**Test report issued under the responsibility of:**
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006 (FCC#: 954701)
Canadian CAB Identifier: FR0003 (ISED#: 4379C)

# RADIO TEST REPORT

## FCC 47 CFR PART 15: 2020
## RSS-210

| | |
|---|---|
| **Company** ..... : | **STID** |
| Address..... : | 20 PA des Pradeaux<br>Boulevard Salvador Allende<br>13850 GREASQUE<br>FRANCE |

| | |
|---|---|
| **Test item description**. ..... : | **Access Controler** |
| Trade Mark. ..... : | STid |
| Manufacturer. ..... : | STid |
| Model/Type reference..... : | SE8M / ARC-SE8M - complete configuration: ARCS-KM/BT2 |
| FCC ID. ..... : | OVNSE8M |
| IC. ..... : | 10520A-SE8M |
| Ratings..... : | 7Vdc-28Vdc |

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

| | |
|---|---|
| **Report Reference No**. ..... : | **RR410-20-102742-6A** |
| Test procedure. ..... : | FCC Certification |
| Diffusion. ..... : | Mr SILVE |
| Applicant's name. ..... : | STID |
| Date of issue. ..... : | March 3, 2022 |
| Total number of pages..... : | 32 |
| Revision. ..... : | 0 |
| Modified page(s). ..... : | Creation |
| Compiled by. ..... : | Nicolas SOULAY |
| Approved by (+ signature). ..... : | Olivier HEYER (Laboratory Manager) |

*Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above. This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.*

**REPORT INDEX:**



**REVISION HISTORY:**

| Revision | Date | Modified pages | Modifications |
|---|---|---|---|
| 0 | March 3, 2022 | / | Creation |

# 1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **Access Controler SE8M complete configuration: ARCS-KM/BT2** (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 Location** | EMITECH MONTPELLIER laboratory |
| Address | 145 rue de Massacan<br>34740 VENDARGUES<br>FRANCE |
| Test procedure. | FCC Certification |
| Tested by | Nicolas SOULAY |
| Test supervisor | David MONTAULON |
| Date of receipt of test item | N/A |
| Date (s) of performance of tests | February 10 to March 03 of 2021 |

**APPLICANT'S GENERAL INFORMATIONS:**

| | |
|---|---|
| **Company name** | STID |
| Company address. | 20 PA des Pradeaux - Boulevard Salvador Allende - 13850 GREASQUE<br>FRANCE |
| Person(s) present during the tests. | No representative for company attended the tests. |
| Responsible. | Mr SILVE |

**GENERAL REMARKS:**

**The information in italics is declared by the manufacturer and is under his responsibility**
**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.**

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report the decimal separator is point.

**POSSIBLE TEST CASE VERDICTS:**

| | |
|---|---|
| Test case does not apply to the test object. | N/A |
| Test case not performed | N/P |
| Test object does meet the requirement. | P (Pass) |
| Test object does not meet the requirement. | F (Fail) |

**DEFINITIONS AND ABBREVIATIONS:**

| | | | | | |
|---|---|---|---|---|---|
| E.U.T. | Equipement under test | AE | Ancillary equipment | Pk | Peak detector |
| RBW | Resolution bandwidth | VBW | Video bandwidth | QP | Quasi-peak detector |
| OATS | Open area test site | FAR | Full anechoic room | Av | Average detector |
| VP | Vertical Polarization | HP | Horizontal Polarization | RMS | Root Mean Square |
| RF | Radio frequency | NTR | Nothing to report | N/C | Not communicated |

## 2. REFERENCE DOCUMENT(S)

**NORMATIVE REFERENCES:**

The following referenced documents are necessary for the application of the present test report.

**FCC 47 CFR PART 15: 2020**
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.

**RSS-210_Issue 10, December 2019**
Licence-Exempt Radio Apparatus: Category I Equipment

**RSS/CNR-Gen,_Issue 5, March 2019**
Exigences générales et information relatives à la certification du matériel de radiocommunication

**ANSI C 63.10:2013**
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

**ANSI C 63.4:2014**
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

Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing.

**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. ..... : *Access Controler*
Model/Type reference..... : SE8M / ARC-SE8M - complete configuration: ARCS-KM/BT2
FCC ID. ..... : OVNSE8M
IC. ..... : 10520A-SE8M
Trade Mark. ..... : *STid*
Serial number (S/N). ..... : *G20310326*
Part number (P/N). ..... : *Not communicated*
Software version. ..... : *Not communicated*
Firmware version. ..... : *SY275A*
Type of sample. ..... : *Standard equipment*
Function(s). ..... : *13.56 MHz, 125kHz and Bluetooth reader*
Manufacturer name. ..... : *STid*
Address..... : *20 parc d'Activités des Pradeaux*

**General product information:**

N/A

## 3.2. EUT Marking plate

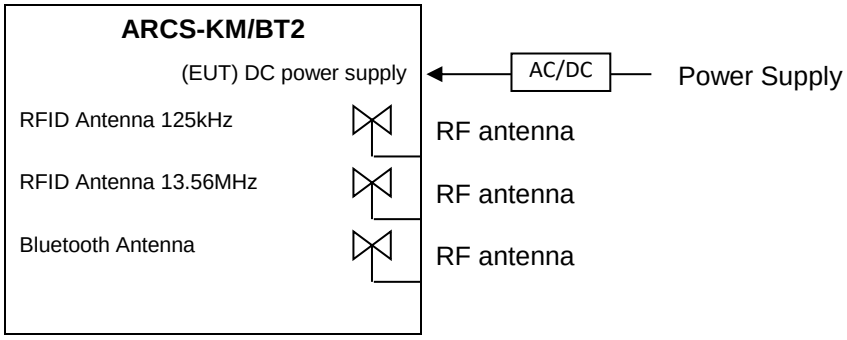

## 3.3. EUT General view

## 3.4. EUT Mechanical and Electrical Design

Power supply. ..... : *12Vdc*
Power supply range. ..... : *7Vdc-28Vdc*
Power type. ..... : *DC Power Supply*
Power (W). ..... : *3.12 max*
Nominal current (A). ..... : *0.26 max*
Dimensions (L x W x H) (m). ..... : *0.15 x 0.08 x0 .025*
Weight (kg). ..... : *0.180*
Temperature range (°C). ..... : *-20°C to +70°C*
Ground bounding strap. ..... : *No*

**Comments:**
*N/A*

## 3.5. EUT Input/Output ports




| PORT | NAME | TYPE | LENGHT | CABLE TYPE | COMMENTS |
|---|---|---|---|---|---|
| 0 | Main frame | N/E | N/A | Plastic | |
| 1 | Power Supply | AC/DC | | 2P | |
| 2 | RF antenna | RF | N/A | N/A | |
| 3 | RF antenna | RF | N/A | N/A | |
| 4 | RF antenna | RF | N/A | N/A | |

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

## 3.6. EUT Radio Specifications

| a) GENERAL INFORMATIONS |
|---|
| According to manufacturer's declarations :<br><br>EUT type..... : *Transmitter*<br>Technology..... : *RFID & Bluetooth*<br>Environmental profile..... : *N/C*<br>Temperature range..... : *-20°C to +70°C*<br>Antenna type ..... : *Integral*<br>Antenna Gain..... : *N/C*<br>**Comments:**<br>*N/A* |
| **b) TRANSMITTER PARAMETERS (TX)** |
| Frequency bands..... : *119kHz-140kHz*<br>*13.553MHz-13.567MHz*<br>*2400MHz-2483.5MHz*<br>RF Power..... : *N/C*<br>Number of channels / Separation..... : *N/C*<br>Modulation type ..... : *RFID: AM*<br>Duty cycle ..... : *N/C*<br>Tested frequency..... : *125kHz* |
| **c) RECEIVER PARAMETERS (RX)** |
| Frequency bands..... : *N/A*<br>Category/Class ..... : *N/A*<br>Bandwidth..... : *N/A* |

