

TEST REPORT  
No.: 19-1-0002901T03a

According to:  
**FCC Regulations**  
Part 15.107 & 15.109

For

PPA15 GmbH  
Stollbergstr. 22  
80539 München (Germany)

Cash Point Interface  
sensalytics taprbox

FCC ID : 2AT5NREV-GB-U

| Laboratory Accreditation and Listings                                                                                                                                                                                                                                                                                                               |                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|   <p>Deutsche<br/>Akkreditierungsstelle<br/>D-PL-12047-01-01<br/>D-PL-12047-01-03<br/>D-PL-12047-01-04</p>                                                                    |  <p>MRA US-EU 0003</p> |
| accredited according to DIN EN ISO/IEC 17025                                                                                                                                                                                                                                                                                                        |                                                                                                            |
| <p><b>CETECOM GmbH</b><br/>Mündelheimer Weg 35 • 40472 Düsseldorf • Germany<br/>Registered in Essen, Germany, Reg. No.: HRB Essen 8984<br/>Tel.: + 49 (0) 211 / 171 497-10 • Fax: + 49 (0) 211 / 171 497-25<br/>E-mail: <a href="mailto:info@cetecom.com">info@cetecom.com</a> • Internet: <a href="http://www.cetecom.com">www.cetecom.com</a></p> |                                                                                                            |

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The listed attachments are an integral part of this report.

## 1. Summary of test results

The test results apply exclusively to the test samples as presented in this Report. The CETECOM GmbH does not assume responsibility for any conclusions and generalizations taken in conjunction with other specimens or samples of the type of the item presented to tests. Also we refer on special conditions which the applicant should fulfill according §2.927 to §2.948, special focus regarding modification of the equipment and availability of sample equipment for market surveillance tests.

The Equipment Under Test (in this report, hereinafter referred as EUT) is a digital device. For this test report typical operating mode were tested according intended use of the equipment **excluding wireless operating modes**.

Following tests have been performed to show compliance with applicable FCC Part 15, Subpart B (Unintentional Radiators) of the CFR 47 Rules, August 2019.

### 1.1. TEST OVERVIEW ACCORDING FCC PART 15B

| No. of Diagram group | Test Cases                                             | Port                              | References, Standards & Limits |                           |                                                                                 | EUT set-up | EUT op-mode | Result      |
|----------------------|--------------------------------------------------------|-----------------------------------|--------------------------------|---------------------------|---------------------------------------------------------------------------------|------------|-------------|-------------|
|                      |                                                        |                                   | FCC                            | IC                        | Limits                                                                          |            |             |             |
| 1                    | AC Power Lines<br>Conducted emissions<br>0.15 – 30 MHz | AC Power lines                    | §15.107                        | ANSI C63.4                | <input type="checkbox"/> Class A<br><input checked="" type="checkbox"/> Class B | 1          | 1           | passed      |
| 2                    | Radiated emissions<br>9 kHz - 30 MHz)                  | Cabinet + Inter-connecting cables | §15.109                        | RSS-Gen., Issue 4 Table 5 | 2400/F(kHz)<br>µV/m<br>24000/F(kHz)<br>µV/m<br>30 µV/m                          | -          | -           | not applied |
| 3                    | Radiated emissions<br>30 MHz-1 GHz                     | Cabinet + Inter-connecting cables | §15.109                        | ANSI C63.4                | <input type="checkbox"/> Class A<br><input checked="" type="checkbox"/> Class B | 2          | 1           | passed      |
| 4                    | Radiated emissions<br>above 1 GHz                      | Cabinet + Inter-connecting cables | §15.109                        | ANSI C63.4                | <input type="checkbox"/> Class A<br><input checked="" type="checkbox"/> Class B | 2          | 1           | passed      |

Remark: -

### 1.2. Attestation:

I declare that all measurements were performed by me or under my supervision and that all measurements have been performed and are correct to my best knowledge. All requirements as shown in above table are met in accordance with enumerated standards.

.....  
Dipl.-Ing. Niels Jeß  
Head of Compliance Testing

.....  
G.Wege  
Responsible for test report

**Test Report No.: 19-1-0002901T03a****2. Administrative Data****2.1. Identification of the testing laboratory**

|                                     |                                                    |
|-------------------------------------|----------------------------------------------------|
| Company name:                       | CETECOM GmbH                                       |
| Address:                            | Mündelheimer Weg 35<br>40472 Düsseldorf<br>Germany |
| Responsible for testing laboratory: | Volker Briddigkeit                                 |
| Deputy:                             | Dipl.-Ing. Niels Jeß                               |

