Field strength in the band 13.110-13.410 MHz and 13.710-14.010 MHz** | | PASS | |
| - **Field strength outside the band 13.110-14.010 MHz** | | PASS | |
| - **Frequency tolerance of the carrier signal** | | PASS | |
| - **Radio frequency powered tag** | | N/A | EUT is an RFID reader |

Sample subject to the test complies with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken account of uncertainty associated with the results.

Opinion(s) and interpretation(s): N/A

## 5. MEASUREMENT UNCERTAINTY

| PARAMETER | MAXIMAL EMITECH UNCERTAINTY | MINIMAL STANDARD UNCERTAINTY |
|---|---|---|
| Radio frequency | ± 1 x $10^{-7}$ | ±1 x $10^{-7}$ |
| RF power, conducted | | |
| RF power | ± 0.8dB | ± 1 dB |
| Power spectral density | ± 2.3dB | ± 3 dB |
| Occuped bandwidth | | |
| RF power | ± 1.2 % | ± 5 % |
| Conducted emission (spurious) | | |
| f ≤ 1 GHz | ± 0.8 dB | ± 3 dB |
| 1 GHz - 12.75 GHz | ± 1.6 dB | |
| Radiated emission (PAR / PIRE / RNE) | | |
| f ≤ 62.5 MHz | ± 5.1 dB | ± 6 dB |
| 62.5 MHz - 1 GHz | ± 5.1 dB | ± 6 dB |
| 1 GHz - 18 GHz | ± 5.2 dB | ± 6 dB |
| 18 GHz – 26 GHz | ± 5.1 dB | ± 6 dB |
| 26 GHz – 40 GHz | ± 5.4 dB | ± 6 dB |
| PIRE and power spectral density with diode | ± 5.4 dB | ± 6 dB |
| Radiated emission (magnetic field) | | |
| 9kHz – 30MHz | ± 2.7 dB | ± 6 dB |
| Supply voltages | ± 3 % | ± 3 % |
| Temperature | ± 1 °C | ± 1°C |
| Humidity | ± 5 % | ± 5 % |
| Time / Duty cycle | ± 4.4 % | ± 5 % |
| Radiated emission (electric field for FCC standard) | | |
| 9kHz – 30MHz | ± 2.7 dB | / |
| 30MHz – 1GHz | ± 5.2 dB | / |
| 1GHz – 18GHz | ± 5.3 dB | / |
| 18GHz – 26GHz | ± 5.5 dB | / |
| 26GHz – 40GHz | ± 5.5 dB | / |

For the calcul of expanded uncertainty, the confidence interval is 95 % (k=2).

# 6. TEST CONDITIONS AND RESULTS

## 6.1. Conducted voltage emission (measurement)

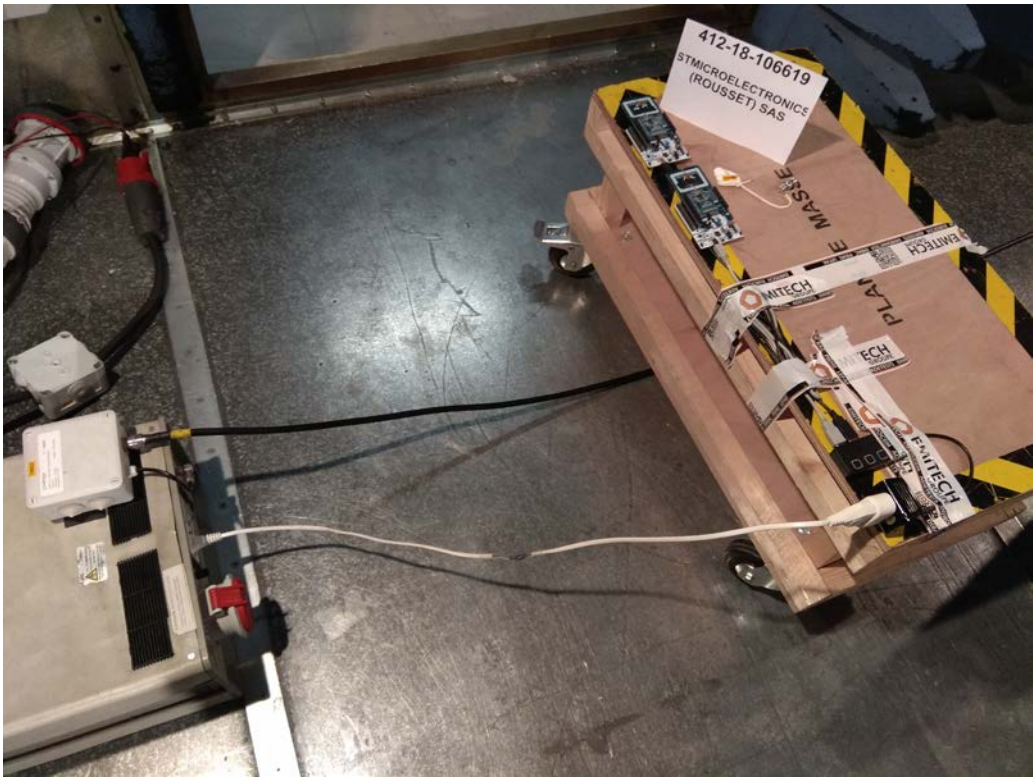
| | |
|---|---|
| **Reference standard:** | FCC part 15.107, 15.207 and RSS-Gen |
| **Test method:** | ANSI C63.4: 2014 |
| **General test setup:** Test is done inside a shielded room. EUT is set on an insulating support at 80cm above the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane. | |

| TESTED CABLE | PARAMETER | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 115Vac/60Hz power supply | 150kHz-30MHz | Class B | EMI5050 | **PASS** |

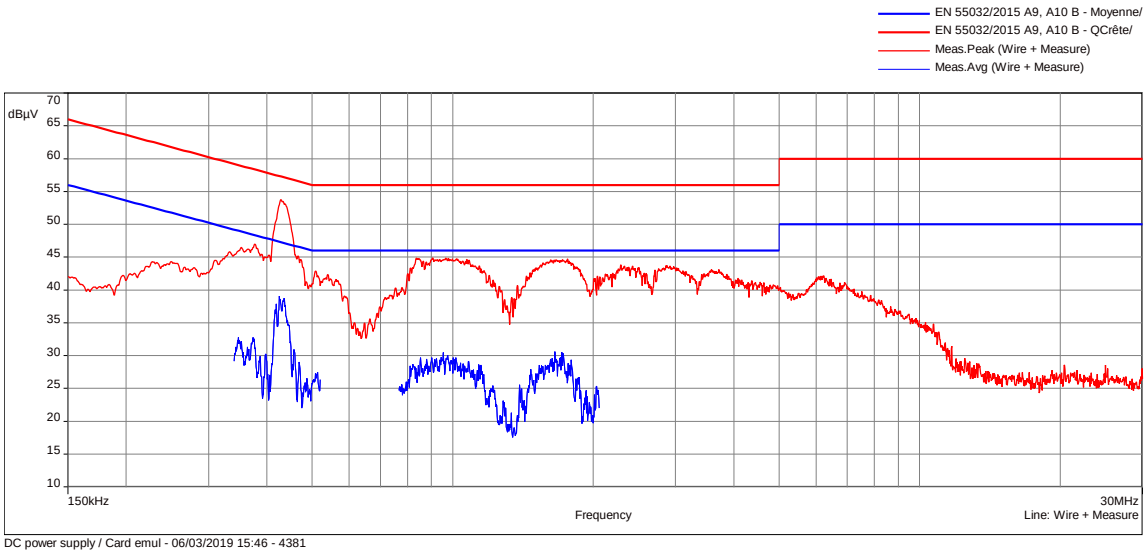
| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 30 to 60 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |
| **Test method deviation:** N/A | | |
| Supplementary information: EUT power supply is done trought a “standard power supply” wich meets FCC and RSS requirements. Test are done in the worst configuration mode: Config Tag which presents the higher carrier level (All modulations activated at the same time). | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| AC power source | KIKUSUI | PCR2000L | 0800 | 12/06/2018 | 12/08/2019 |
| Cable | MICRO-COAX | N-3m | 10536 | 12/10/2017 | 12/12/2019 |
| Cable | EMITECH | Current absorber sheath | 10653 | 19/10/2018 | 19/12/2020 |
| Cable | SUCOFLEX | N-3m | 14378 | 19/01/2017 | 19/09/2019 |
| LISN | PMM | L2-16 | 1209 | 08/02/2018 | 08/04/2020 |
| PE choke | EMITECH | CISPR 16-2-1 : 2008 | 10071 | | |
| Receiver | Rohde & Schwarz | ESI | 9704 | 15/02/2019 | 15/04/2020 |
| Shielded enclosure | COMTEST | SAC 3m | 14494 | 14/02/2017 | 14/04/2020 |
| Software | Nexio | | 0000 | | |
| Surges Suppressor | Hewlett Packard | 11947A | 0238 | 11/09/2017 | 11/11/2019 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermohygrometer | Testo | 608-H2 | 12269 | 27/11/2017 | 27/01/2020 |

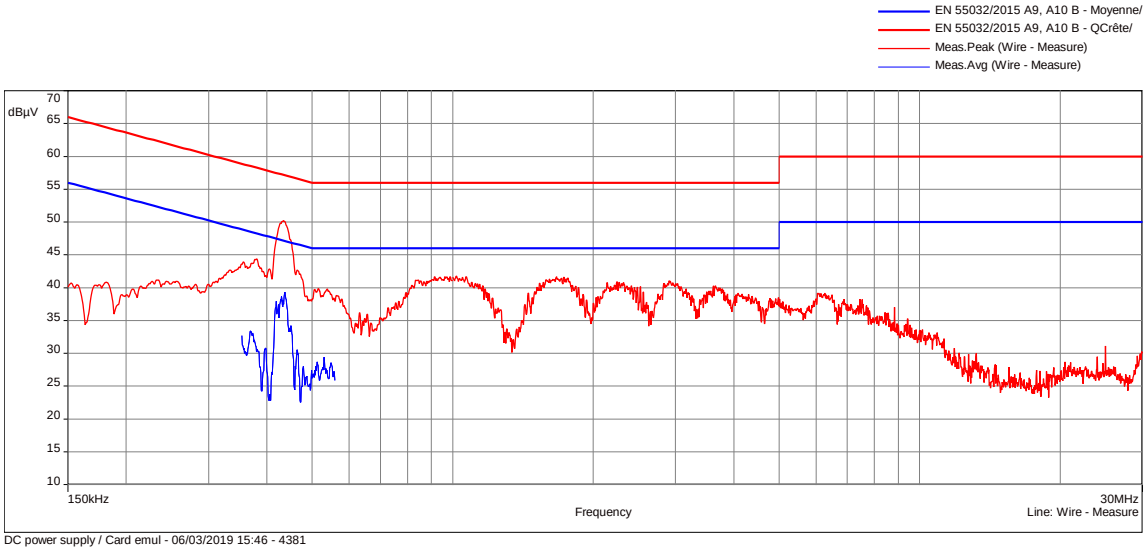
Blank cells = Permanent validity

| TEST SETUP PHOTO(S) – POWER SUPPLY USED FOR CONDUCTED MEASUREMENT |
| --- |
|  |

| CONDUCTED EMISSION (MEASUREMENT) - GRAPH | | | |
|---|---|---|---|
| DC POWER SUPPLY / CARD EMUL | | EMI4381 | |
| **EUT mode:** | #1 | **T (°C):** | 21.2 |
| **Test Date:** | 03/06/2019 15:46:44 | **H (%):** | 50.5 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |




DC power supply / Card emul - 06/03/2019 15:46 - 4381




DC power supply / Card emul - 06/03/2019 15:46 - 4381

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Wire- port | 150kHz-1MHz | 10kHz | 30kHz | Peak/Avg |
| Wire- port | 1MHz-10MHz | 10kHz | 30kHz | Peak |
| Wire- port | 10MHz-30MHz | 10kHz | 30kHz | Peak |
| Wire+ port | 150kHz-1MHz | 10kHz | 30kHz | Peak/Avg |
| Wire+ port | 1MHz-10MHz | 10kHz | 30kHz | Peak/Avg |
| Wire+ port | 10MHz-30MHz | 10kHz | 30kHz | Peak |
| **Measure with:** | A.M.N. | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

## 6.2. Occupied Bandwidth

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.225 & RSS-210 |
| **Test method:** | FCC part 15.225 & RSS-210 |
| **Test description:** The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical spectra, splits up into β/2 on each side of the spectrum. Unless otherwise specified, β/2 is taken as 0,5 %.<br>The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions.<br>EUT is connected to the measuring receiver via 50Ω attenuator(s). | |

| TESTED PARAMETER | OBW | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 99% Bandwidth | 7.7944 kHz | <14kHz | EMI5993 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | 21.3°C |
| Relative Humidity | 20 to 75 % | 39.4 % |
| Atmospheric pressure | N/A | 1015 hPa |
| **Test method deviation:** N/A | | |
| Supplementary information: Test are done in the worst configuration mode: Config Tag which presents the higher carrier level (All modulations activated at the same time). | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| AC power source | KIKUSUI | PCR4000L | 3074 | 12/06/2018 | 12/08/2019 |
| Antenna | Emitech | 3.5 cm | 4653 | | |
| Cable | MICRO-COAX | N-3m | 10535 | 06/04/2017 | 06/06/2019 |
| Climatic enclosure | CLIMATS | EXCAL 7714-HA | 14261 | 26/04/2018 | 26/06/2019 |
| Multimeter | FLUKE | 8808A | 12446 | 24/04/2018 | 24/06/2019 |
| Spectrum analyzer | Rohde & Schwarz | FSW43 | 14830 | 28/12/2018 | 28/02/2020 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermohygrometer | Testo | 608-H2 | 12268 | 27/11/2017 | 27/01/2020 |

Blank cells = Permanent validity

| OCCUPIED BANDWIDTH - GRAPH | | |
|---|---|---|
| 99% BANDWIDTH | | EMI5993 |
| **EUT mode:** | D-M3 | |
| **Test Date:** | 29/05/2019 | |
| **Test Operator:** | MPA | |


14:20:59 29.05.2019

| **Results:** | The system has an OBW of 4.456 kHz |
|---|---|

*EUT modification(s): N/A*

## 6.3. Radiated spurious emissions

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.225 & CNR-Gen |
| **Test method:** | FCC part 15.109, 15.209, 15.205, 15.215, CNR-Gen |

**General test setup:** For f <30MHz, EUT is set on an insulating support at 80cmcm above the ground reference plane.

Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a semi-anechoic chamber. The EUT was rotated 360°in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°).

Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions.

For f > 30MHz, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for f >1GHz).

Preliminary (peak) 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 located at various heights in horizontal and vertical polarities.

Final measurements (quasi-peak or average) were then performed in a semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° about its azimuth and adjusting the receive antenna height from 1 to 4 m.

All frequencies were investigated, where applicable.

For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.

| TESTED CONFIGURATION | PARAMETER | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| All modes | 9kHz-150kHz | 15.209 | See below | **PASS** |
| All modes | 150kHz-30MHz | 15.209 | See below | **PASS** |
| All modes | 30MHz-1GHz | 15.209 | See below | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 20 to 75 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |

**Test method deviation:** N/A

Supplementary information:

From 9 kHz to 30MHz: limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

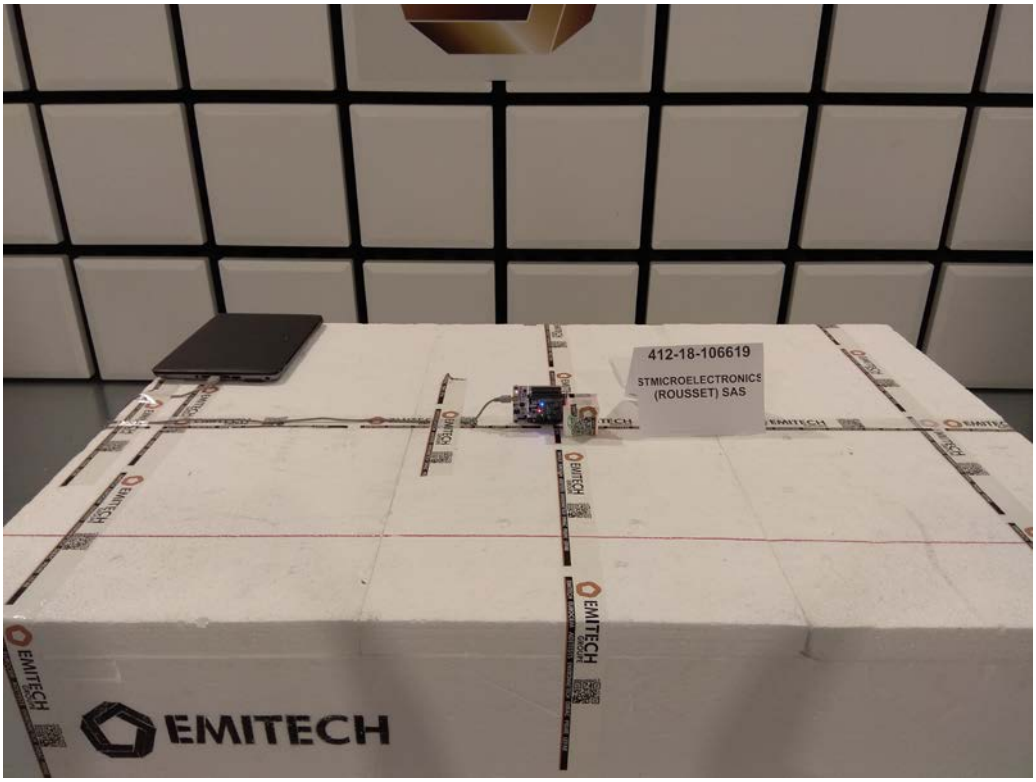
From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209.

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| AC power source | CHROMA | 61603 | 12532 | 24/04/2018 | 24/06/2019 |
| Antenna | Rohde & Schwarz | HFH2-Z2 | 5825 | 20/09/2017 | 20/11/2019 |
| Antenna | Electro Metrics | BIA-30HF | 0824 | 13/06/2018 | 13/08/2021 |
| Antenna | Rohde & Schwarz | HL223 | 3126 | 13/06/2018 | 13/08/2021 |
| Cable | SUCOFLEX | N-3m | 14378 | 19/01/2017 | 19/09/2019 |
| Cable | SUCOFLEX | N-6,5m | 14380 | 19/01/2017 | 19/09/2019 |
| Cable | TechniWAVE | N-0.23m | 14891 | 23/02/2018 | 23/04/2020 |
| Cable | TechniWAVE | N-0.23m | 14899 | 23/02/2018 | 23/04/2020 |

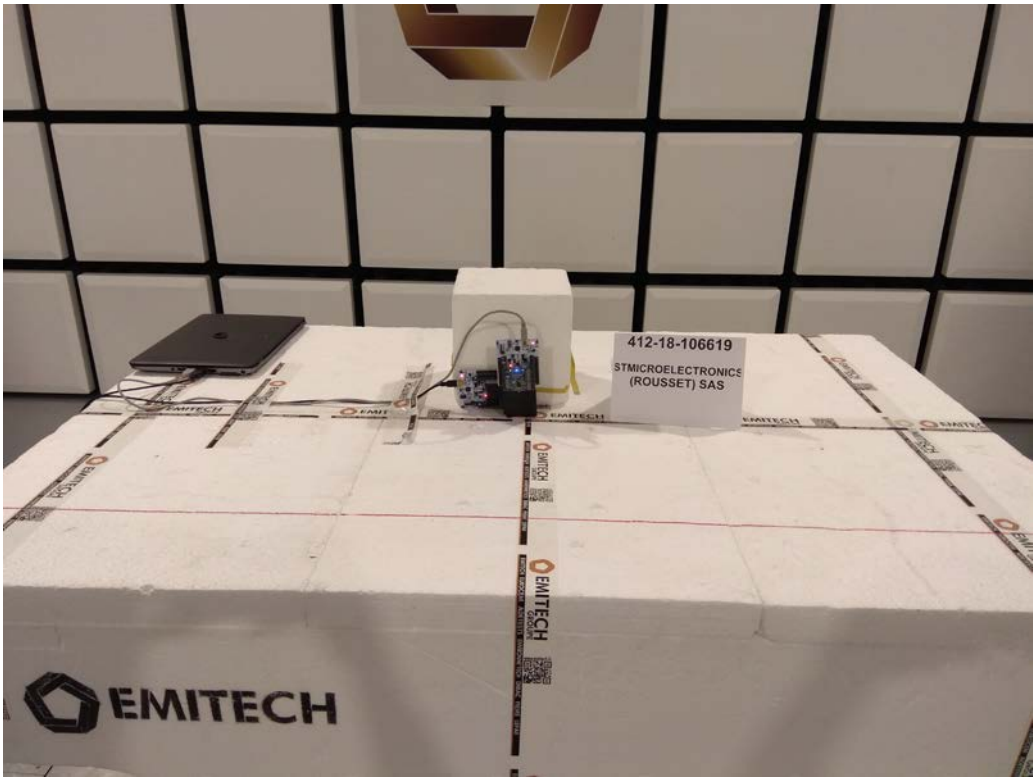
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
|---|---|---|---|---|---|
| Cable | MegaPhase | N-8m | 15813 | 12/11/2018 | 12/01/2021 |
| Receiver | Agilent Technologies | E4440A | 5824 | 18/04/2018 | 18/06/2020 |
| Shielded enclosure | COMTEST | SAC 3m | 14494 | 14/02/2017 | 14/04/2020 |
| Software | Nexio | | 0000 | | |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermohygrometer | Testo | 608-H2 | 12269 | 27/11/2017 | 27/01/2020 |
| Turntable | Maturo | NCD | 14657 | | |

Blank cells = Permanent validity

**TEST SETUP PHOTO(S) RADIATED EMISSIONS (CONFIG TAG)**



## TEST SETUP PHOTO(S) RADIATED EMISSIONS (CARD EMUL)



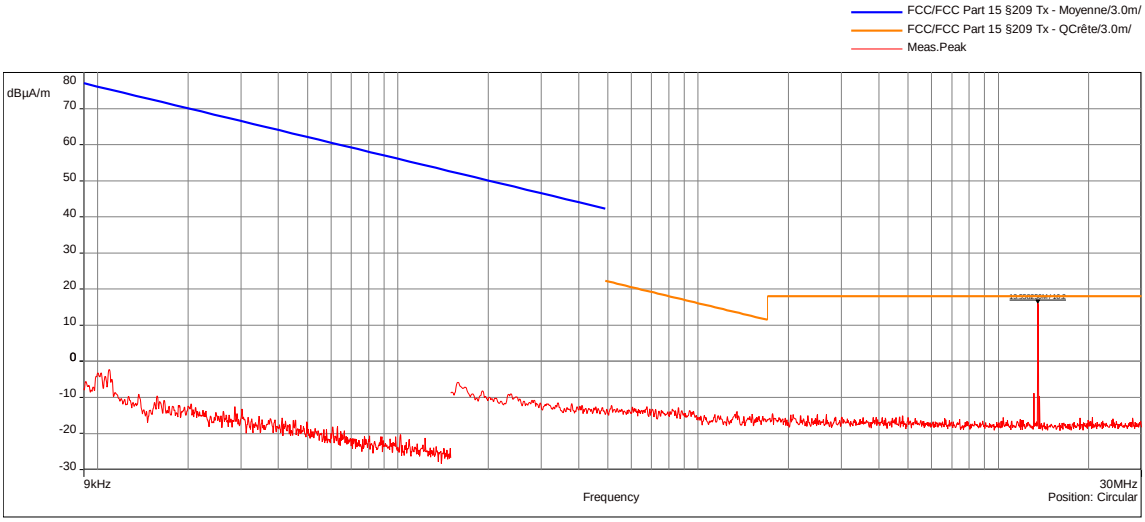

## TEST SETUP PHOTO(S) RADIATED EMISSIONS (30MHZ-200MHZ)

| TEST SETUP PHOTO(S) RADIATED EMISSIONS (200MHZ-1GHZ) |
|---|
|  |

| TEST SETUP PHOTO(S) RADIATED EMISSION(F<30MHZ, PRE MEASUREMENT) |
|---|
|  |

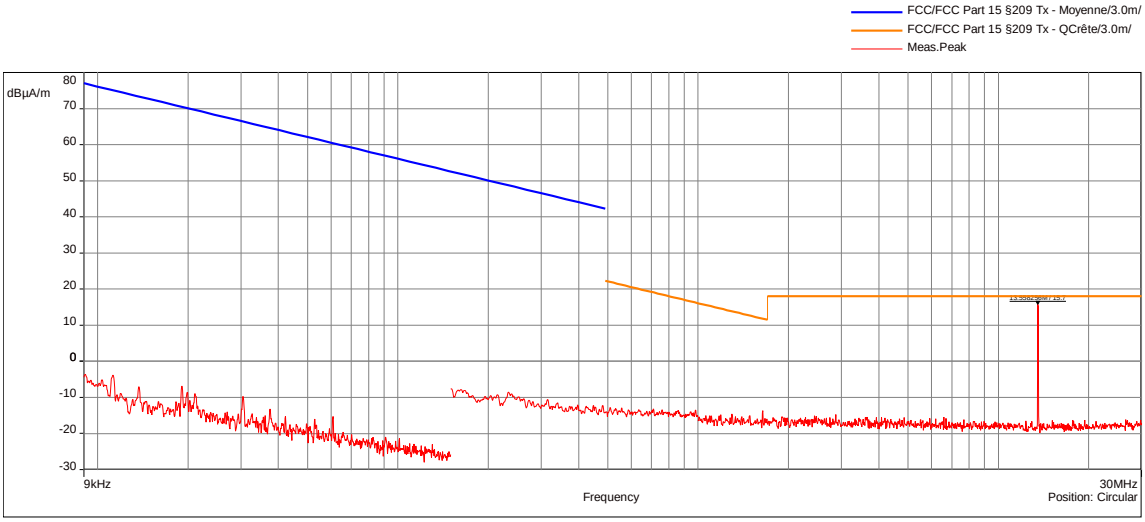
| TEST SETUP PHOTO(S) RADIATED EMISSION(F<30MHZ, FINAL MEASUREMENT) |
| --- |
|  |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CONFIG TAG / POSITION 1 | | EMI4301 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:36:56 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