## 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 | |

| TEST DESIGNATION | SEVERITY | VERDICT | COMMENTS |
|---|---|---|---|
| **INTENTIONAL RADIATORS** | | | |
| **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** | |

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 $10^{-7}$ |
| Occuped bandwidth | | |
| RF power | ± 3.8 % | ± 5 % |
| Radiated emission (magnetic field) | | |
| 9kHz – 30MHz | ± 3 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 | ± 5.0 dB | / |
| 1GHz – 18GHz | ± 5.6 dB | / |
| Conducted emission | | |
| (Artificial Mains Network) 150kHz – 30MHz | ± 3.4 dB | ± 3.4 dB |

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

# 6. TEST CONDITIONS AND RESULTS

## 6.1. Conducted limits

| | |
|---|---|
| **Reference standard:** | FCC part 15.207& RSS-Gen |
| **Test method:** | ANSI C63.10 |
| **General test setup:** EUT is set on an insulating support at 40cm from the 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.<br>Additionnal ground terminals (if any) are connected to earth terminal of the AMN. | |

| TESTED CABLE | PARAMETER | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| ARCS-KM AC power supply | 150kHz-30MHz | Class B | EMI5972 | **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: N/A | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| Cable | N | 3m | 16421 | 04/05/2019 | 04/07/2021 |
| Cable | EMITECH | Current absorber sheath | 9491 | 23/06/2020 | 23/08/2022 |
| Ground plane | EMITECH | Test area | 11569 | | |
| LISN | PMM | L2-16 | 1209 | 08/06/2020 | 08/08/2022 |
| Receiver | Agilent Technologies | E4440A | 5824 | 22/10/2020 | 22/12/2022 |
| Receiver | Rohde & Schwarz | ESHS10 | 3371 | 27/04/2020 | 27/06/2021 |
| Software | Nexio | | 0000 | | |
| Surges Suppressor | Hewlett Packard | 11947A | 0239 | 27/01/2021 | 27/03/2024 |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/05/2020 | 07/07/2022 |

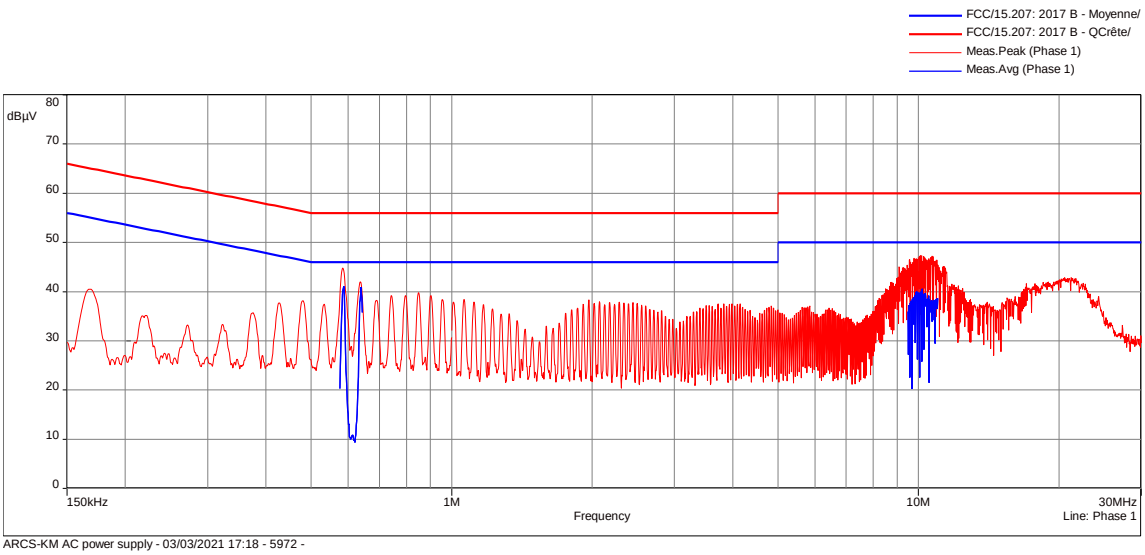
BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| TEST SETUP PHOTO(S) - ARCS-KM/BT2 AC POWER SUPPLY |
|---|
|  |

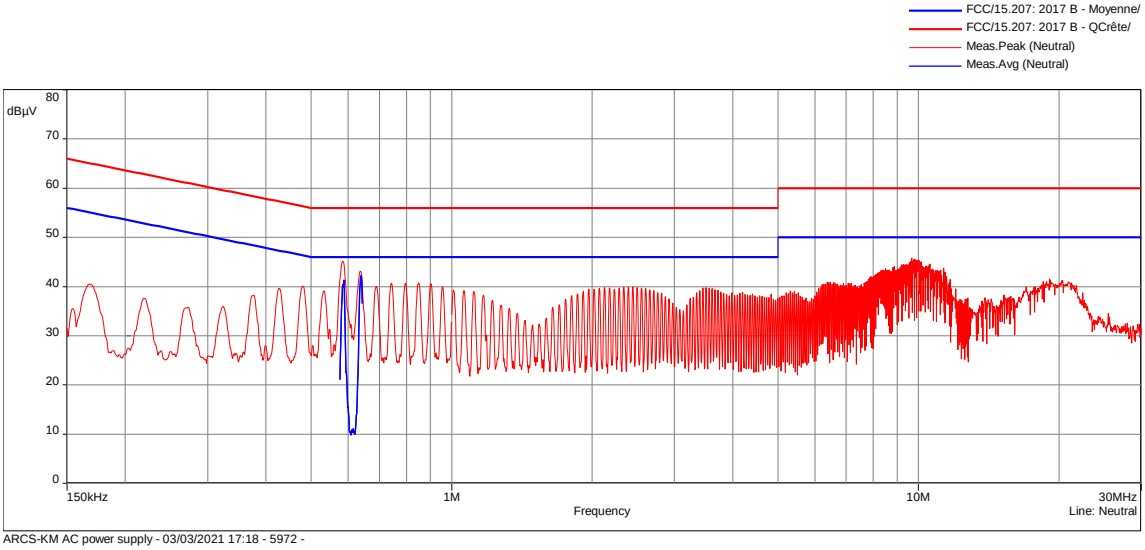


| CONDUCTED EMISSION (MEASUREMENT) - TABULATED RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| ARCS-KM/BT2 AC POWER SUPPLY | | | | | | EMI5972 | |
| **Terminal** | **Test Frequency (MHz)** | **Meter Reading dB (µV)** | **Detector (Pk/QP/Av)** | **Gain/Loss Factor (dB)** | **Level dB (µV)** | **Limit dB (µV)** | **Margin (dB)** |
| Neutral | 0.587 | / | Av | / | 41.39 | 46 | -4.61 |
| Neutral | 0.639 | / | Av | / | 42.22 | 46 | -3.78 |
| Neutral | 9.670 | / | Pk | / | 45.78 | 60 | -14.22 |
| Phase 1 | 0.587 | / | Av | / | 41.14 | 46 | -4.86 |
| Phase 1 | 0.64 | / | Av | / | 40.95 | 46 | -5.05 |
| Phase 1 | 10.193 | / | Av | / | 40.55 | 50 | -9.45 |
| Supplementary information: N/A | | | | | | | |

| CONDUCTED EMISSION (MEASUREMENT) - GRAPH | | | |
|---|---|---|---|
| ARCS-KM/BT2 AC POWER SUPPLY | | EMI5972 | |
| **EUT mode:** | #1 | **T (°C):** | 21.5 |
| **Test Date:** | 03/03/2021 17:18:42 | **H (%):** | 30.7 |
| **Test Operator:** | NSO | **P (hPa):** | 1020 |