**2.2. Test location****2.2.1. Test laboratory**

|               |                                                           |
|---------------|-----------------------------------------------------------|
| Company name: | see chapter 2.1. Identification of the testing laboratory |
|---------------|-----------------------------------------------------------|

**2.3. Organizational items**

|                                                 |                                     |
|-------------------------------------------------|-------------------------------------|
| Responsible for test report and project leader: | Gerrit Wege                         |
| Receipt of EUT:                                 | 2019-07-02                          |
| Date(s) of test:                                | 2019-07-02, 2019-07-03 & 2019-07-08 |
| Date of report:                                 | 2019-08-16                          |
| -----                                           |                                     |
| Version of template:                            | 18.08.2016                          |

**2.4. Applicant's details**

|                   |                                              |
|-------------------|----------------------------------------------|
| Applicant's name: | PPA15 GmbH                                   |
| Address:          | Stollbergstr. 22,<br>80539 München (Germany) |
| Contact person:   | Mr. Obernitz Yorck                           |

**2.5. Manufacturer's details**

|                      |                                |
|----------------------|--------------------------------|
| Manufacturer's name: | please see Applicant's details |
| Address:             | please see Applicant's details |

**Test Report No.: 19-1-0002901T03a**
**3. Equipment under test (EUT)**
**3.1. EUT: Type, S/N etc. and short descriptions used in this test report**

| Short description*) | EUT                  | Type                | S/N serial number | HW hardware status | SW software status |
|---------------------|----------------------|---------------------|-------------------|--------------------|--------------------|
| EUT A               | Cash Point Interface | sensalytics taprbox | 81AB-0FFA         | 06/2019            | Pi 3 Model B+      |
| EUT B               | AC/DC Adaptor        | LEIKE NT03054       | -                 | -                  | -                  |

\*) EUT short description is used to simplify the identification of the EUT in this test report.

**3.2. Auxiliary Equipment (AE): Type, S/N etc. and short descriptions**

| AE short description *) | Auxiliary Equipment | Type            | S/N serial number | HW hardware status | SW software status |
|-------------------------|---------------------|-----------------|-------------------|--------------------|--------------------|
| AE 1                    | Printer             | EPSON           | -                 | -                  | -                  |
| AE 2                    | LAN (PC)            | Medion MD 83002 | -                 | -                  | Windows® 10        |

\*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

| EUT set-up no. *) | Combination of EUT and AE | Remarks                        |
|-------------------|---------------------------|--------------------------------|
| set. 1            | EUT A +EUT B + AE1 & AE2  | The EUT was connected to LISN  |
| set. 2            | EUT A +EUT B + AE1 & AE2  | The EUT was connected to mains |

\*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

**3.3. EUT operating mode**

| EUT operating mode no. *) | Description of operating mode                                                                 | Additional information |
|---------------------------|-----------------------------------------------------------------------------------------------|------------------------|
| op. 1                     | Test mode operation with continuous ping command on LAN Interface and ready for print of bill | -                      |

\*) EUT operating mode no. is used to simplify the test report.

**Test Report No.: 19-1-0002901T03a**
**Accredited EMC Test Laboratory**
**3.4. Additional declaration and description of EUT**

 (Applicant's declaration, ☐ = not selected, ☒ = selected)