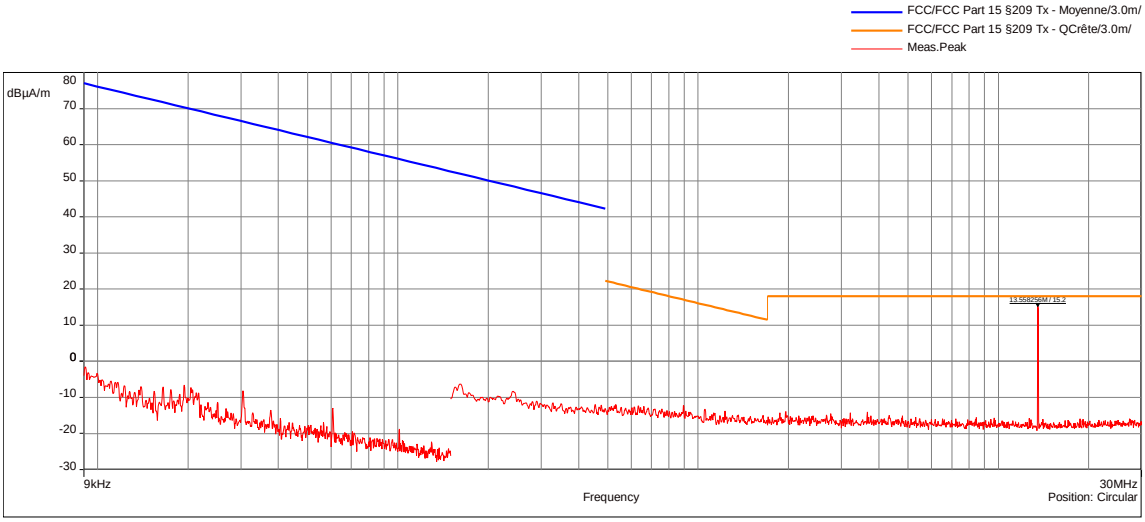
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CONFIG TAG / POSITION 1 | | EMI4302 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:37:39 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

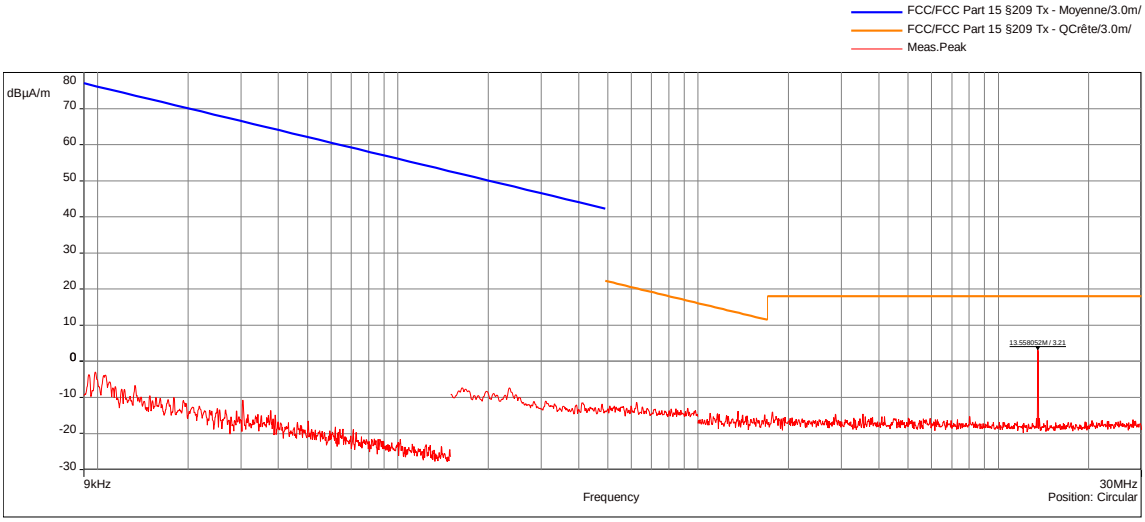
| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CONFIG TAG / POSITION 1 | | EMI4303 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:40:28 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CONFIG TAG / POSITION 2 | | EMI4304 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:45:31 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |

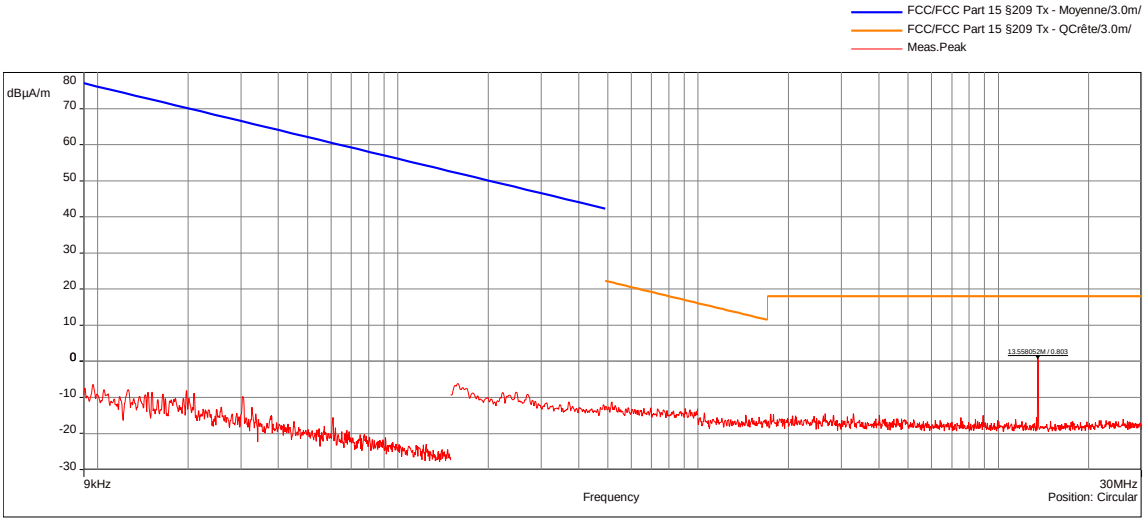



| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |

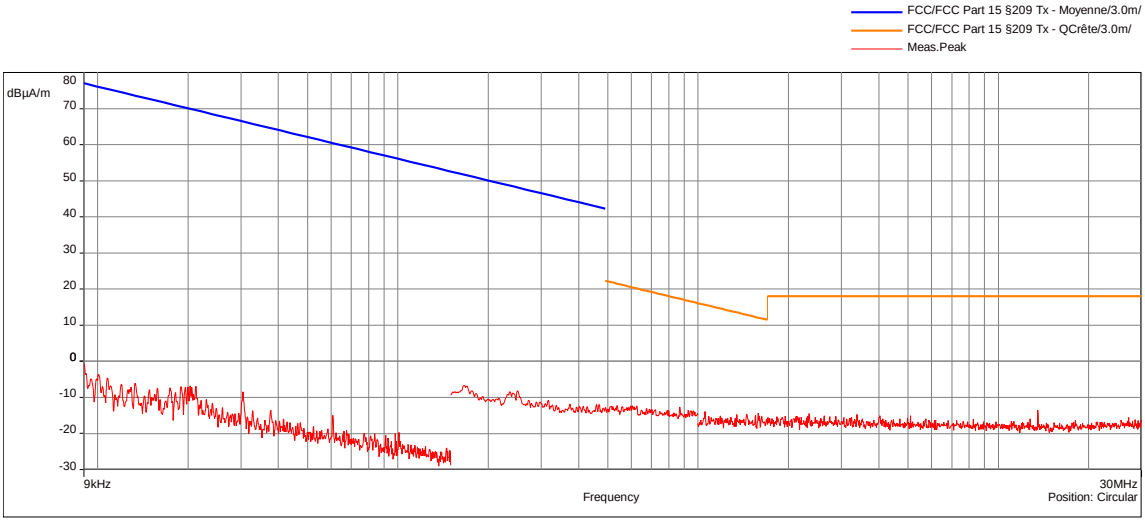
*EUT modification(s): N/A*

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CONFIG TAG / POSITION 2 | | EMI4305 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:48:19 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

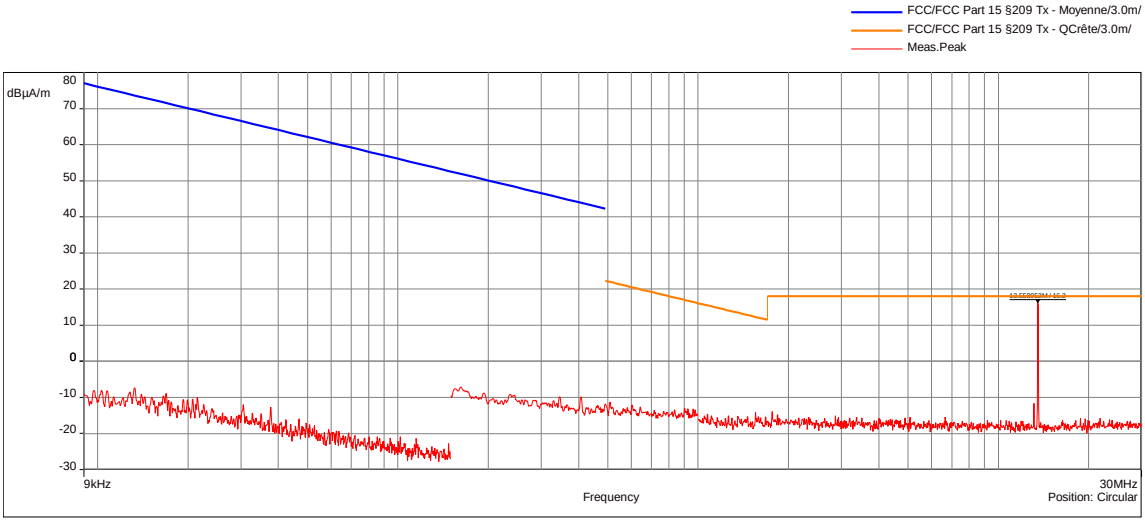
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CONFIG TAG / POSITION 2 | | EMI4306 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:51:45 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

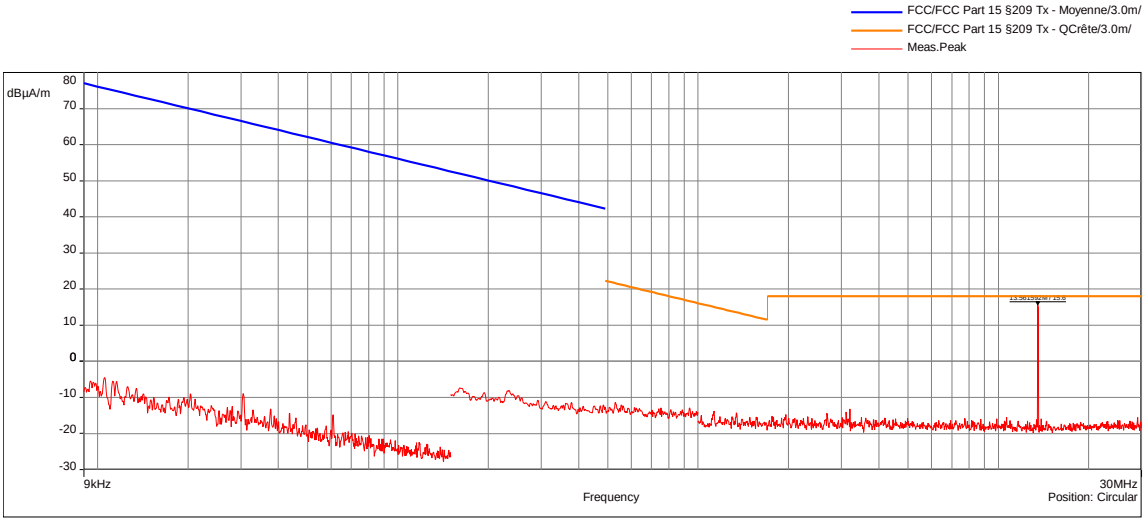
| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CONFIG TAG / POSITION 3 | | EMI4307 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:54:59 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