ARCS-KM AC power supply - 03/03/2021 17:18 - 5972 -




ARCS-KM AC power supply - 03/03/2021 17:18 - 5972 -

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Neutral | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Neutral | 1MHz-10MHz | 10kHz | 30kHz | Peak |
| Neutral | 10MHz-30MHz | 10kHz | 30kHz | Peak |
| Phase 1 | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Phase 1 | 1MHz-10MHz | 10kHz | 30kHz | Peak |
| Phase 1 | 10MHz-30MHz | 10kHz | 30kHz | Peak |
| Neutral | 576kHz-644kHz | 10kHz | 30kHz | Average |
| Phase 1 | 576kHz-644kHz | 10kHz | 30kHz | Average |
| Phase 1 | 9.5MHz-11MHz | 10kHz | 30kHz | Average |
| **Measure with:** | A.M.N. | | | |
| **Comments:** | | | | |
| EUT modification(s): N/A | | | | |

## 6.2. 20 dB Bandwidth

| | |
|---|---|
| **Reference standard:** | FCC Radio part 15.215 & RSS-210 |
| **Test method:** | ANSI C63.10: 2013 |
| **General test setup:** EUT is connected to the measuring receiver via 50Ω attenuator(s) or a near field probe detects the field near the equipment. Tests are done in max-hold mode in order to capture all signal. | |

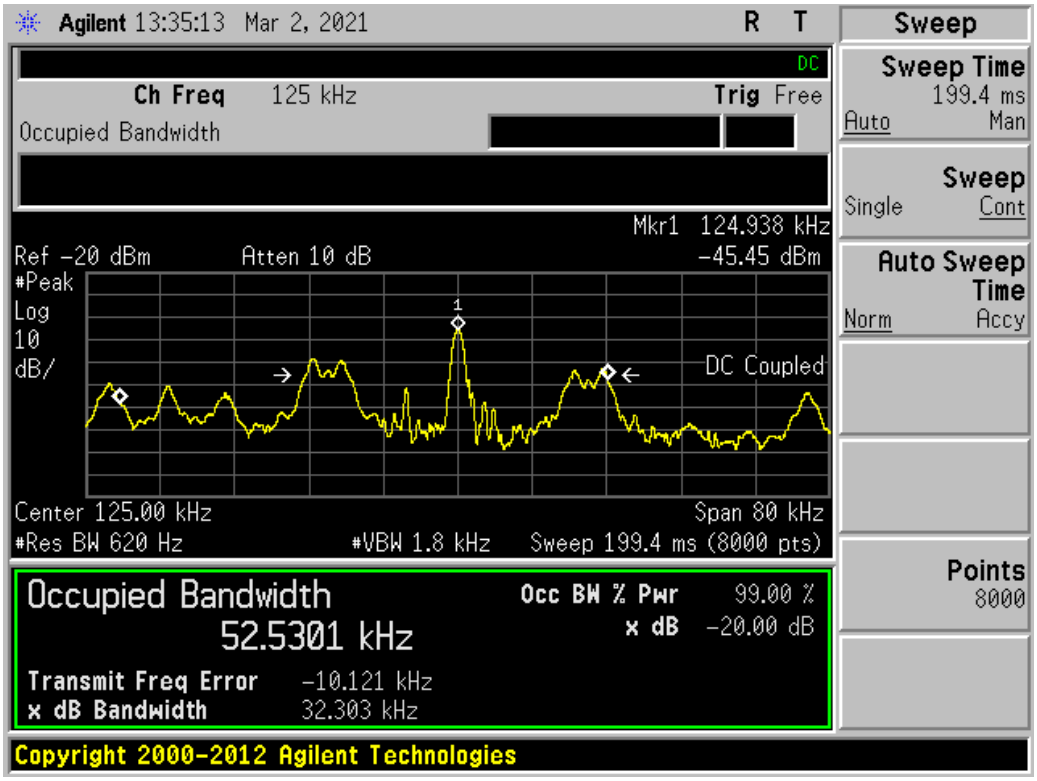
| TESTED CABLE | -20DB BANDWIDTH (KHZ) | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 25°C / 12Vdc | 32.303 | N/A | EMI5676 | **PASS** |
| 25°C / 7Vdc | 32.287 | N/A | EMI6012 | **PASS** |
| 25°C / 28Vdc | 32.277 | N/A | EMI6013 | **PASS** |

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

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| Antenna | EMITECH | 3.5 cm | 4653 | | |
| Attenuator | Radiall | R412720124 | 4391 | 02/02/2018 | 02/04/2021 |
| Cable | N | 3m | 16421 | 04/05/2019 | 04/07/2021 |
| Climatic enclosure | Secasi | SM600C | 1670 | | |
| Power supply | TTI | PL303QMD | 8496 | | |
| Receiver | Agilent Technologies | E4440A | 5824 | 22/10/2020 | 22/12/2022 |
| Software | Nexio | | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12268 | 07/05/2020 | 07/07/2022 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermometer contactless | GHM Greisinger | GMH 3710 | 12968 | 06/10/2020 | 06/12/2021 |
| Voltmeter | Agilent Technologies | E4440A | 5824 | 22/10/2020 | 22/12/2022 |

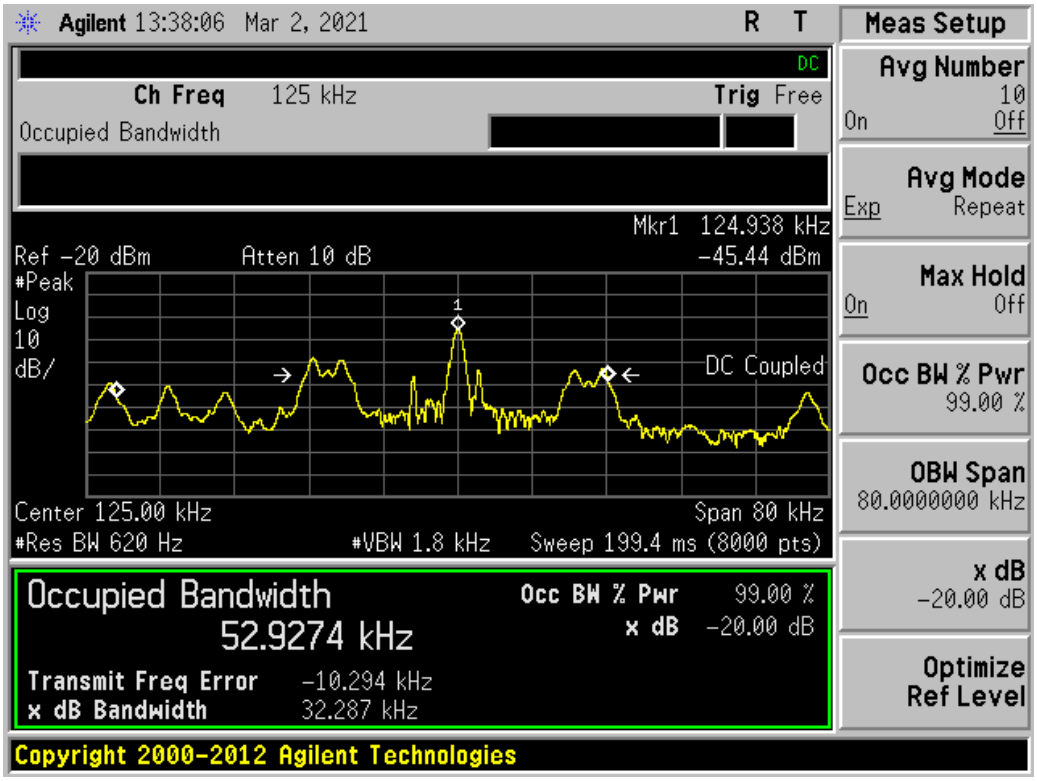
Blank cells = Permanent validity

| -20dB BANDWIDTH - GRAPH | | |
|---|---|---|
| 25°C / 12VDC | | EMI5676 |
| **EUT mode:** | PERMANENT EMISSION MODE | |
| **Test Date:** | 02/03/2021 | |
| **Test Operator:** | NSO | |