|                                                                                                                                                                                                                                                                                                                                                                        |          |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                 |                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Set-up 1                                                                                                                                                                                                                                                                                                                                                               |          | <input checked="" type="checkbox"/> Table top<br><input type="checkbox"/> floor-standing<br><input type="checkbox"/> wall-mounted<br><input type="checkbox"/> not defined                                                                                                                                          | typical use<br><input type="checkbox"/> portable use<br><input checked="" type="checkbox"/> fixed use<br><input type="checkbox"/> vehicular use | typical operating cycle of EUT.<br><input checked="" type="checkbox"/> > 0,5 sec.<br><input type="checkbox"/> : |
| Place of use                                                                                                                                                                                                                                                                                                                                                           |          | <input checked="" type="checkbox"/> Residential, commercial and light industry<br><input type="checkbox"/> Industrial environment<br><input type="checkbox"/> vehicular use                                                                                                                                        |                                                                                                                                                 |                                                                                                                 |
| Highest frequency generated or used in the device or on which the device operates or tunes<br><br>Operation Mode: Test mode operation<br>Remark: no wireless functions                                                                                                                                                                                                 |          | <input type="checkbox"/> below 1.705 MHz -> up to 30 MHz<br><input type="checkbox"/> 1.705 MHz – 108 MHz -> up to 1 GHz<br><input type="checkbox"/> 108 MHz -500 MHz -> up to 2 GHz<br><input type="checkbox"/> 500MHz 1000 MHz -> up to 5 GHz<br><input checked="" type="checkbox"/> 1400 MHz (Main PLL) -> 7 GHz |                                                                                                                                                 |                                                                                                                 |
| <b>Power line:</b><br><input type="checkbox"/> DC <input checked="" type="checkbox"/> L1, <input type="checkbox"/> L2, <input type="checkbox"/> L3, <input checked="" type="checkbox"/> N<br>60 Hz <input type="checkbox"/> 12V, <input type="checkbox"/> 24V, <input checked="" type="checkbox"/> 120V, <input type="checkbox"/> 400V<br><input type="checkbox"/> 5 V |          | EUT-grounding:<br><input type="checkbox"/> none<br><input checked="" type="checkbox"/> with power supply<br><input type="checkbox"/> additional: ground bonding strap at pipe input<br>in case of deviation during tests the single details are described on chapter 4)                                            |                                                                                                                                                 |                                                                                                                 |
| <b>Other Ports</b><br>(description of interconnecting cables)<br>Connector                                                                                                                                                                                                                                                                                             |          | total cable length used during the test                                                                                                                                                                                                                                                                            | shielding                                                                                                                                       | connected during test                                                                                           |
| AC cable                                                                                                                                                                                                                                                                                                                                                               | -        | <input type="checkbox"/> > 1m <input type="checkbox"/> > 2m <input type="checkbox"/> > 3m<br><input checked="" type="checkbox"/> : 1.4 m                                                                                                                                                                           | <input type="checkbox"/> screened<br><input checked="" type="checkbox"/> unscreened                                                             | <input checked="" type="checkbox"/> yes<br><input type="checkbox"/> no                                          |
| LAN I/O                                                                                                                                                                                                                                                                                                                                                                | RJ 45    | <input type="checkbox"/> > 1m <input type="checkbox"/> > 2m <input type="checkbox"/> > 3m<br><input checked="" type="checkbox"/> : 12.0 m                                                                                                                                                                          | <input checked="" type="checkbox"/> screened<br><input type="checkbox"/> unscreened                                                             | <input checked="" type="checkbox"/> yes<br><input type="checkbox"/> no                                          |
| USB                                                                                                                                                                                                                                                                                                                                                                    | USB      | <input type="checkbox"/> > 1m <input type="checkbox"/> > 2m <input type="checkbox"/> > 3m<br><input checked="" type="checkbox"/> : 6.0m                                                                                                                                                                            | <input checked="" type="checkbox"/> screened<br><input type="checkbox"/> unscreened                                                             | <input checked="" type="checkbox"/> yes<br><input type="checkbox"/> no                                          |
| microUSB                                                                                                                                                                                                                                                                                                                                                               | microUSB | <input checked="" type="checkbox"/> > 1m <input type="checkbox"/> > 2m <input type="checkbox"/> > 3m<br><input type="checkbox"/> : 0.2m                                                                                                                                                                            | <input checked="" type="checkbox"/> screened<br><input type="checkbox"/> unscreened                                                             | <input checked="" type="checkbox"/> yes<br><input type="checkbox"/> no                                          |
| Does EUT contain devices susceptible to magnetic fields, e.g. Hall elements, electrodynamics microphones, etc.?                                                                                                                                                                                                                                                        |          |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                 | <input type="checkbox"/> yes<br><input checked="" type="checkbox"/> no                                          |
| Is mounting position / usual operating position defined?                                                                                                                                                                                                                                                                                                               |          |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                 | <input type="checkbox"/> yes<br><input checked="" type="checkbox"/> no                                          |

**3.5. Configuration of cables used for testing**

| Cable number | Item     | Type                  | S/N serial number | HW hardware status | Cable length |
|--------------|----------|-----------------------|-------------------|--------------------|--------------|
| 1            | DC IN    | from AC/DC adaptor    | -                 | -                  | 1.4 m        |
| 2            | LAN      | CAT VI to external PC | -                 | -                  | 12 m         |
| 3            | USB      | USB Type A to Printer | -                 | -                  | 6 m          |
| 4            | microUSB | microUSB floating     | -                 | -                  | 1 m          |

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**4. Description of test system set-up's**
**4.1. Test system set-up for AC power-line conducted emission measurements**