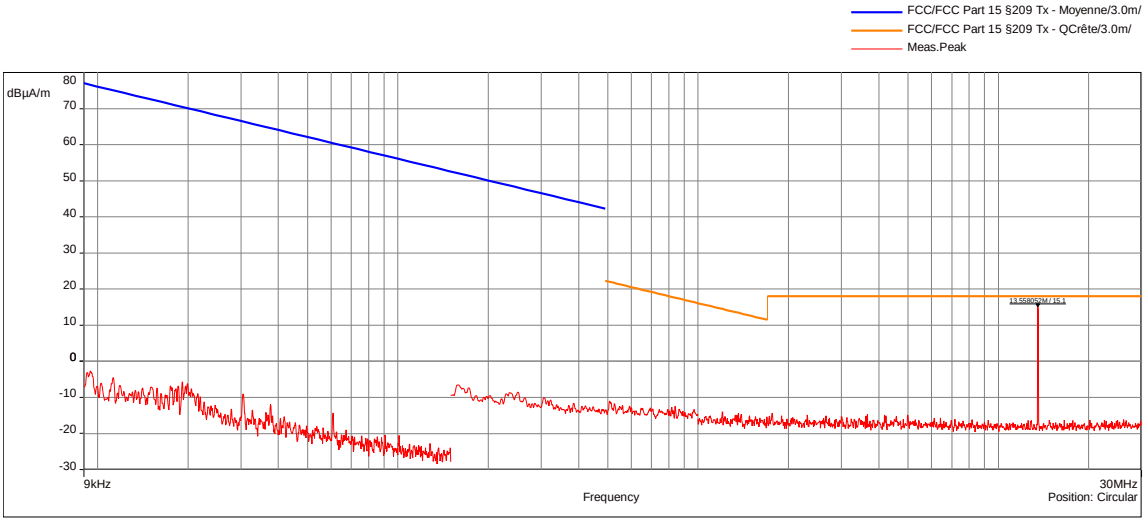
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CONFIG TAG / POSITION 3 | | EMI4308 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:57:27 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CONFIG TAG / POSITION 3 | | EMI4309 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 08:59:59 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |

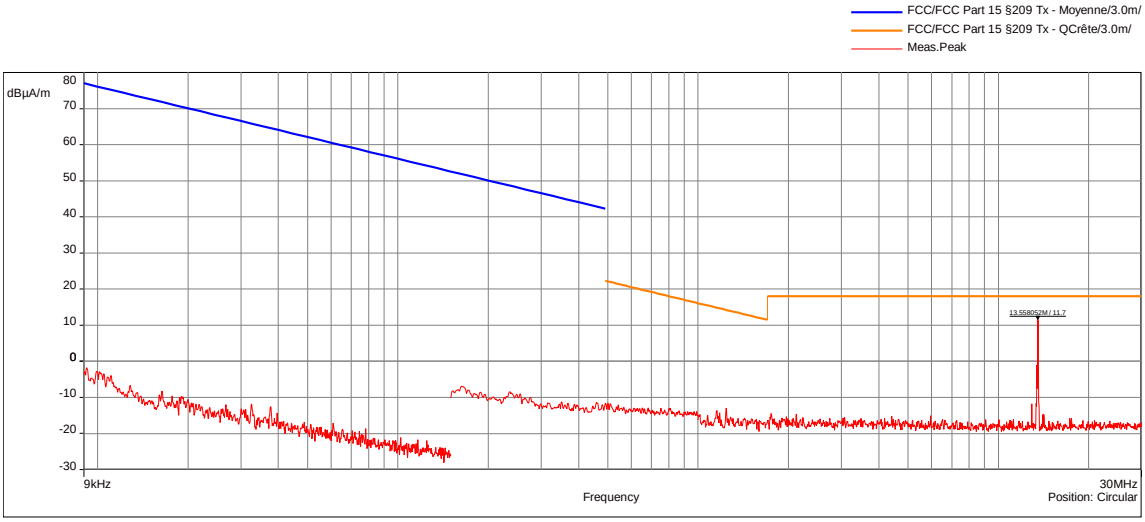



| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |

*EUT modification(s): N/A*

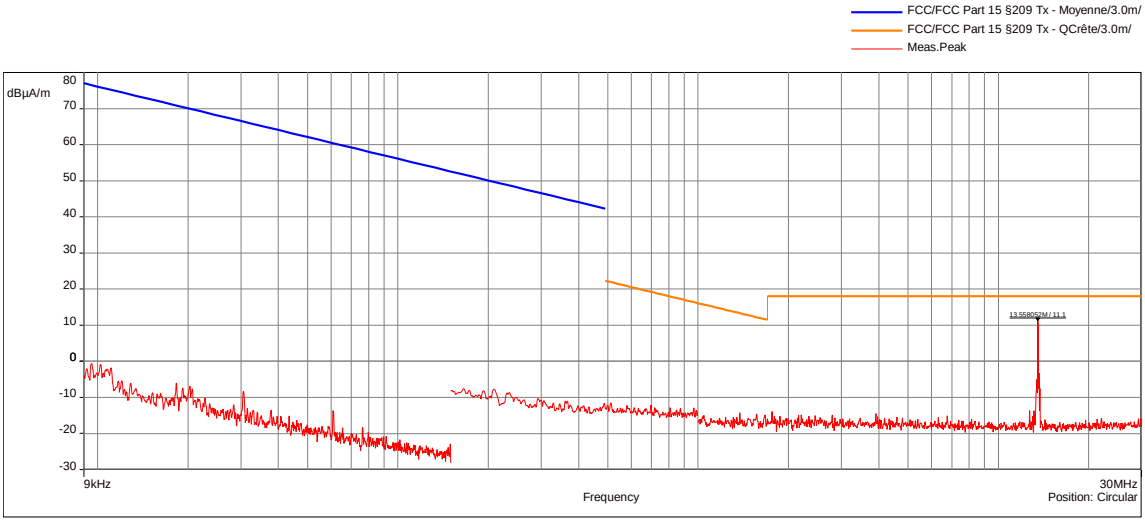
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CARD EMUL / POSITION 1 | | EMI4310 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:22:25 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

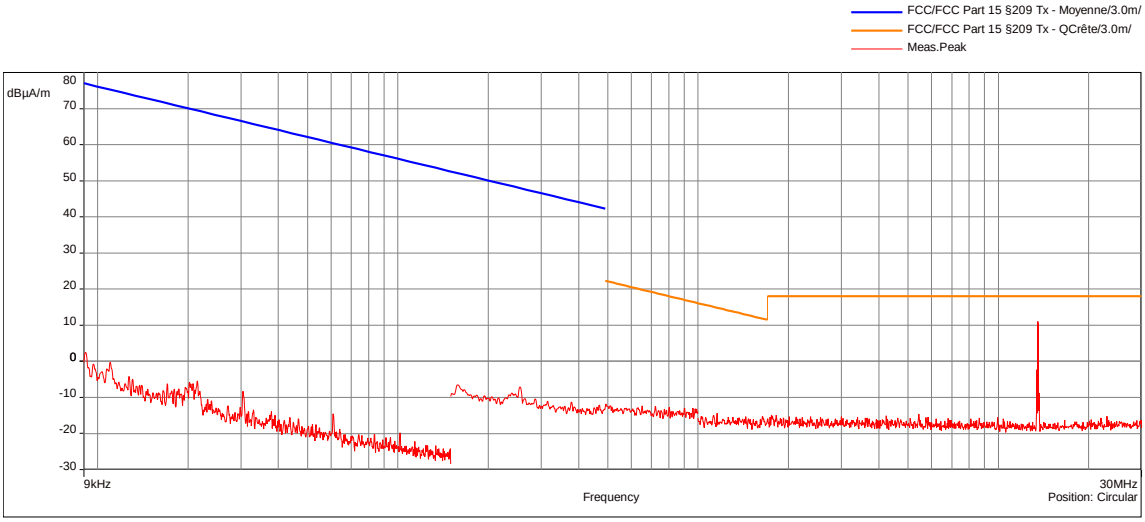
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CARD EMUL / POSITION 1 | | EMI4311 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:25:52 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

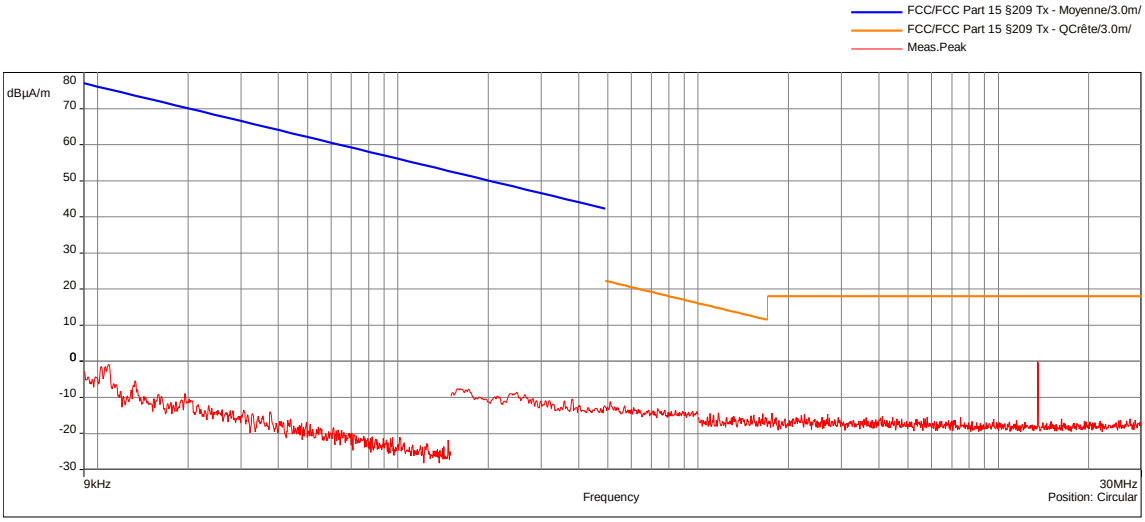
| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CARD EMUL / POSITION 1 | | EMI4312 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:28:50 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CARD EMUL / POSITION 2 | | EMI4314 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:41:44 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |

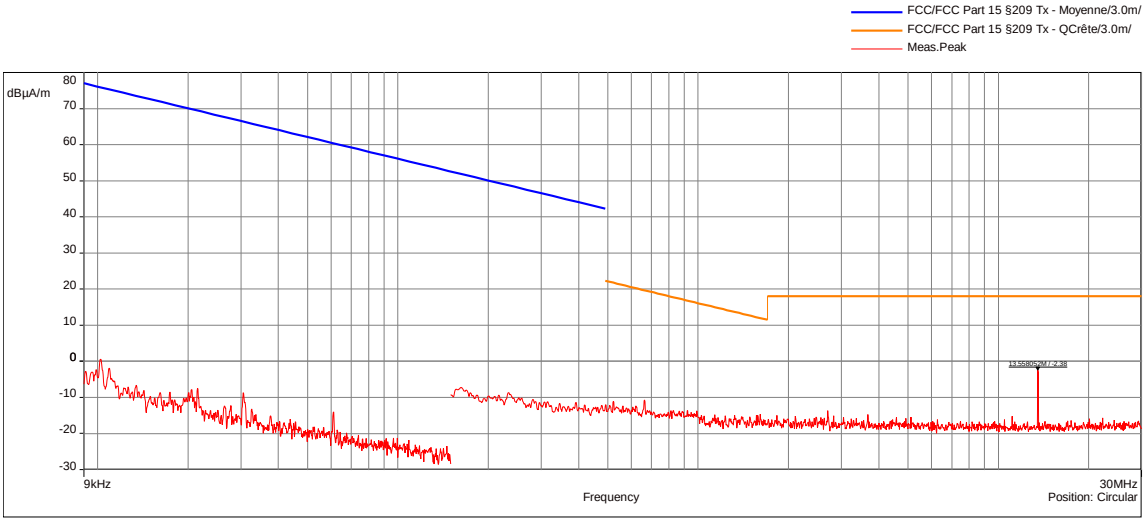



| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |

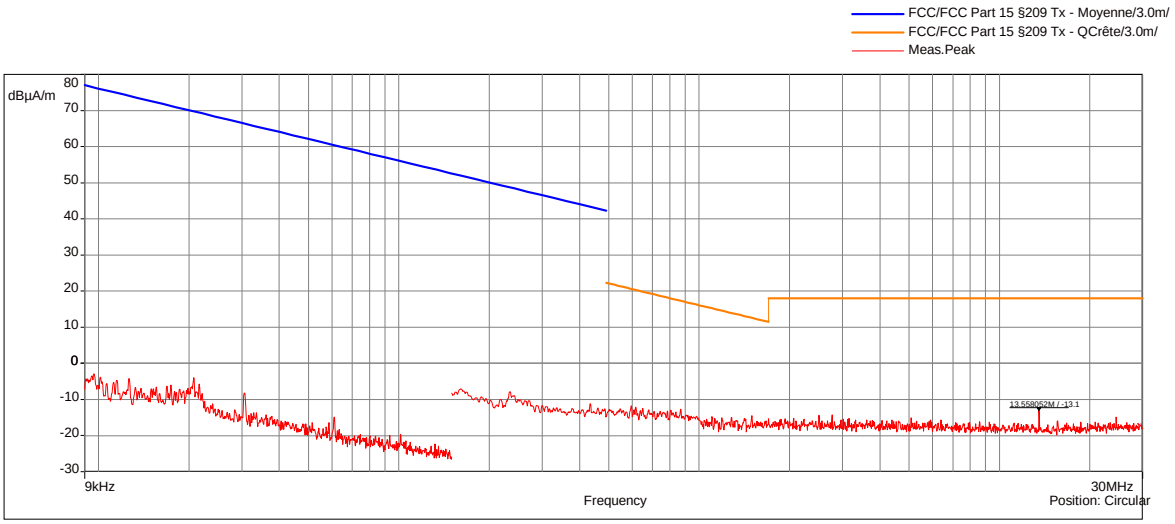
*EUT modification(s): N/A*

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CARD EMUL / POSITION 2 | | EMI4315 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:46:16 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |