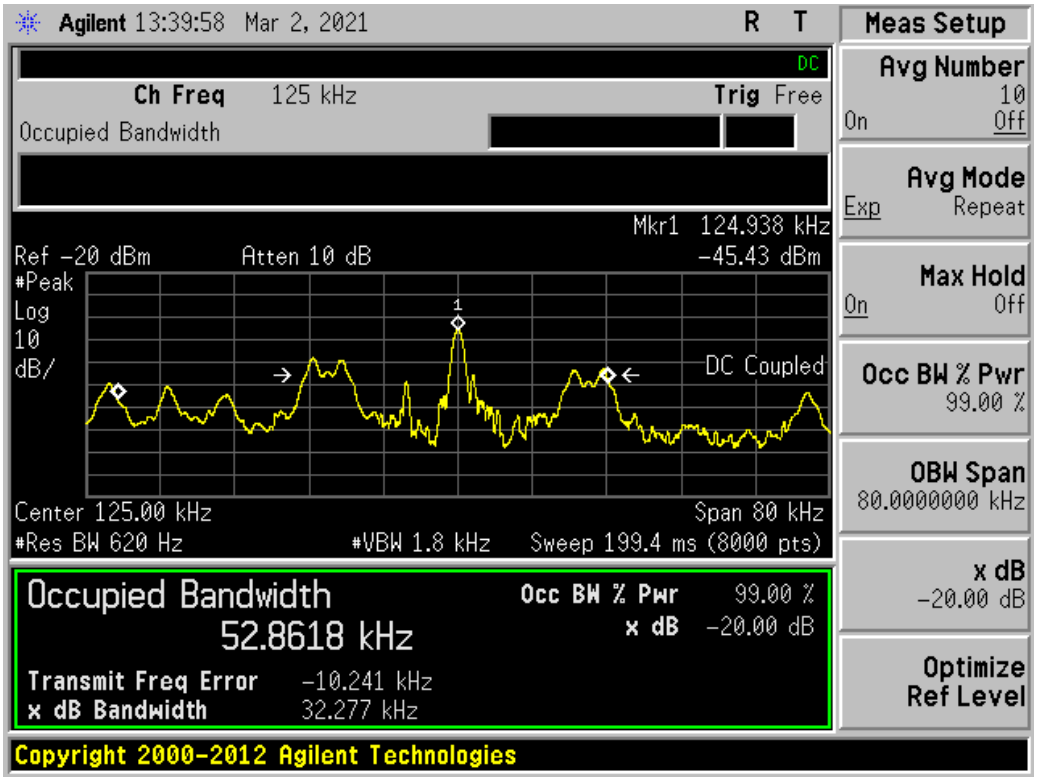

EUT modification(s): N/A

| -20DB BANDWIDTH - GRAPH | | |
|---|---|---|
| 25°C / 7VDC | | EMI6012 |
| **EUT mode:** | PERMANENT EMISSION MODE | |
| **Test Date:** | 02/03/2021 | |
| **Test Operator:** | NSO | |




EUT modification(s): N/A

| -20dB BANDWIDTH - GRAPH | | |
|---|---|---|
| 28VDC | | EMI6013 |
| **EUT mode:** | PERMANENT EMISSION MODE | |
| **Test Date:** | 02/03/2021 | |
| **Test Operator:** | NSO | |




EUT modification(s): N/A

## 6.3. Field strength at 125 kHz

| | |
|---|---|
| **Reference standard:** | FCC Radio part 15.209 & RSS-210 |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** EUT is set on an insulating support at 80cm. Measurements were 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 |
|---|---|---|---|---|
| ARCS-KM/BT2 125kHz (OATS) | Permanent emission mode | 15.209 | EMI5984 | **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 | 24/04/2020 | 24/06/2022 |
| Cable | Huber + Suhner | N-20m | 8385 | 07/01/2021 | 07/03/2023 |
| Mast controller | Heinrich Deisel | HD100 | 4036 | | |
| Multimeter | FLUKE | 8808A | 10382 | 28/09/2020 | 28/11/2021 |
| Open area test site | EMITECH | Salinelles | 3482 | 10/10/2017 | 10/12/2021 |
| Receiver | Rohde & Schwarz | ESHS10 | 3371 | 27/04/2020 | 27/06/2021 |
| Receiver | Rohde & Schwarz | FPL1003 | 16027 | 14/08/2020 | 14/10/2021 |

Blank cells = Permanent validity

| FIELD STRENGTH - TABULATED RESULTS | | | | |
|---|---|---|---|---|
| TEST ARCS-KM/BT2 CONDITION | FREQUENCY | Level at 10m (dBµA/m) | Level at 300m (µV/m) | Limit at 300m (µV/m) |
| 125kHz (OATS) | 125kHz | -10.444dBµA/m<br>(Azimuth: 180°)<br>(Antenna Pos: 0°) | 0.13 | 19.2 |

| TEST SETUP PHOTOS |
| --- |
|  |

| TEST SETUP PHOTOS |
| --- |
|  |

## 6.4. Radiated emission limits

| | |
|---|---|
| **Reference standard:** | FCC part 15 Radio part 15.209 & CNR-Gen |
| **Test method:** | ANCI C63.10: 2013 |

**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 |
|---|---|---|---|---|
| ARCS-KM/BT2 / 0° | 9kHz-30MHz | 15.209 | EMI4844 | **PASS** |
| ARCS-KM/BT2 / 45° | 9kHz-30MHz | 15.209 | EMI4845 | **PASS** |
| ARCS-KM/BT2 / 90° | 9kHz-30MHz | 15.209 | EMI4846 | **PASS** |
| 30MHz-1GHz / ARCS-KM/BT2 | 30MHz-1GHz | 15.209 | EMI4794 | **PASS** |
| >1GHz / ARCS-KM/BT2 | 1GHz-12.75GHz | 15.209 | EMI4813 | **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.

Above 1GHz average limit in restricted bands §15.205 is 54dBµV/m. Otherwise, the limit is 20dB under carrier emission level at 3m without averaging.