**Specification:** ANSI C63.4-2014 chapter 7

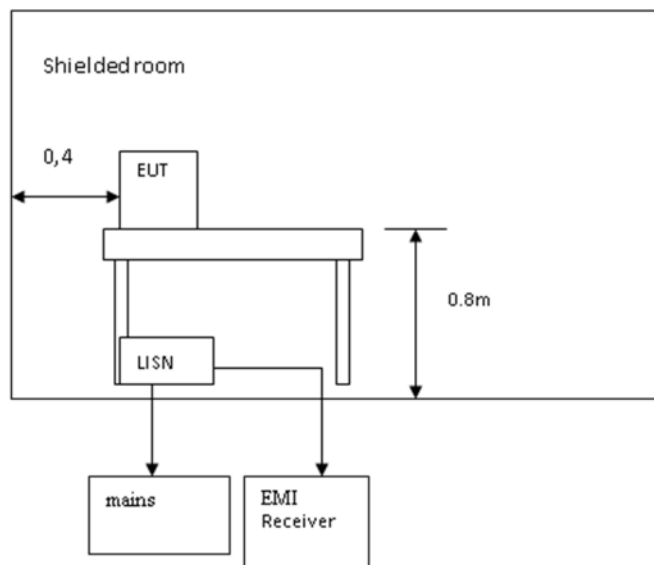
**General Description:**

The radio frequency voltage conducted back into the AC power line in the frequency range 150 kHz to 30 MHz has to be investigated. Compliance should be tested by measuring the radio frequency voltage between each power line and ground at the power terminals in the stated frequency range.

A 50 Ohm / 50  $\mu$ H line impedance stabilization network (LISN) is used coupling the interface to the measurement equipment. The EUT power input leads are connected through the LISN to the AC-power source. The LISN enclosure is electrically connected to the ground plane. The measuring instrument is connected to the coaxial output of the LISN.

Tabletop devices were set-up on a 80 cm height above reference ground plane, floor standing equipment 10 cm raised above ground plane. Measurements have been performed on each phase line and neutral line of the devices AC-power lines. The EUT was power supplied with 120 V/60 Hz. The EUT was tested in the defined operating mode and installed (connected) to accessory equipment according the general description of use given by the applicant.

**Schematic:**



**Testing method:**

**Exploratory, preliminary measure-ments** as a first step, determines the worst-case phase line (neutral or phase) as well as the most critical operating mode of the equipment. A complete frequency-sweep with PK-Detector is performed on each current-carrying conductor.

**Final testing** for power phases and critical frequencies (Margin to AV- or QP limit lower than 3 dB) as a second step includes measurements with receivers detector set to Quasi-Peak and Average.

**Formula:**

$$V_C = V_R + C_L \quad (1)$$

$$M = L_T - V_C \quad (2)$$

$V_C$  = measured Voltage –corrected value

$V_R$  = Receiver reading

$C_L$  = Cable loss

$M$  = Margin

$L_T$  = Limit

Values are in dB, positive margin means value is below limit.

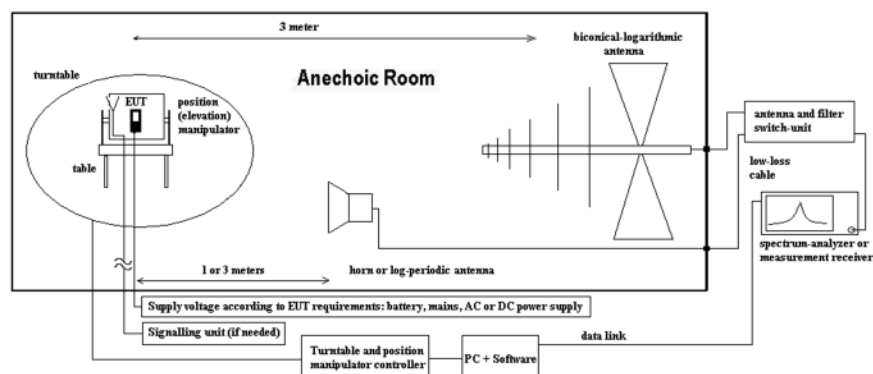


**Test Report No.: 19-1-0002901T03a**
**4.2. Test system set-up for radiated electric field measurement 30 MHz to 1 GHz**

**Specification:** ANSI C63.4-2014 chapter 8.2.3

**General Description:** Evaluating the field emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a NSA-compliant semi anechoic chamber (SAC) recognized by the regulatory commissions.

**Schematic:**



**Testing method:**

**Exploratory, preliminary measurements**

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 0.8 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 90°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and its characteristics was recorded with an EMI-receiver, broadband antenna and software.