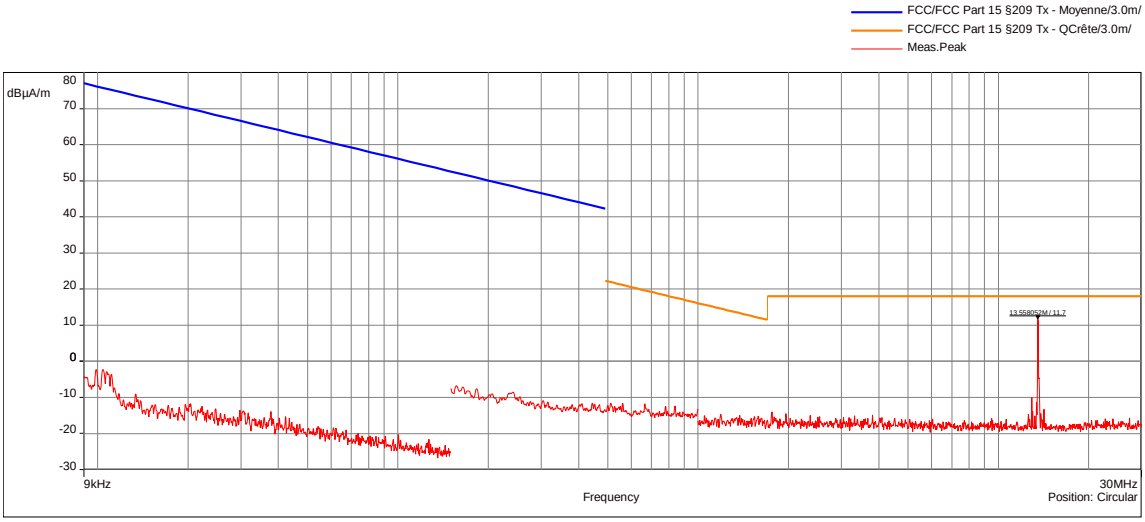

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency | | | |
| *EUT modification(s): N/A* | | | | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CARD EMUL / POSITION 2 | | EMI4316 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:46:48 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor. | | | |
| *EUT modification(s): N/A* | | | | |

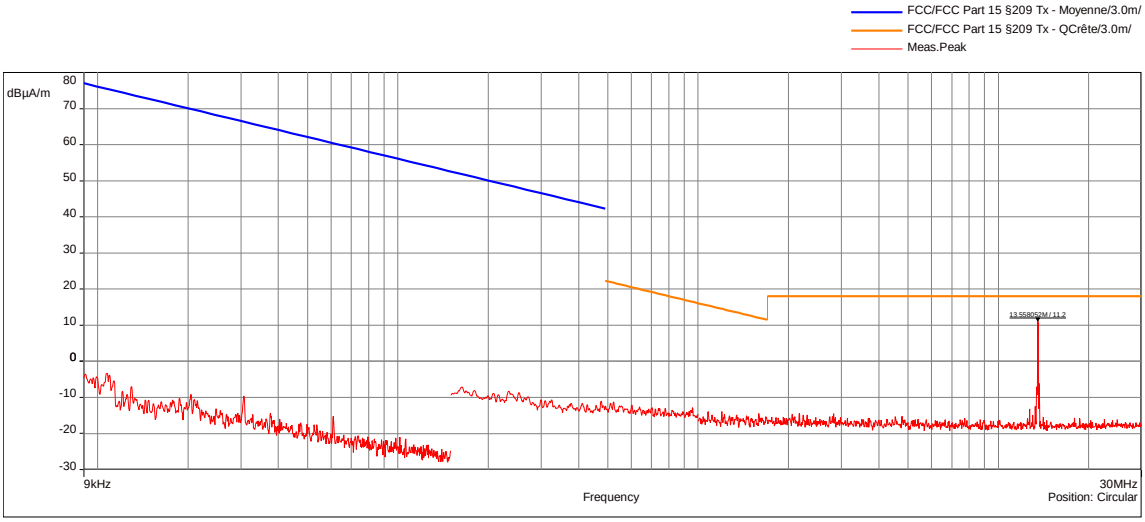
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 0° / CARD EMUL / POSITION 3 | | EMI4317 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:54:27 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

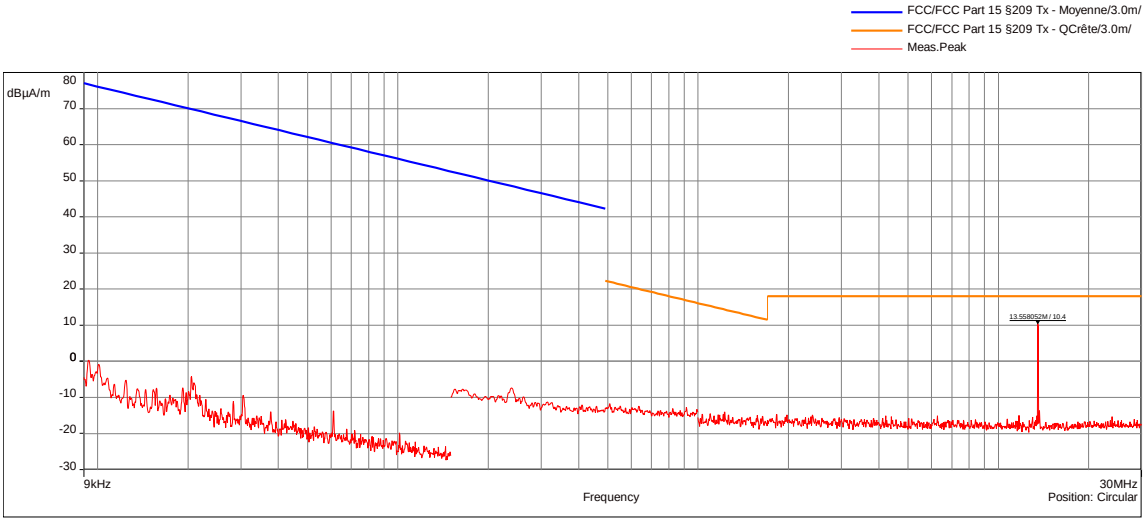
| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 45° / CARD EMUL / POSITION 3 | | EMI4318 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 09:57:28 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |
| *EUT modification(s): N/A* | |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| TX/ 90° / CARD EMUL / POSITION 3 | | EMI4319 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22 |
| **Test Date:** | 28/05/2019 10:00:41 | **H (%):** | 48.7 |
| **Test Operator:** | MPA | **P (hPa):** | 1010 |

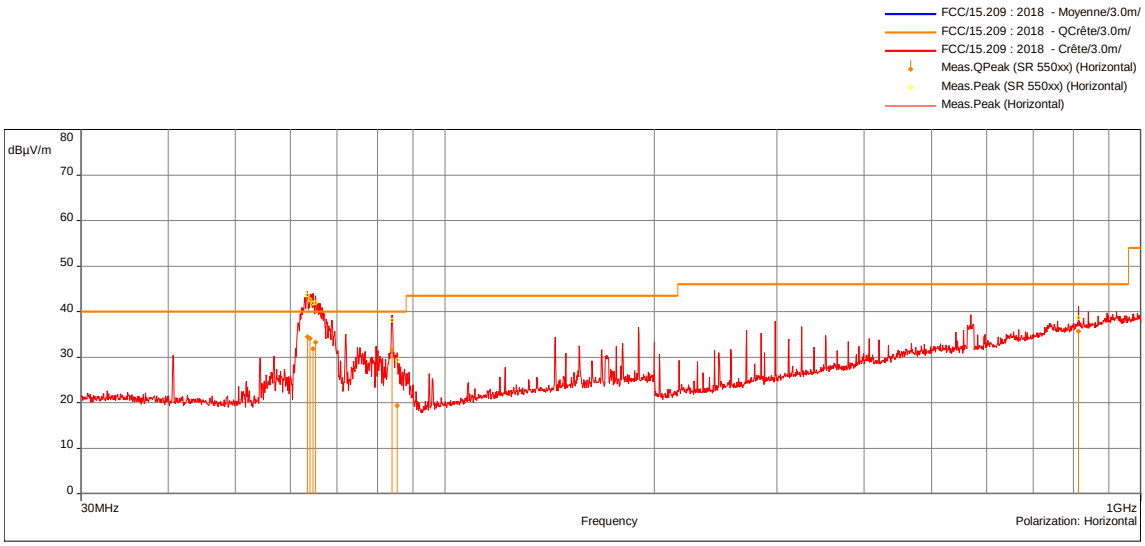


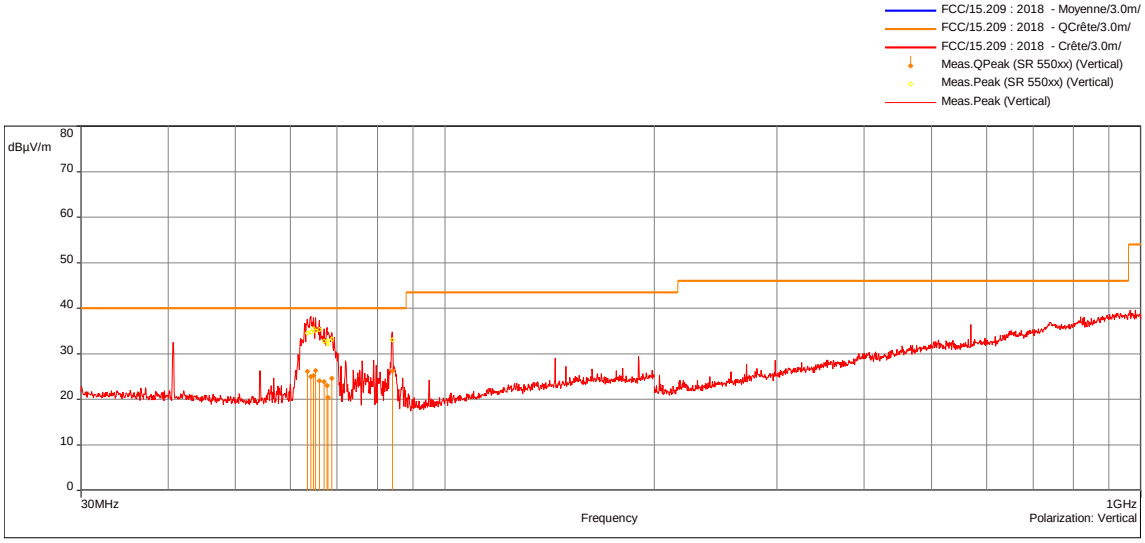

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |

| | |
|---|---|
| **Configuration:** | N/A |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.<br>13.56MHz: Util frequency |

*EUT modification(s): N/A*

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CONFIG TAG / POSITION 1 | | EMI4295 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 16:18:15 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |