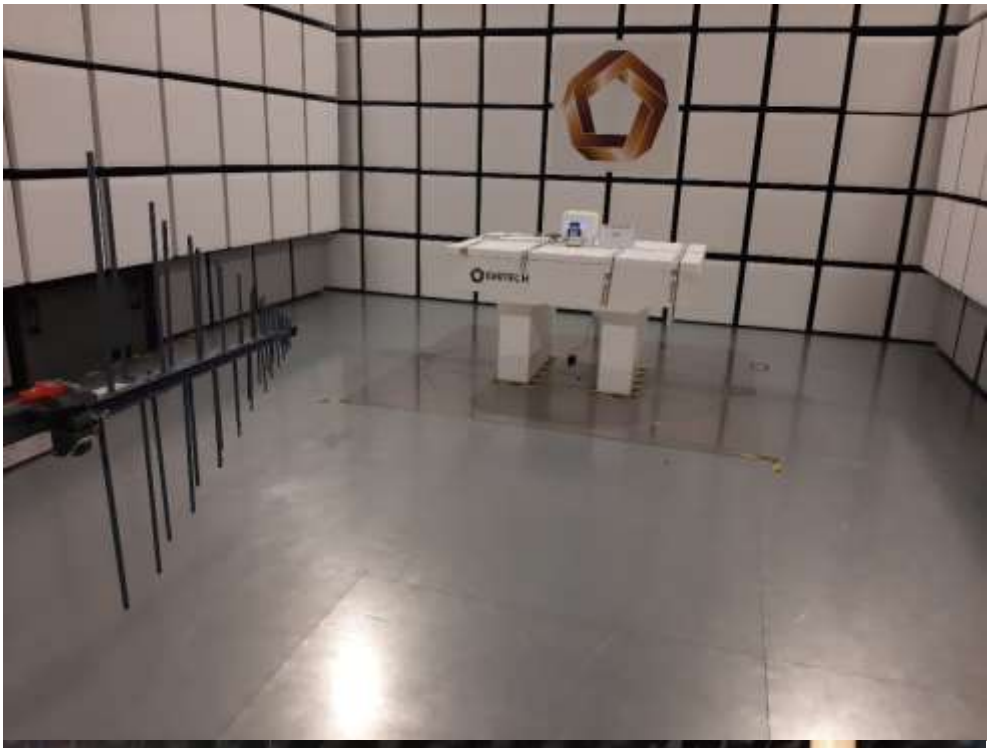
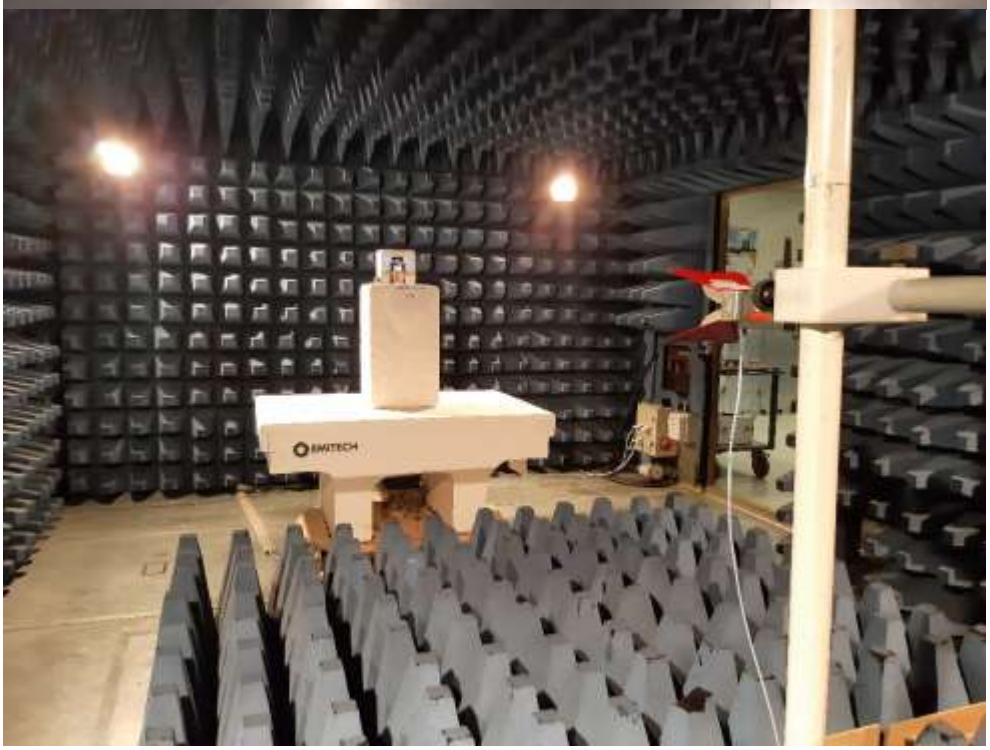
| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| **CATEGORY** | **BRAND** | **TYPE** | **IDENTIFIER** | **CAL. DATE** | **CAL. DUE** |
| Antenna | ETS-Lindgren | 3117 | 5456 | 24/07/2019 | 24/09/2022 |
| Antenna | Electro Metrics | BIA-30HF | 0824 | 13/06/2018 | 13/08/2021 |
| Antenna | Rohde & Schwarz | HFH2-Z2 | 5825 | 24/04/2020 | 24/06/2022 |
| Antenna | Rohde & Schwarz | HL223 | 1137 | 13/06/2018 | 13/08/2021 |
| Antenna | Rohde & Schwarz | HL223 | 3126 | 13/06/2018 | 13/08/2021 |
| Cable | MegaPhase | F135N1N28 | 16664 | 25/10/2019 | 25/12/2021 |

| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
|---|---|---|---|---|---|
| Cable | MegaPhase | F135N1N28 | 16666 | 25/10/2019 | 25/12/2021 |
| Cable | SUCOFLEX | N-3m | 14378 | 25/06/2019 | 25/08/2021 |
| Cable | SUCOFLEX | N-3m | 14379 | 25/06/2019 | 25/08/2021 |
| Cable | MegaPhase | N-3m | 14852 | 30/10/2018 | 30/06/2021 |
| Cable | SUCOFLEX | N-6,5m | 14380 | 25/07/2019 | 25/09/2021 |
| Cable | MegaPhase | N-8m | 15813 | 14/01/2021 | 14/03/2023 |
| Cable | MegaPhase | RG214N1N139 | 16658 | 23/10/2019 | 23/12/2021 |
| Cable | Huber + Suhner | SF102K | 16041 | 28/02/2019 | 28/04/2021 |
| Cable | MegaPhase | TM18-N1N1-118 | 12841 | 14/08/2020 | 14/10/2022 |
| Filter | Micro-Tronics | HPM 15162 | 10273 | 12/01/2019 | 12/03/2022 |
| Filter | Micro-Tronics | HPM18865 | 12843 | 09/06/2018 | 09/08/2021 |
| Preamplifier | Techniwave | APS16-0087 | 14040 | 02/12/2020 | 02/02/2022 |
| Preamplifier | Mini-circuit | ZFL-1000LN | 1119 | 11/08/2020 | 11/10/2021 |
| Receiver | Rohde & Schwarz | ESI | 9704 | 03/03/2020 | 03/05/2021 |
| Receiver | Rohde & Schwarz | FSW43 | 14830 | 29/07/2020 | 29/09/2021 |
| Shielded enclosure | RAY PROOF | C.V2 | 1423 | 04/10/2019 | 04/12/2022 |
| Shielded enclosure | COMTEST | SAC 3m | 14494 | 02/10/2019 | 02/12/2022 |
| Software | Nexio | | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12269 | 07/05/2020 | 07/07/2022 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Turntable | INN-CO | CO3000 & DS1200S | 11571 | | |