Measurement antenna: horizontal and vertical, heights: 1,0 m and 1,82 m as worst-case determined by an exploratory emission measurements. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

**Final measurement on critical frequencies**

Based on the exploratory measurements, the most critical frequencies are re-measured by main-taining the EUT's worst-case operation mode, cable position, etc. either on 10m OATS or 3m semi-anechoic chamber.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself either over 3-orthogonal axis (not defined usage position) or 2-orthogonal axis (defined usage position). The measurement antenna height between 1 m and 4 m.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

**Formula:**

$$E_C = E_R + AF + C_L + D_F - G_A \quad (1)$$

$$M = L_T - E_C \quad (2)$$

AF = Antenna factor

C<sub>L</sub> = Cable loss

D<sub>F</sub> = Distance correction factor (if used)

E<sub>C</sub> = Electrical field – corrected value

E<sub>R</sub> = Receiver reading

G<sub>A</sub> = Gain of pre-amplifier (if used)

L<sub>T</sub> = Limit

M = Margin

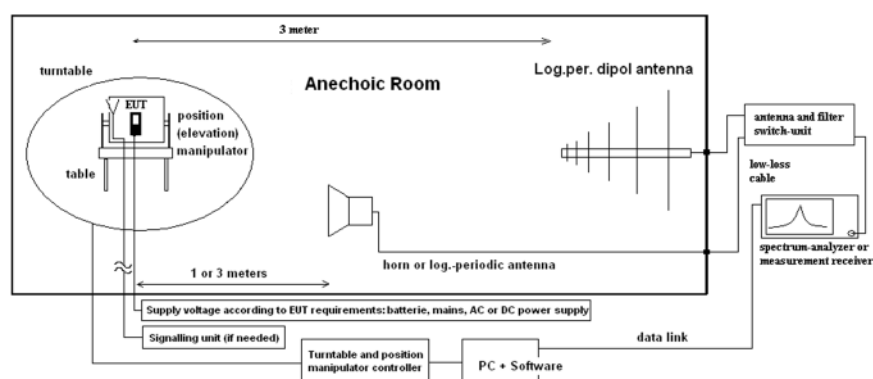
All units are dB-units, positive margin means value is below limit.

**Test Report No.: 19-1-0002901T03a**
**4.3. Test system set-up for radiated electric field measurement above 1 GHz**

**Specification:** ANSI C63.4-2014 chapter 8.3

**General Description:** Evaluating the emissions have to be done first by an exploratory emissions measurement and a final measurement for most critical frequencies. The tests are performed in a CISPR 16-1-4:2010 compliant fully anechoic room (FAR) recognized by the regulatory commission. The measurement distance was set to 3 meter for frequencies up to 18 GHz and 2 meter above 18 GHz. Horn antennas are used for frequency range 1 GHz to 40 GHz. The EUT is aligned within 3 dB beam width of the measurement antenna with three orthogonal axis measurements on the EUT.

**Schematic:**



**Testing method:**

**Exploratory, preliminary measurements**

The EUT and its associated accessories are placed on a non-conductive position manipulator (tipping device) of 1.55 m height which is placed on the turntable. By rotating the turntable (range 0° to 360°, step 15°) and the EUT itself either on 3-orthogonal axis (portable equipment) or 2-orthogonal axis (defined operational position of EUT) the emission spectrum and it's characteristics was recorded with an EMI-receiver, broadband antenna and software.

The measurements are performed in horizontal and vertical polarization of the measurement antennas. The results are documented in a diagram. Critical frequencies (low margin to limit) are saved within a table for further investigations. If various operating modes are supported, further investigations are made to find the worst-case of them. Also the interconnection cables and equipment position were varied in order to maximize the emissions.

**Final measurement on critical frequencies**

Based on the exploratory measurements, the most critical frequencies are re-measured by main-taining the EUT's worst-case operation mode, cable position, etc.

First a frequency zoom around the critical frequency is done to locate the frequency more precisely. After this step, for all identified critical frequencies, the maximum peak was determined.

Following parameters were varied: the turntable angle continuously in the range 0 to 360 degree, the EUT itself over 3-orthogonal axis and the height for EUT with large dimensions.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

On the determined worst-case position, a final measurement with necessary bandwidth and detector according standard has been carried out.

**Formula:**

$$E_C = E_R + AF + C_L + D_F - G_A \quad (1)$$

$$M = L_T - E_C \quad (2)$$

$E_C$  = Electrical field – corrected value

$E_R$  = Receiver reading

$M$  = Margin

$L_T$  = Limit

$AF$  = Antenna factor

$C_L$  = Cable loss

$D_F$  = Distance correction factor (if used)

$G_A$  = Gain of pre-amplifier (if used)

All units are dB-units, positive margin means value is below limit.