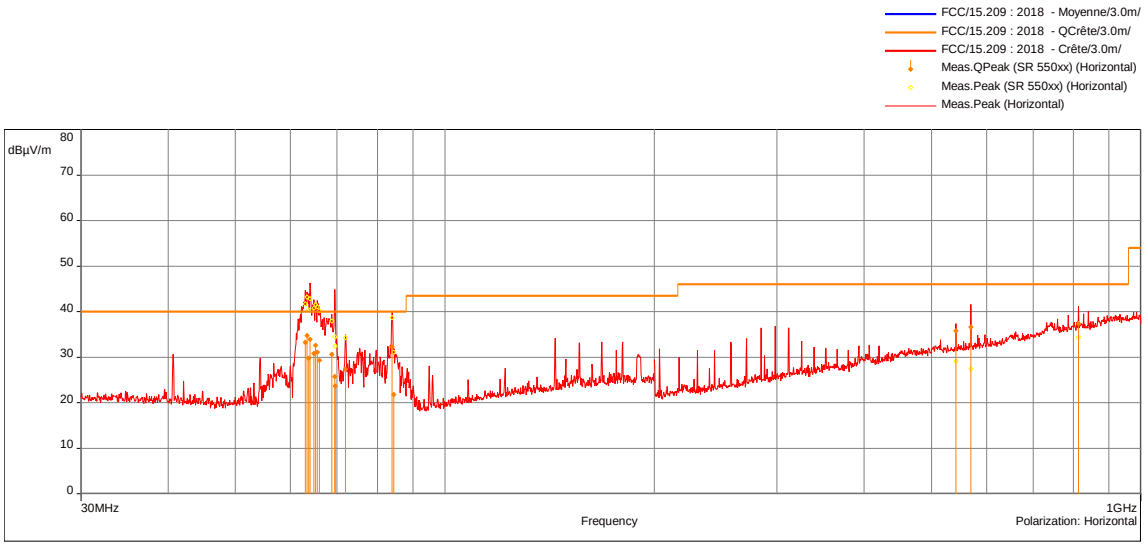


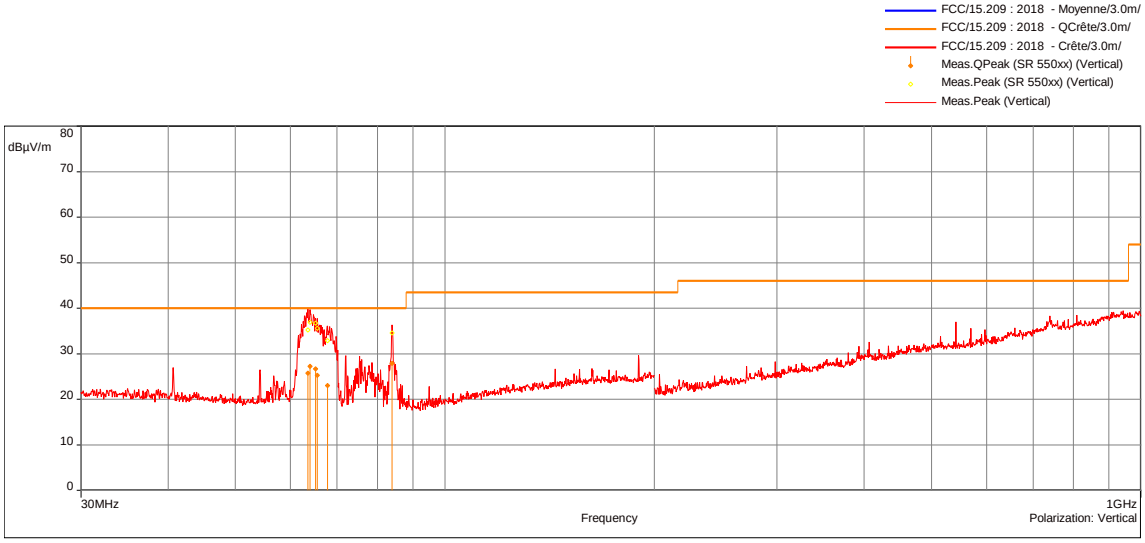




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 63.435478 | Vertical | 34.54 | 26.15 | 40 | -13.85 |
| 64.203394 | Vertical | 34.76 | 25 | 40 | -15 |
| 64.6807472 | Vertical | 35.5 | 25.19 | 40 | -14.81 |
| 65.1581004 | Vertical | 35.02 | 26.34 | 40 | -13.66 |
| 66.0090343 | Vertical | 35.35 | 24 | 40 | -16 |
| 67.0260042 | Vertical | 32.81 | 23.88 | 40 | -16.12 |
| 67.7524112 | Vertical | 32.81 | 23.03 | 40 | -16.97 |
| 67.8769381 | Vertical | 32.09 | 20.4 | 40 | -19.6 |
| 68.81089 | Vertical | 33.28 | 24.61 | 40 | -15.39 |
| 84.0446832 | Vertical | 33.08 | 26.16 | 40 | -13.84 |
| 63.435478 | Horizontal | 43.63 | 34.51 | 40 | -5.49 |
| 64.0166036 | Horizontal | 42.65 | 34.11 | 40 | -5.89 |
| 64.6392382 | Horizontal | 41.91 | 31.82 | 40 | -8.18 |
| 65.1996093 | Horizontal | 41.99 | 33.26 | 40 | -6.74 |
| 83.9824197 | Horizontal | 38.13 | 31.44 | 40 | -8.56 |
| 85.3314614 | Horizontal | 29.43 | 19.36 | 40 | -20.64 |
| 813.649127 | Horizontal | 38.71 | 35.72 | 46 | -10.28 |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CONFIG TAG / POSITION 2 | | EMI4296 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 13:42:11 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |

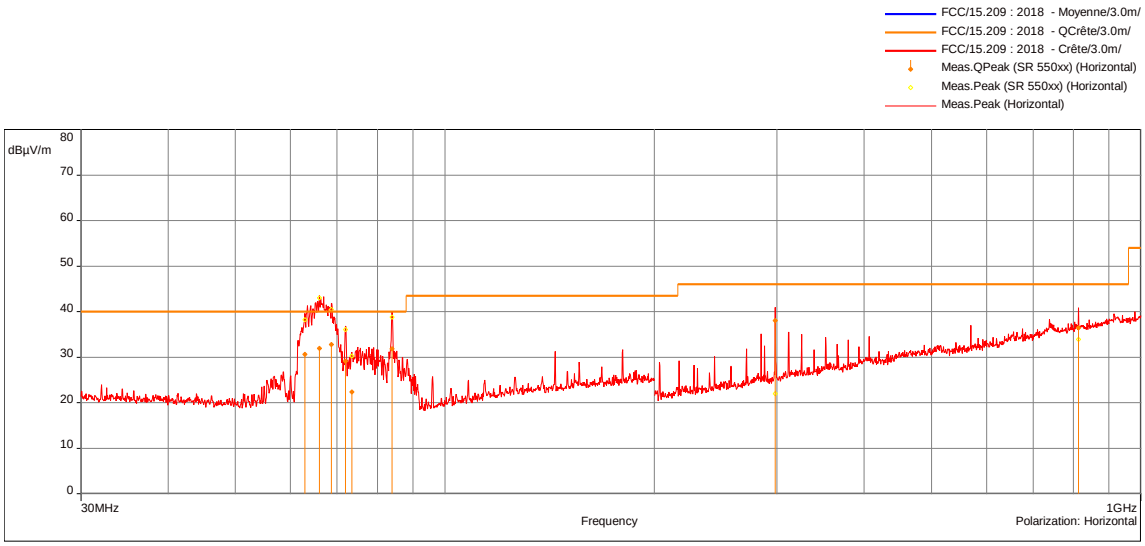


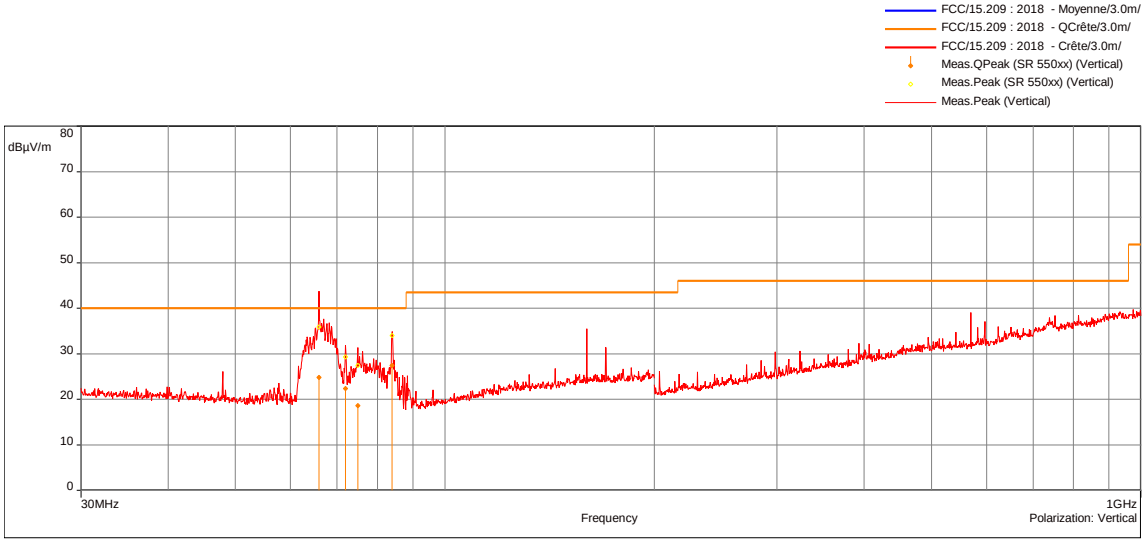




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 63.5600049 | Vertical | 35.17 | 25.75 | 40 | -14.25 |
| 63.9958491 | Vertical | 36.95 | 27.23 | 40 | -12.77 |
| 65.1373459 | Vertical | 36.76 | 26.69 | 40 | -13.31 |
| 65.5316811 | Vertical | 35.62 | 25.25 | 40 | -14.75 |
| 67.7731657 | Vertical | 32.86 | 23.03 | 40 | -16.97 |
| 83.9824197 | Vertical | 34.52 | 27.89 | 40 | -12.11 |
| 62.9996337 | Horizontal | 41.72 | 33.27 | 40 | -6.73 |
| 63.3732145 | Horizontal | 43.21 | 34.72 | 40 | -5.28 |
| 63.7467953 | Horizontal | 40.42 | 29.81 | 40 | -10.19 |
| 64.0166036 | Horizontal | 42.79 | 33.86 | 40 | -6.14 |
| 64.8467831 | Horizontal | 40.73 | 30.78 | 40 | -9.22 |
| 65.1996093 | Horizontal | 41.55 | 32.61 | 40 | -7.39 |
| 65.5524356 | Horizontal | 41.04 | 31.07 | 40 | -8.93 |
| 66.0505433 | Horizontal | 40.17 | 29.28 | 40 | -10.72 |
| 68.7486265 | Horizontal | 37.94 | 30.6 | 40 | -9.4 |
| 69.4957881 | Horizontal | 34.42 | 25.72 | 40 | -14.28 |
| 69.578806 | Horizontal | 32.4 | 23.67 | 40 | -16.33 |
| 71.9863265 | Horizontal | 34.31 | 27.38 | 40 | -12.62 |
| 84.0031742 | Horizontal | 38.71 | 32.18 | 40 | -7.82 |
| 84.418264 | Horizontal | 31.05 | 21.78 | 40 | -18.22 |
| 542.424612 | Horizontal | 29.07 | 35.8 | 46 | -10.2 |
| 569.576364 | Horizontal | 27.46 | 36.58 | 46 | -9.42 |
| 813.649127 | Horizontal | 34.34 | 37.39 | 46 | -8.61 |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CONFIG TAG / POSITION 3 | | EMI4297 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 14:07:39 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |