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

| TRANSMITTER RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS | | | |
|---|---|---|---|
| **Frequency (MHz)** | **Antenna Position** | **Level** | **Limit** |
| 24.410 | 0° | -11.462 dBµA/m | 18.04 dBµA/m |
| 27.151 | 0° | 0.081 dBµA/m | 18.04 dBµA/m |
| 24.419 | 45° | -8.926 dBµA/m | 18.04 dBµA/m |
| 27.151 | 45° | 0.211 dBµA/m | 18.04 dBµA/m |
| 24.419 | 90° | -6.921 dBµA/m | 18.04 dBµA/m |
| 27.151 | 90° | 0.571 dBµA/m | 18.04 dBµA/m |
| 30.446 | Horizontal | 24.861 dBµV/m | 40 dBµV/m |
| 95.075 | Horizontal | 27.936 dBµV/m | 43.5 dBµV/m |
| 288.211 | Horizontal | 34.870 dBµV/m | 46 dBµV/m |
| 30.446 | Vertical | 39.873 dBµV/m | 40 dBµV/m |
| 40.562 | Vertical | 34.657 dBµV/m | 40 dBµV/m |
| 52.124 | Vertical | 32.199 dBµV/m | 40 dBµV/m |

| TEST SETUP PHOTOS |
| --- |
|  |
|  |

| TEST SETUP PHOTOS |
| --- |
|  |
|  |

| TEST SETUP PHOTOS |
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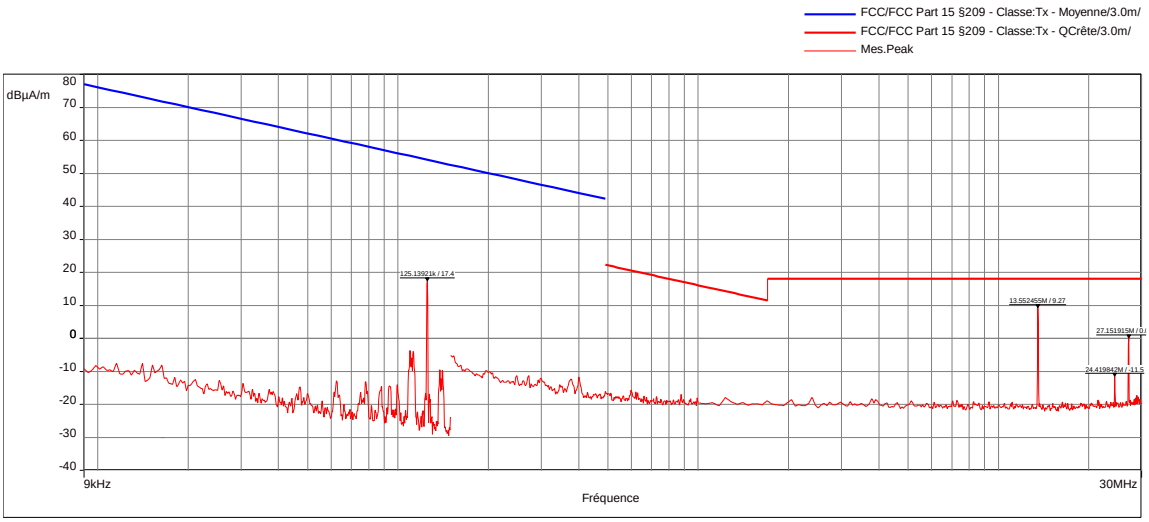
|  |

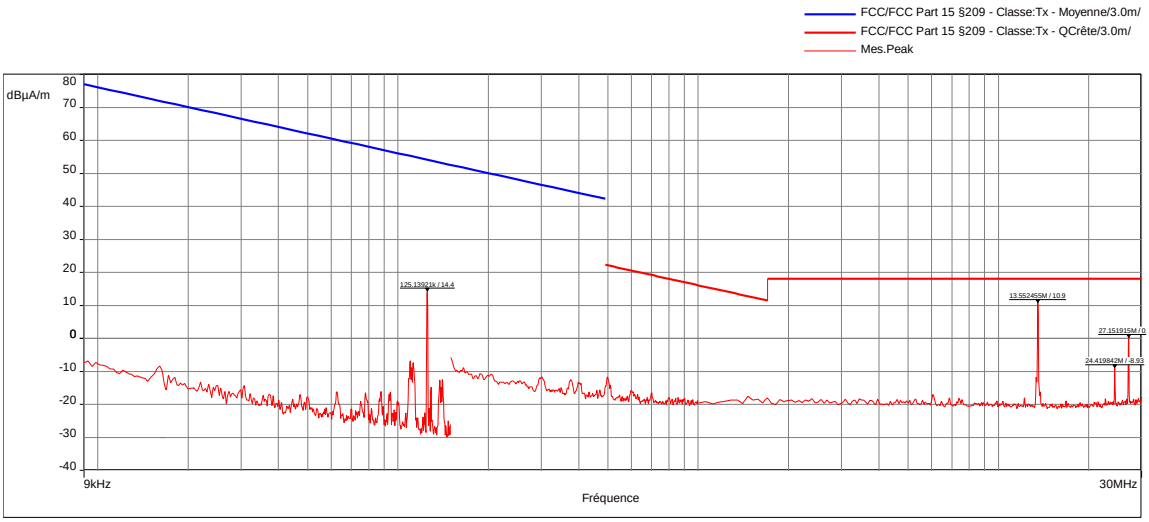
| TEST SETUP PHOTOS |
| --- |
|  |

| TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH | | | |
|---|---|---|---|
| **ARCS-KM/BT2 / 0°** | | **EMI4844** | |
| **EUT mode:** | Permanent emission mode | **T (°C):** | 16.1 |
| **Test Date:** | 11/02/2021 11:29:50 | **H (%):** | 43.3 |
| **Test Operator:** | NSO | **P (hPa):** | 1016 |



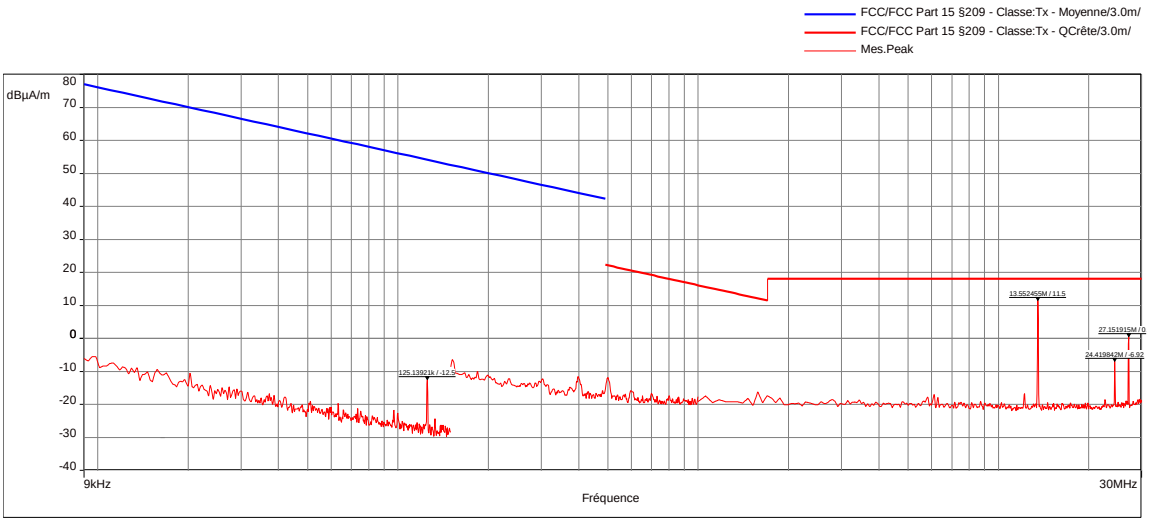

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots 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 | | | |
|---|---|---|---|
| **ARCS-KM/BT2 / 45°** | | **EMI4845** | |
| **EUT mode:** | Permanent emission mode | **T (°C):** | 16.1 |
| **Test Date:** | 11/02/2021 11:33:15 | **H (%):** | 43.3 |
| **Test Operator:** | NSO | **P (hPa):** | 1016 |