## 5. Measurements

### 5.1. General Limit - Conducted emissions on AC-Power lines

#### 5.1.1. Test location and equipment

|               |                                                                         |                                                       |                                                                            |                                   |
|---------------|-------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------|
| test location | <input checked="" type="checkbox"/> CETECOM Duesseldorf (Chapter 2.2.1) |                                                       | <input type="checkbox"/> Please see Chapter 2.2.2                          |                                   |
| test site     | <input type="checkbox"/> 25911 EMI field < 1GHz; SAC5                   | <input type="checkbox"/> 25912 EMI field > 1GHz; SAC5 | <input checked="" type="checkbox"/> 25341 Shielded room laboratory 1       |                                   |
| Receiver      | <input type="checkbox"/> 25311 ESU 40                                   | <input checked="" type="checkbox"/> 25370 ESR 7       | <input type="checkbox"/> 25235 ESCS 30                                     |                                   |
| Antenna       | <input type="checkbox"/> 25038 HFH2-Z2                                  | <input type="checkbox"/> 25357 HL562E                 | <input type="checkbox"/> 25364 HF907                                       |                                   |
| LISN          | <input checked="" type="checkbox"/> 25021 ESH2-Z5                       | <input type="checkbox"/> 25156 ESH3-Z6                | <input type="checkbox"/> 25263 ESH3-Z6                                     |                                   |
| signalling    | <input type="checkbox"/> 25xxx CMU 200                                  | <input type="checkbox"/> 25xxx CMU 200                | <input type="checkbox"/> 594 CMW500                                        | <input type="checkbox"/> not used |
| DC voltage    | <input type="checkbox"/> 25036 HP 6267 B                                |                                                       | <input type="checkbox"/> 25289 5V via TDK-Lambda Americas Inc.             |                                   |
| AC voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains                   |                                                       | <input checked="" type="checkbox"/> 25316 120 V 60 Hz via EM Test DPA 503N |                                   |

#### 5.1.2. Requirements

|       |                 |                                                             |                |                                                  |                |
|-------|-----------------|-------------------------------------------------------------|----------------|--------------------------------------------------|----------------|
| FCC   |                 | Part 15, Subpart B, §15.107                                 |                |                                                  |                |
| ANSI  |                 | C63.4-2014, § 5.2, 6, 7                                     |                |                                                  |                |
| Limit | Frequency [MHz] | <input checked="" type="checkbox"/> Conducted limit Class B |                | <input type="checkbox"/> Conducted limit Class A |                |
|       |                 | QUASI-Peak [dBµV]                                           | AVERAGE [dBµV] | QUASI-Peak [dBµV]                                | AVERAGE [dBµV] |
|       | 0.15 – 0.5      | 66 to 56*                                                   | 56 to 46*      | 79                                               | 66             |
|       | 0.5 – 5         | 56                                                          | 46             | 73                                               | 60             |
|       | 5 – 30          | 60                                                          | 50             | 73                                               | 60             |

Remark: \* decreases with the logarithm of the frequency

#### 5.1.3. Test condition and test set-up

|                                       |                   |                                                                                                    |                                                       |                                                                                                  |
|---------------------------------------|-------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Signal link to test system (if used): |                   | <input type="checkbox"/> air link                                                                  | <input type="checkbox"/> cable connection             | <input type="checkbox"/> none                                                                    |
| EUT-grounding                         |                   | <input type="checkbox"/> none                                                                      | <input checked="" type="checkbox"/> with power supply | <input type="checkbox"/> additional connection                                                   |
| Equipment set up                      |                   | <input checked="" type="checkbox"/> table top<br>(40 cm distance to reference ground plane (wall)) |                                                       | <input type="checkbox"/> floor standing<br>EUT stands isolated on reference ground plane (floor) |
| Climatic conditions                   |                   | Temperature: 25.3°C                                                                                |                                                       | Rel. humidity: 30%                                                                               |
| EMI-Receiver or Analyzer settings     | Scan data         | <input type="checkbox"/> 9 – 150 kHz, RBW = 200 Hz, Step = 61 Hz                                   |                                                       |                                                                                                  |
|                                       |                   | <input checked="" type="checkbox"/> 150 kHz – 30 MHz RBW = 9 kHz, Step = 4 kHz                     |                                                       |                                                                                                  |
|                                       | other:            |                                                                                                    |                                                       |                                                                                                  |
| EMI-Receiver or Analyzer settings     | Scan-Mode         | 10 dB EMI-Receiver Mode                                                                            |                                                       |                                                                                                  |
|                                       | Pre-measurement   | Peak detector, Repetitive-Scan, max-hold, sweep-time 10 ms per frequency point                     |                                                       |                                                                                                  |
|                                       | Final measurement | Average & Quasi-peak detector at critical frequencies                                              |                                                       |                                                                                                  |
| General measurement procedures        |                   | Please see chapter "Test system set-up for AC power line conducted emissions measurements"         |                                                       |                                                                                                  |