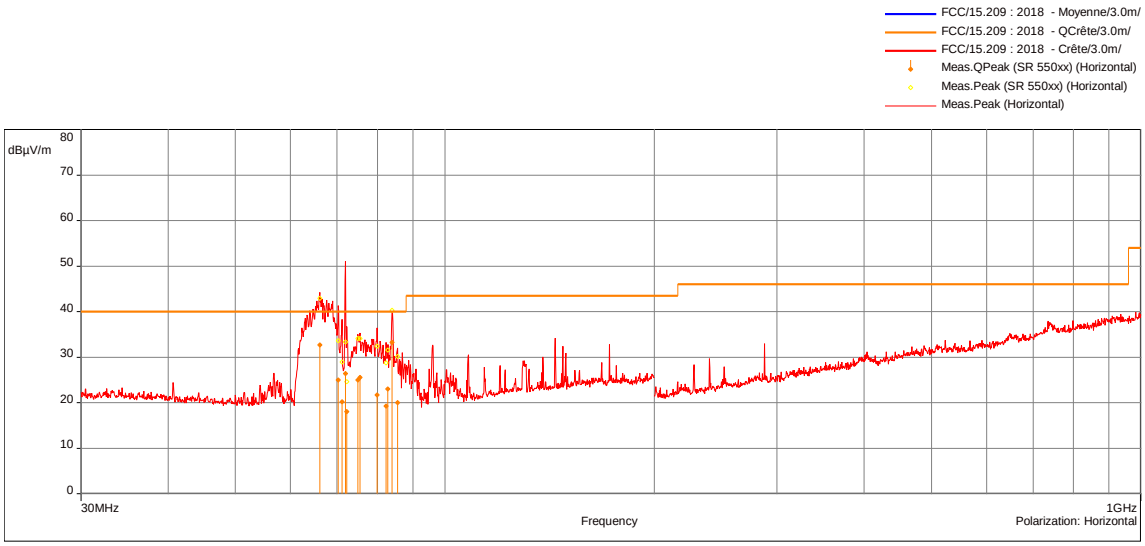


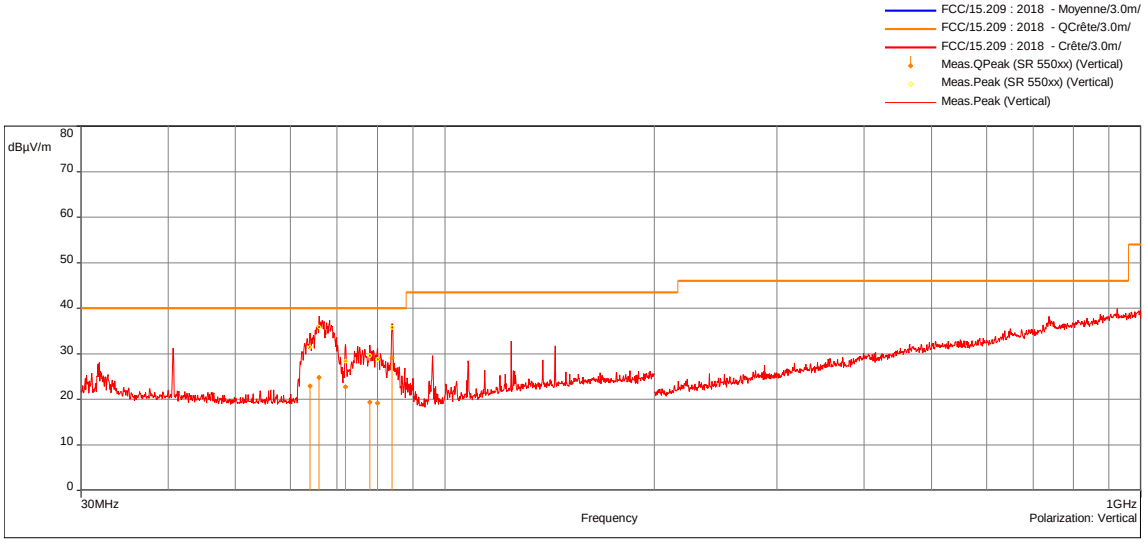




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 65.8845074 | Vertical | 35.91 | 24.77 | 40 | -15.23 |
| 72.0070809 | Vertical | 29.28 | 22.39 | 40 | -17.61 |
| 74.954218 | Vertical | 27.46 | 18.6 | 40 | -21.4 |
| 83.9824197 | Vertical | 34.01 | 27.43 | 40 | -12.57 |
| 62.9581248 | Horizontal | 38.21 | 30.59 | 40 | -9.41 |
| 66.0505433 | Horizontal | 42.99 | 31.97 | 40 | -8.03 |
| 68.7278721 | Horizontal | 40.47 | 32.79 | 40 | -7.21 |
| 71.965572 | Horizontal | 36.11 | 29.16 | 40 | -10.84 |
| 73.459895 | Horizontal | 30.26 | 22.38 | 40 | -17.62 |
| 83.9409108 | Horizontal | 38.82 | 31.87 | 40 | -8.13 |
| 298.35185 | Horizontal | 21.99 | 37.99 | 46 | -8.01 |
| 813.649127 | Horizontal | 33.86 | 36.48 | 46 | -9.52 |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CARD EMUL / POSITION 1 | | EMI4298 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 14:26:57 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |

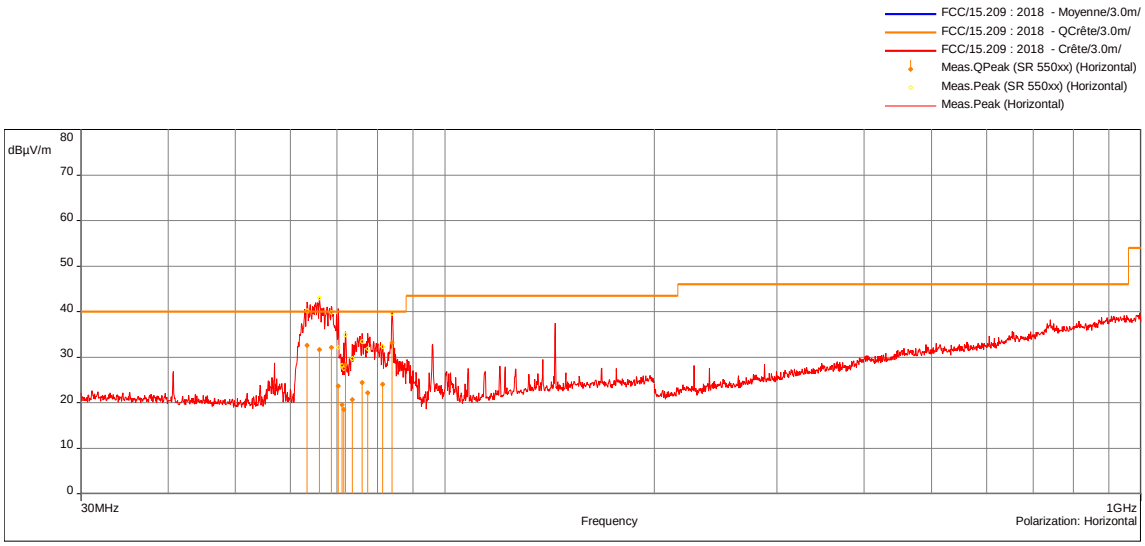


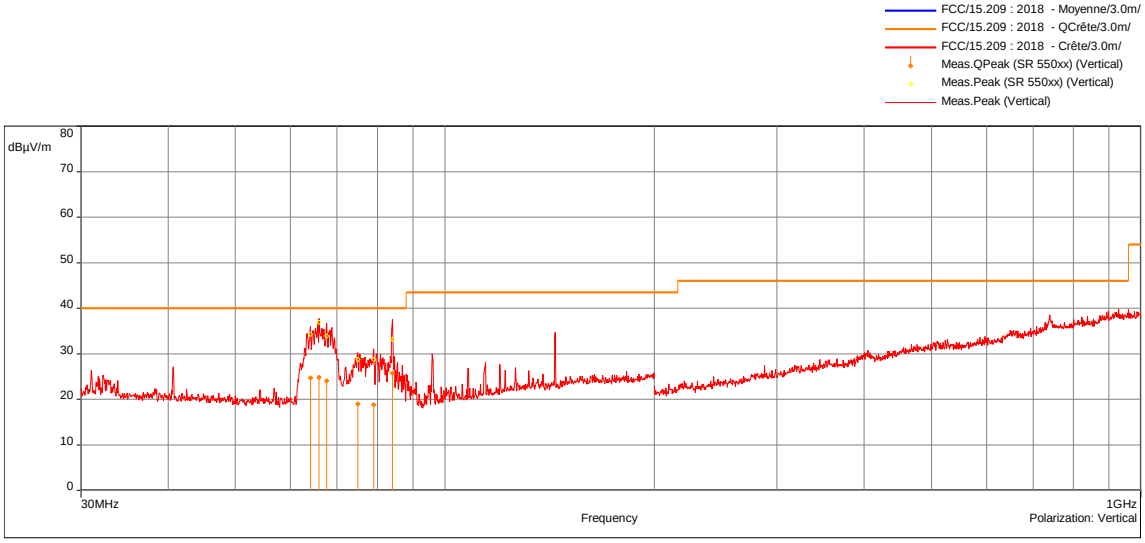




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 63.9958491 | Vertical | 31.48 | 22.92 | 40 | -17.08 |
| 65.9675253 | Vertical | 35.83 | 24.8 | 40 | -15.2 |
| 71.9863265 | Vertical | 28.41 | 22.7 | 40 | -17.3 |
| 78.0051276 | Vertical | 29.62 | 19.36 | 40 | -20.64 |
| 80.0598218 | Vertical | 28.74 | 19.17 | 40 | -20.83 |
| 83.9409108 | Vertical | 35.81 | 29.11 | 40 | -10.89 |
| 66.0920523 | Horizontal | 42.88 | 32.67 | 40 | -7.33 |
| 70.2844586 | Horizontal | 33.6 | 25.02 | 40 | -14.98 |
| 71.156147 | Horizontal | 28.91 | 20.23 | 40 | -19.77 |
| 71.924063 | Horizontal | 33.36 | 26.39 | 40 | -13.61 |
| 72.3183982 | Horizontal | 24.57 | 18.01 | 40 | -21.99 |
| 74.954218 | Horizontal | 34.06 | 25 | 40 | -15 |
| 75.4730802 | Horizontal | 34.14 | 25.58 | 40 | -14.42 |
| 79.9352948 | Horizontal | 32.4 | 21.7 | 40 | -18.3 |
| 82.2597973 | Horizontal | 28.74 | 19.24 | 40 | -20.76 |
| 82.8201685 | Horizontal | 31.56 | 23.02 | 40 | -16.98 |
| 83.9824197 | Horizontal | 40.27 | 33.24 | 40 | -6.76 |
| 85.4559883 | Horizontal | 30.17 | 19.98 | 40 | -20.02 |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CARD EMUL / POSITION 2 | | EMI4299 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 14:52:42 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |