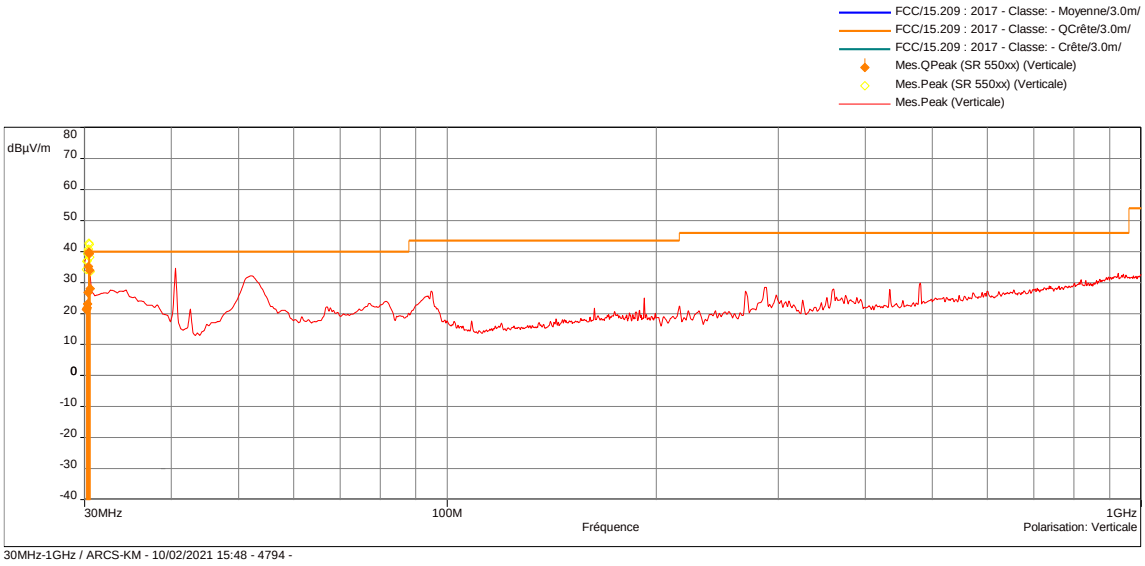

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots 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 | | | |
|---|---|---|---|
| **ARCS-KM/BT2 / 90°** | | **EMI4846** | |
| **EUT mode:** | Permanent emission mode | **T (°C):** | 16.1 |
| **Test Date:** | 11/02/2021 11:38:15 | **H (%):** | 43.3 |
| **Test Operator:** | NSO | **P (hPa):** | 1016 |

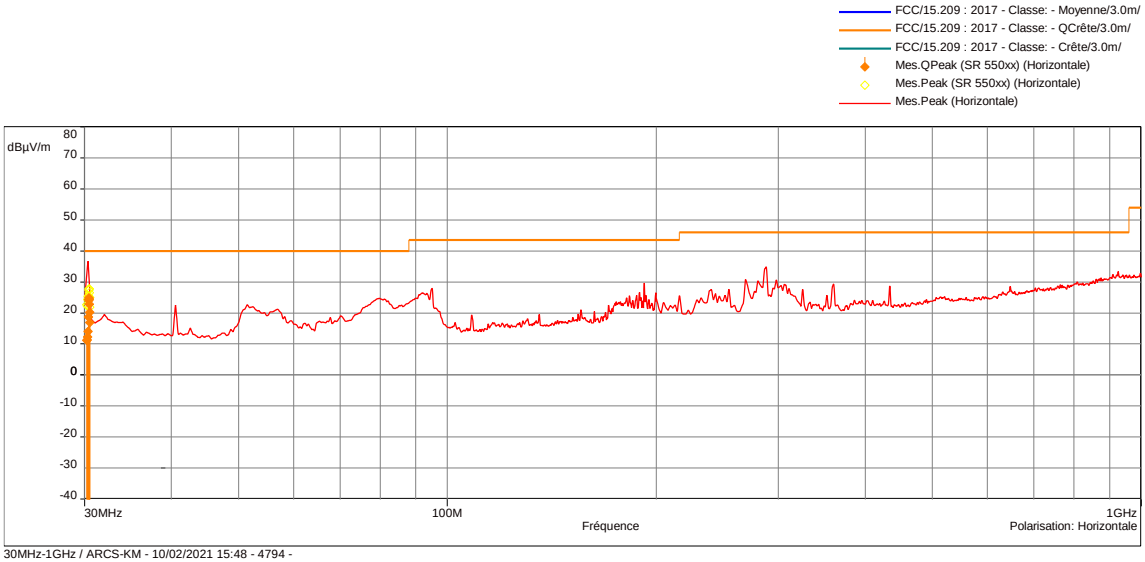



| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Circular | 9kHz-150kHz | 300Hz | 1kHz | Peak |
| Circular | 150kHz-1MHz | 10kHz | 30kHz | Peak |
| Circular | 1MHz-30MHz | 10kHz | 30kHz | Peak |
| **Configuration:** | N/A | | | |
| **Comments:** | Limit indicated on these plots 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 | | | |
|---|---|---|---|
| **30MHz-1GHz / ARCS-KM/BT2** | | **EMI4794** | |
| **EUT mode:** | Permanent emission mode | **T (°C):** | 21.9 |
| **Test Date:** | 10/02/2021 15:48:58 | **H (%):** | 36.5 |
| **Test Operator:** | NSO | **P (hPa):** | 1015 |