#### 5.1.4. Measurement results

The results are presented below in summary form only. For more information please see the diagrams

| EUT set-up no.: |                                   |                                                                                                                                                         | set-up 1   |                                           |        |
|-----------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------|--------|
| Diagram-No.     | EUT operating mode no. or commend | Used Detector                                                                                                                                           | Power line | Additional (scan-) information or remarks | Result |
| 1.01            | 1                                 | <input checked="" type="checkbox"/> Peak (pre-scan)<br><input checked="" type="checkbox"/> AV (final)<br><input checked="" type="checkbox"/> QP (final) | L / N      | -                                         | passed |

## 5.2. General Limit - Radiated field strength emissions, 30 MHz - 1 GHz

### 5.2.1. Test location and equipment

|               |                                                                         |                                                       |                                                                            |                                   |
|---------------|-------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------|
| test location | <input checked="" type="checkbox"/> CETECOM Duesseldorf (Chapter 2.2.1) |                                                       | <input type="checkbox"/> Please see Chapter 2.2.2                          |                                   |
| test site     | <input checked="" type="checkbox"/> 25414 EMI field < 1GHz; SAC3        | <input type="checkbox"/> 25912 EMI field > 1GHz; SAC5 | <input type="checkbox"/> 25901 EMI conducted                               |                                   |
| Receiver      | <input checked="" type="checkbox"/> 25311 ESU 40                        | <input type="checkbox"/> 25348 ESR 7                  | <input type="checkbox"/>                                                   |                                   |
| Antenna       | <input type="checkbox"/> 25357 HL562E                                   | <input checked="" type="checkbox"/> 25357 HL562E      | <input type="checkbox"/> 25364 HF907                                       |                                   |
| LISN          | <input type="checkbox"/> 25261 ESH2-Z5                                  | <input type="checkbox"/> 25156 ESH3-Z6                | <input type="checkbox"/> 25263 ESH3-Z6                                     |                                   |
| signalling    | <input type="checkbox"/> 20547 CMU 200                                  | <input type="checkbox"/> 25xxx CMU 200                | <input type="checkbox"/> 20594 CMW500                                      | <input type="checkbox"/> not used |
| DC voltage    | <input type="checkbox"/> 25036 HP 6267 B                                | <input type="checkbox"/> Battery powered (4 V)        | <input type="checkbox"/> 25289 5V via TDK-Lambda UP60-3.5                  |                                   |
| AC voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains                   |                                                       | <input checked="" type="checkbox"/> 25316 120 V 60 Hz via EM Test DPA 503N |                                   |

### 5.2.2. Requirements/Limits

|       |                 |                                                                                                                                                                 |                                         |
|-------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| FCC   |                 | <input checked="" type="checkbox"/> Part 15 Subpart B, §15.109, class B<br><input type="checkbox"/> Part 15 Subpart C, §15.209 @ frequencies defined in §15.205 |                                         |
| ANSI  |                 | <input checked="" type="checkbox"/> C63.4-2014<br><input type="checkbox"/> C63.10-2013                                                                          |                                         |
| Limit | Frequency [MHz] | Radiated emissions limits, 3 meters                                                                                                                             |                                         |
|       |                 | QUASI Peak [ $\mu\text{V/m}$ ]                                                                                                                                  | QUASI-Peak [ $\text{dB}\mu\text{V/m}$ ] |
|       | 30 - 88         | 100                                                                                                                                                             | 40.0                                    |
|       | 88 - 216        | 150                                                                                                                                                             | 43.5                                    |
|       | 216 - 960       | 200                                                                                                                                                             | 46.0                                    |
|       | above 960       | 500                                                                                                                                                             | 49.0                                    |

### 5.2.3. Test condition and measurement test set-up

|                                       |  |                                                                                                                 |                                                       |                                                |
|---------------------------------------|--|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------|
| Signal link to test system (if used): |  | <input type="checkbox"/> air link                                                                               | <input type="checkbox"/> cable connection             | <input type="checkbox"/> none                  |
| EUT-grounding                         |  | <input type="checkbox"/> none                                                                                   | <input checked="" type="checkbox"/> with power supply | <input type="checkbox"/> additional connection |
| Equipment set up                      |  | <input checked="" type="checkbox"/> table top 0.8 m height                                                      |                                                       |                                                |
| Climatic conditions                   |  | Temperature: 27.0°C                                                                                             |                                                       |                                                |
| EMI-Receiver (Analyzer) Settings      |  | Rel. humidity: 35%                                                                                              |                                                       |                                                |
| Scan frequency range:                 |  | <input checked="" type="checkbox"/> 30 – 1000 MHz <input type="checkbox"/> other:                               |                                                       |                                                |
| Scan-Mode                             |  | <input checked="" type="checkbox"/> 6 dB EMI-Receiver Mode <input type="checkbox"/> 3 dB spectrum analyser mode |                                                       |                                                |
| Detector                              |  | Peak / Quasi-peak                                                                                               |                                                       |                                                |
| RBW/VBW                               |  | 120 kHz                                                                                                         |                                                       |                                                |
| Mode:                                 |  | Repetitive-Scan, max-hold                                                                                       |                                                       |                                                |
| Scan step                             |  | 40 kHz                                                                                                          |                                                       |                                                |
| Sweep-Time                            |  | 10 ms                                                                                                           |                                                       |                                                |
| General measurement procedures        |  | Please see chapter "Test system set-up for electric field measurement in the range 30 MHz to 1 GHz"             |                                                       |                                                |