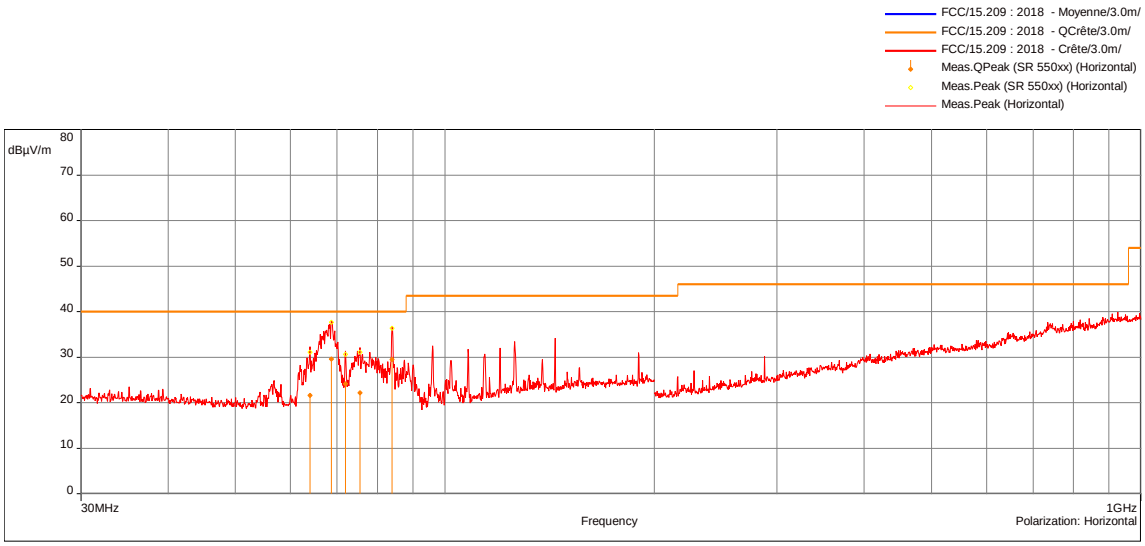


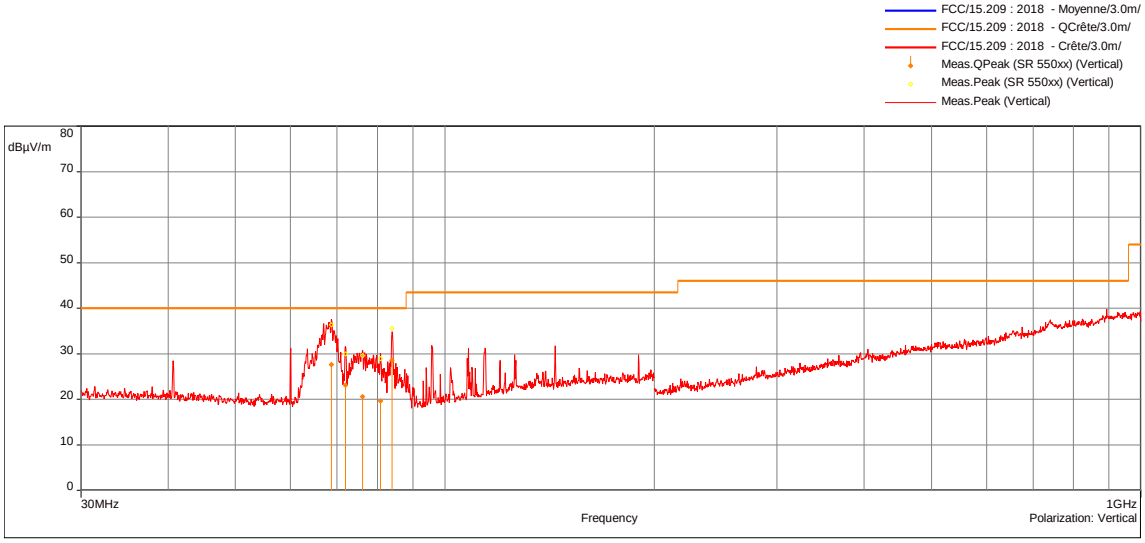




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 64.0996215 | Vertical | 34.33 | 24.71 | 40 | -15.29 |
| 65.9675253 | Vertical | 36.91 | 24.83 | 40 | -15.17 |
| 67.5863753 | Vertical | 33.88 | 24.08 | 40 | -15.92 |
| 74.9334636 | Vertical | 28.74 | 19 | 40 | -21 |
| 78.959834 | Vertical | 28.72 | 18.77 | 40 | -21.23 |
| 84.0654377 | Vertical | 33.11 | 25.76 | 40 | -14.24 |
| 63.393969 | Horizontal | 40.21 | 32.62 | 40 | -7.38 |
| 65.9882798 | Horizontal | 43.04 | 31.68 | 40 | -8.32 |
| 68.7071176 | Horizontal | 39.87 | 32.13 | 40 | -7.87 |
| 70.2844586 | Horizontal | 32.13 | 23.7 | 40 | -16.3 |
| 71.156147 | Horizontal | 28.2 | 19.5 | 40 | -20.5 |
| 71.5712367 | Horizontal | 27.5 | 18.54 | 40 | -21.46 |
| 71.9863265 | Horizontal | 34.92 | 28.39 | 40 | -11.61 |
| 73.6051764 | Horizontal | 29.72 | 20.69 | 40 | -19.31 |
| 76.0126969 | Horizontal | 33.47 | 24.38 | 40 | -15.62 |
| 77.5070199 | Horizontal | 31.86 | 22.14 | 40 | -17.86 |
| 81.3881089 | Horizontal | 32.26 | 24.09 | 40 | -15.91 |
| 83.9824197 | Horizontal | 39.66 | 33.11 | 40 | -6.89 |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH | | | |
|---|---|---|---|
| TX MODE/ CARD EMUL / POSITION 3 | | EMI4300 | |
| **EUT mode:** | D-M2 | **T (°C):** | 22.3 |
| **Test Date:** | 27/05/2019 15:10:03 | **H (%):** | 48 |
| **Test Operator:** | MPA | **P (hPa):** | 1011 |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 30MHz-200MHz | 100kHz | 300kHz | Peak |
| Horizontal | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| Vertical | 200MHz-1GHz | 100kHz | 300kHz | Peak |
| **Configuration:** | | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| Frequency (MHz) | Polarisation | Peak (dBµV/m) | QP (dBµV/m) | QP Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 68.6863631 | Vertical | 36.37 | 27.62 | 40 | -12.38 |
| 71.9863265 | Vertical | 29.95 | 23.07 | 40 | -16.93 |
| 76.0957148 | Vertical | 29.54 | 20.53 | 40 | -19.47 |
| 80.7862288 | Vertical | 28.96 | 19.67 | 40 | -20.33 |
| 83.9616652 | Vertical | 35.61 | 28.53 | 40 | -11.47 |
| 63.9958491 | Horizontal | 31.06 | 21.58 | 40 | -18.42 |
| 68.7278721 | Horizontal | 37.67 | 29.6 | 40 | -10.4 |
| 71.965572 | Horizontal | 30.6 | 24.15 | 40 | -15.85 |
| 75.4523257 | Horizontal | 31.09 | 22.18 | 40 | -17.82 |
| 84.0031742 | Horizontal | 36.31 | 29.52 | 40 | -10.48 |

## 6.4. Field strength in the band 13.553-13.567MHz

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.225 a) & RSS-210 |
| **Test method:** | FCC part 15 Radio part 15.225 a) & RSS-210 |
| **General test setup:** EUT is set on an insulating support at 80cm. Measurements were then performed in a 10-meter Open Area Test Site that complies to CISPR 16.<br>The EUT was rotated 360° in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°).<br>For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded. | |

| TEST CASE | EUT MODE | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| Tx mode | Permanent emission mode | 15848µV/m at 30m | - | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | N/A |
| Relative Humidity | 20 to 75 % | N/A |
| Atmospheric pressure | N/A | N/A |
| **Test method deviation:** N/A | | |
| Supplementary information: N/A | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | Rohde & Schwarz | HFH2-Z2 | 5825 | 20/09/2017 | 20/11/2019 |
| Antenna mast | INNCO | MA4000-EP-O | 10261 | | |
| Cable | Huber + Suhner | N-20m | 8385 | 11/10/2017 | 11/12/2019 |
| Mast controller | Heinrich Deisel | HD100 | 4036 | | |
| Open area test site | EMITECH | Salinelles | 3482 | 10/10/2017 | 10/12/2020 |
| Receiver | Rohde & Schwarz | ESHS10 | 3371 | 20/09/2018 | 20/11/2019 |
| Turntable | Heinrich Deisel | D4420 | 4038 | | |

Blank cells = Permanent validity

| FIELD STRENGTH - TABULATED RESULTS – CONFIG TAG | | | | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Polarization (°)** | **Level at 10m (dBµA/m)** | **Limit at 10m (dBµA/m)** | **Limit at 30m (µV/m)** |
| 13.56 | 0 | -1.91 | 51.58 | 15848 |
| 13.56 | 45 | -0.41 | 51.58 | 15848 |
| 13.56 | 90 | 2.69 | 51.58 | 15848 |

Maximun level at 10m is 2.69dBµA/m for a limit at 51.58 dBµA/m.
Using an extrapolation factor of 40dB/dec and a conversion factor of -51.5dB, level at 30m is 35.11 dBµV/m for a limit at 84 dBµV/m.

| FIELD STRENGTH - TABULATED RESULTS – CARD EMULATION | | | | |
|---|---|---|---|---|
| **Frequency (MHz)** | **Polarization (°)** | **Level at 10m (dBµA/m)** | **Limit at 10m (dBµA/m)** | **Limit at 30m (µV/m)** |
| 13.56 | 0 | -5.71 | 51.58 | 15848 |
| 13.56 | 45 | -4.21 | 51.58 | 15848 |
| 13.56 | 90 | -1.01 | 51.58 | 15848 |

Maximun level at 10m is -1.01dBµA/m for a limit at 51.58 dBµA/m.
Using an extrapolation factor of 40dB/dec and a conversion factor of -51.5dB, level at 30m is 31.41 dBµV/m for a limit at 84 dBµV/m.

**TEST SETUP PHOTO(S)**

## 6.5. Field strength outside the band 13.110-14.010MHz

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.225 b) c) & d) & RSS-210 |
| **Test method:** | FCC part 15 Radio part 15.225 a) c) & d) & RSS-210 |
| **General test setup:** EUT is set inside the climatic enclosure.<br>Carrier level are correlated with the maximum carrier level measured in normal conditions. | |

| FREQUENCY BAND | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|
| Below 13.110MHz | §15.209 | See graphic & §6.3 of this report | **PASS** |
| 13.110-13.410MHz | 106µV/m at 30m | See graphic | **PASS** |
| 13.410-13.553MHz | 334µV/m at 30m | See graphic | **PASS** |
| 13.553-13.567MHz | 15,848µV/m at 30m | See graphic & §6.4 of this report | **PASS** |
| 13.567-13.710MHz | 334µV/m at 30m | See graphic | **PASS** |
| 13.710-14.010MHz | 106µV/m at 30m | See graphic | **PASS** |
| Above 14.010MHz | §15.209 | See graphic & §6.3 of this report | **PASS** |

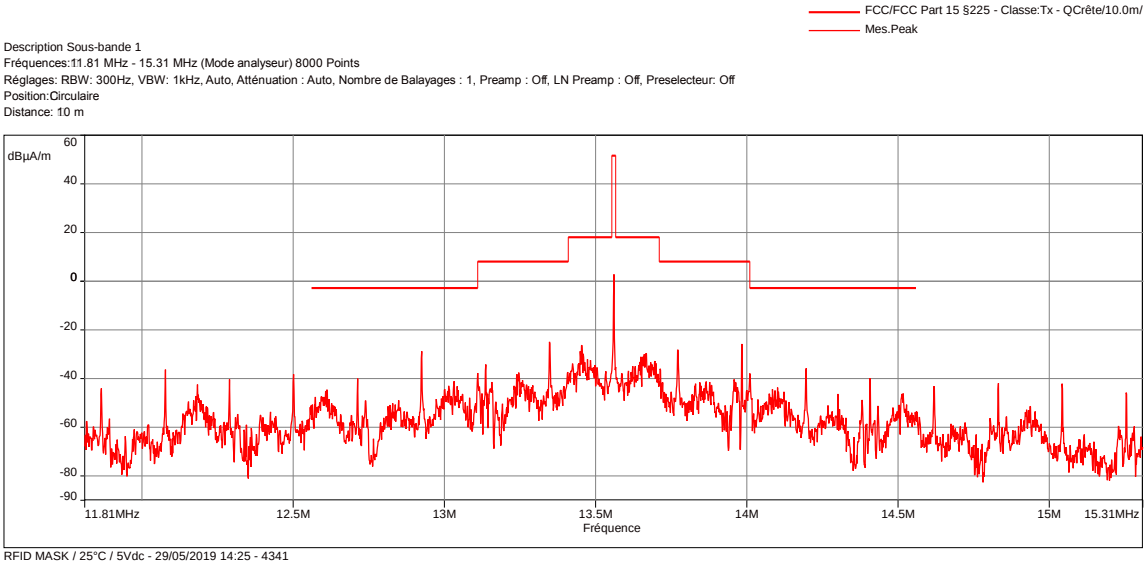
| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | *See Graph(es)* |
| Relative Humidity | 20 to 75 % | *See Graph(es)* |
| Atmospheric pressure | N/A | *See Graph(es)* |
| **Test method deviation:** N/A | | |
| Supplementary information: Test are done in the worst configuration mode: Config Tag which presents the higher carrier level (All modulations activated at the same time). | | |

**TEST EQUIPMENT USED**

| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
|---|---|---|---|---|---|
| AC power source | KIKUSUI | PCR4000L | 3074 | 12/06/2018 | 12/08/2019 |
| Antenna | Emitech | 3.5 cm | 4653 | | |
| Cable | MICRO-COAX | N-3m | 10535 | 06/04/2017 | 06/06/2019 |
| Climatic enclosure | CLIMATS | EXCAL 7714-HA | 14261 | 26/04/2018 | 26/06/2019 |
| Multimeter | FLUKE | 8808A | 12446 | 24/04/2018 | 24/06/2019 |
| Spectrum analyzer | Rohde & Schwarz | FSW43 | 14830 | 28/12/2018 | 28/02/2020 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermohygrometer | Testo | 608-H2 | 12268 | 27/11/2017 | 27/01/2020 |

Blank cells = Permanent validity

| FIELD STRENGTH IN THE BAND 13.110-14.010MHZ AND OUTSIDE - GRAPH | | | |
|---|---|---|---|
| FIELD STRENGTH IN THE BAND 13.110-14.010MHZ AND OUTSIDE | | EMI5564 | |
| **EUT mode:** | Tx mode | **T (°C):** | 21.3°C |
| **Test Date:** | 10/04/2019 | **H (%):** | 39.4 % |
| **Test Operator:** | MPA | **P (hPa):** | 1015hPa |




| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| RF port | 11.81-15.31MHz | 300Hz | 1kHz | Peak max hold |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor. | | | |
| *EUT modification(s): N/A* | | | | |

## 6.6. Measurement of Frequency Stability

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.225 e) & RSS-210 |
| **Test method :** | FCC part 15 Radio part 15.225 e), ANSI C63.10:2013 and RSS Gen |

**General test setup:** The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

EUT is set inside the climatic enclosure. Carrier level are correlated with the maximum carrier level measured in normal conditions.

A digital temperature probe is set near the equipement in order to ensure a temperature stabilisation.

Measurement are made according to ANSI C63.10:2013 §6.8.1, only extremes tests values are shown in final results.

| TEST CASE | EUT MODE | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| Tx mode | Tx mode | +/-0.01% | - | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | N/A |
| Relative Humidity | 20 to 75 % | N/A |
| Atmospheric pressure | N/A | N/A |
| **Test method deviation:** N/A | | |
| Supplementary information: N/A | | |

**TEST EQUIPMENT USED**

| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
|---|---|---|---|---|---|
| AC power source | KIKUSUI | PCR4000L | 3074 | 12/06/2018 | 12/08/2019 |
| Antenna | Emitech | 3.5 cm | 4653 | | |
| Cable | MICRO-COAX | N-3m | 10535 | 06/04/2017 | 06/06/2019 |
| Climatic enclosure | CLIMATS | EXCAL 7714-HA | 14261 | 26/04/2018 | 26/06/2019 |
| Digital thermometer | GHM Greisinger | GMH 3710 | 12968 | 11/02/2019 | 11/04/2020 |
| Multimeter | FLUKE | 8808A | 12446 | 24/04/2018 | 24/06/2019 |
| Spectrum analyzer | Rohde & Schwarz | FSW43 | 14830 | 28/12/2018 | 28/02/2020 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermohygrometer | Testo | 608-H2 | 12268 | 27/11/2017 | 27/01/2020 |
| Thermometer contactless | GHM Greisinger | GMH 3710 | 12968 | 11/02/2019 | 11/04/2020 |

Blank cells = Permanent validity

| EFFECTIVE RADIATED POWER - TABULATED RESULTS | | | | |
|---|---|---|---|---|
| **Test Case (Temperature variation)** | **Temperature (°C)** | **Power supply (Vdc)** | **Frequency (MHz)** | **Frequency error (%)** |
| Normal conditions | 25 | 5 | 13.560268 | - |
| Extremes tests conditions | -30 | 5 | 13.5602425 | 0.00179 |
| | +55 | 5 | 13.5602025 | 0.00149 |

**TEST SETUP PHOTO(S)**


**End of test report**