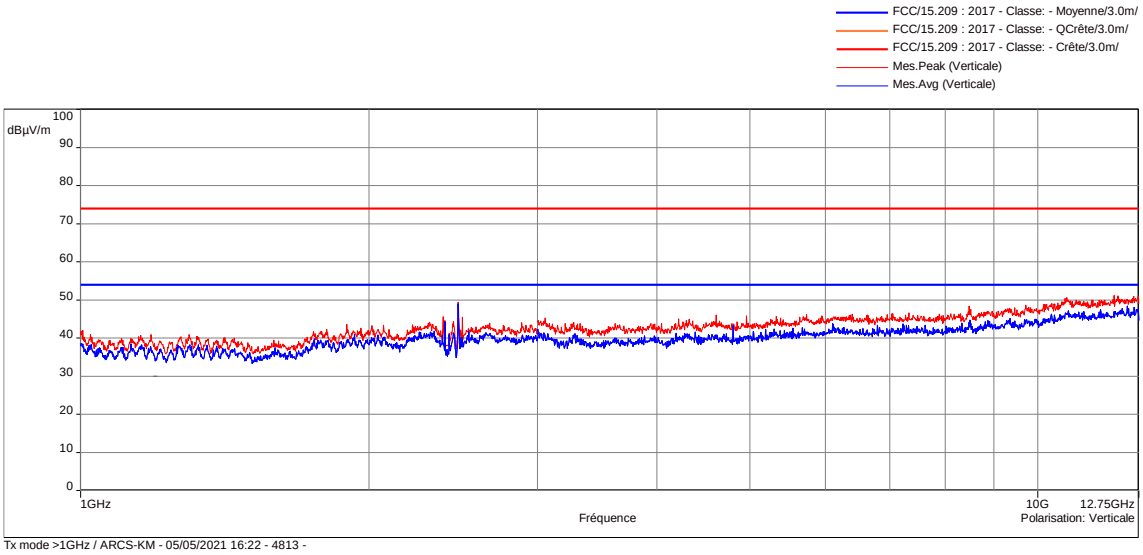

30MHz-1GHz / ARCS-KM - 10/02/2021 15:48 - 4794 -



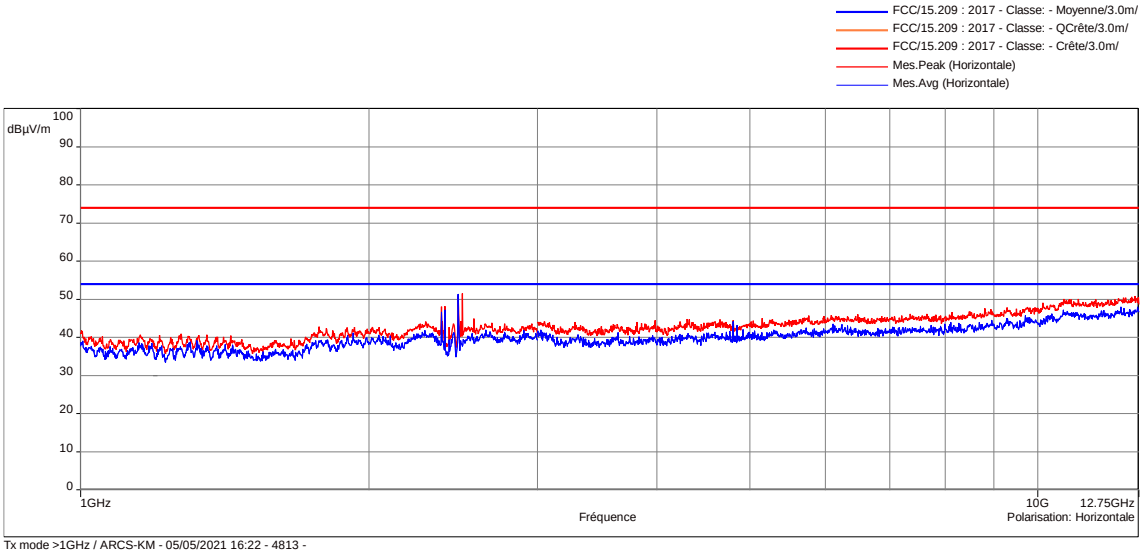

30MHz-1GHz / ARCS-KM - 10/02/2021 15:48 - 4794 -

| 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:** | N/A | | | |
| **Comments:** | N/A | | | |
| *EUT modification(s): N/A* | | | | |

| RADIATED SPURIOUS EMISSIONS - GRAPH | | | |
|---|---|---|---|
| >1GHz / ARCS-KM/BT2 | | EMI4813 | |
| **EUT mode:** | Permanent emission mode | **T (°C):** | 19.9 |
| **Test Date:** | 16/02/2021 09:04:39 | **H (%):** | 37.3 |
| **Test Operator:** | NSO | **P (hPa):** | 1016 |




Tx mode >1GHz / ARCS-KM - 05/05/2021 16:22 - 4813 -




Tx mode >1GHz / ARCS-KM - 05/05/2021 16:22 - 4813 -

| POSITION | FREQUENCIES | RBW | VBW | DETECTOR |
|---|---|---|---|---|
| Vertical | 1GHz-3GHz | 1MHz | 3MHz | Peak; Avg; |
| Horizontal | 1GHz-3GHz | 1MHz | 3MHz | Peak; Avg; |
| Vertical | 3GHz-12.75GHz | 1MHz | 3MHz | Peak; Avg; |
| Horizontal | 3GHz-12.75GHz | 1MHz | 3MHz | Peak; Avg; |
| **Configuration:** | N/A | | | |
| **Comments:** | Bluetooth carrier frequency is rejected by a notch filter. | | | |
| EUT modification(s): N/A | | | | |

## 6.5. Measurement of frequency stability

| | |
|---|---|
| **Reference standard:** | FCC part 15.215 |
| **Test method:** | ANSI C63.10: 2013 |
| **Test description:** 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.<br>EUT is set inside the climatic enclosure. EUT is connected to the measuring receiver via 50Ω attenuator(s). | |

| TEST CASE | EUT MODE | SEVERITY | RESULT TAB. | VERDICT |
|---|---|---|---|---|
| 25°C/ 12Vdc | Permanent emission mode | - | EMI5993 | **PASS** |
| 25°C/ 7Vdc | Permanent emission mode | - | EMI6004 | **PASS** |
| 25°C/ 28Vdc | Permanent emission mode | - | EMI6005 | **PASS** |
| -20°C/ 12Vdc | Permanent emission mode | - | EMI6006 | **PASS** |
| -20°C/ 7Vdc | Permanent emission mode | - | EMI6007 | **PASS** |
| -20°C/ 28Vdc | Permanent emission mode | - | EMI6008 | **PASS** |
| 70°C/ 12Vdc | Permanent emission mode | - | EMI6009 | **PASS** |
| 70°C/ 7Vdc | Permanent emission mode | - | EMI6010 | **PASS** |
| 70°C/ 28Vdc | Permanent emission mode | - | EMI6011 | **PASS** |

| LABORATORY PARAMETERS: | REQUIRED PRIOR TO THE TEST | DURING THE TEST |
|---|---|---|
| Ambient Temperature | 15 to 35 °C | - °C |
| Relative Humidity | 20 to 75 % | - % |
| Atmospheric pressure | N/A | - hPa |
| **Test method deviation:** N/A | | |
| Supplementary information: EUT power supply is replaced by a stabilized power supply. | | |

| TEST EQUIPMENT USED | | | | | |
|---|---|---|---|---|---|
| CATEGORY | BRAND | TYPE | IDENTIFIER | CAL. DATE | CAL. DUE |
| Antenna | EMITECH | 3.5 cm | 4653 | | |
| Attenuator | Radiall | R412720124 | 4391 | 02/02/2018 | 02/04/2021 |
| Cable | N | 3m | 16421 | 04/05/2019 | 04/07/2021 |
| Climatic enclosure | Secasi | SM600C | 1670 | | |
| Power supply | TTI | PL303QMD | 8496 | | |
| Receiver | Agilent Technologies | E4440A | 5824 | 22/10/2020 | 22/12/2022 |
| Software | Nexio | | 0000 | | |
| Thermohygrometer | Testo | 608-H2 | 12268 | 07/05/2020 | 07/07/2022 |
| Thermohygrometer | Bioblock Scientific | Météostar | 0963 | 25/01/2019 | 25/03/2021 |
| Thermometer contactless | GHM Greisinger | GMH 3710 | 12968 | 06/10/2020 | 06/12/2021 |
| Spectrum analyzer | Agilent Technologies | E4440A | 5824 | 22/10/2020 | 22/12/2022 |

Blank cells = Permanent validity

| FREQUENCY ERROR - TABULATED RESULTS | | | | |
|---|---|---|---|---|
| TEST CASE | FREQUENCY | FREQUENCY ERROR | LIMIT | RESULT TAB. |
| 25°C/ 12Vdc | 0.124998 MHz | 0 Hz | - | EMI5993 |
| 25°C/ 7Vdc | 0.124998 MHz | 0 Hz | - | EMI6004 |
| 25°C/ 28Vdc | 0.124998 MHz | 0 Hz | - | EMI6005 |
| -20°C/ 12Vdc | 0.124997 MHz | -1 Hz | - | EMI6006 |
| -20°C/ 7Vdc | 0.124997 MHz | -1 Hz | - | EMI6007 |
| -20°C/ 28Vdc | 0.124997 MHz | -1 Hz | - | EMI6008 |
| 70°C/ 12Vdc | 0.125001 MHz | 3 Hz | - | EMI6009 |
| 70°C/ 7Vdc | 0.125000 MHz | 2 Hz | - | EMI6010 |
| 70°C/ 28Vdc | 0.125000 MHz | 2 Hz | - | EMI6011 |

**End of test report**