### 5.2.4. MEASUREMENT RESULTS

The results are presented below in summary form only. For more information please see diagrams included in annex 1.

Table of measurement results:

| Dia-gram no. | Frequency range | Set-up no. | OP-mode no. | Remark | Used detector                       |                          |                                     | Result |
|--------------|-----------------|------------|-------------|--------|-------------------------------------|--------------------------|-------------------------------------|--------|
|              |                 |            |             |        | PK                                  | AV                       | QP                                  |        |
| 2.01         | 30 MHz – 1 GHz  | 2          | 1           | -      | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | passed |

Remark: see diagrams in annex 1 for more details

**Test Report No.: 19-1-0002901T03a**
**Accredited EMC Test Laboratory**
**5.3. General Limit - Radiated emissions, above 1 GHz**
**5.3.1. Test location and equipment absorber modified SAR**

|               |                                                                         |                                                                  |                                                                            |                                   |
|---------------|-------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------|
| test location | <input checked="" type="checkbox"/> CETECOM Duesseldorf (Chapter 2.2.1) |                                                                  | <input type="checkbox"/> Please see Chapter 2.2.2                          |                                   |
| test site     | <input type="checkbox"/> 25358 EMI field < 1GHz; SAC5                   | <input checked="" type="checkbox"/> 25358 EMI field > 1GHz; SAC5 | <input type="checkbox"/> 25901 EMI conducted                               |                                   |
| Receiver      | <input type="checkbox"/> 25311 ESU 40                                   | <input checked="" type="checkbox"/> 25348 ESR 7                  | <input type="checkbox"/>                                                   |                                   |
| Antenna       | <input type="checkbox"/> 25038 HFH2-Z2                                  | <input type="checkbox"/> 25357 HL562E                            | <input checked="" type="checkbox"/> 25364 HF907                            |                                   |
| LISN          | <input type="checkbox"/> 25261 ESH2-Z5                                  | <input type="checkbox"/> 25156 ESH3-Z6                           | <input type="checkbox"/> 25263 ESH3-Z6                                     |                                   |
| signalling    | <input type="checkbox"/> 20547 CMU 200                                  | <input type="checkbox"/> 25xxx CMU 200                           | <input type="checkbox"/> 20594 CMW500                                      | <input type="checkbox"/> not used |
| DC voltage    | <input type="checkbox"/> 25036 HP 6267 B                                | <input type="checkbox"/>                                         | <input type="checkbox"/>                                                   |                                   |
| AC voltage    | <input type="checkbox"/> 230 V 50 Hz via public mains                   |                                                                  | <input checked="" type="checkbox"/> 25316 120 V 60 Hz via EM Test DPA 503N |                                   |

**5.3.2. Requirements/Limits (CLASS B equipment)**

|                                                   |                                                                                                                                                                                                                                                                |             |             |                            |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|----------------------------|
| <b>FCC</b>                                        | <input checked="" type="checkbox"/> Part 15 Subpart B, §15.109 class B                                                                                                                                                                                         |             |             |                            |
| <b>IC</b>                                         | <input type="checkbox"/> RSS-Gen., Issue 4, Chapter 8.9, Table 4+6 (transmitter licence exempt)<br><input type="checkbox"/> RSS-Gen., Issue 4, Chapter 8.9, Table 2 (receiver)<br><input type="checkbox"/> ICES-003, Issue 6, Chapter 6.2.2, Table 7 (class B) |             |             |                            |
| <b>ANSI</b>                                       | <input checked="" type="checkbox"/> C63.4-2014<br><input type="checkbox"/> C63.10-2013                                                                                                                                                                         |             |             |                            |
| Frequency [MHz]                                   | Limits                                                                                                                                                                                                                                                         |             |             |                            |
|                                                   | AV [µV/m]                                                                                                                                                                                                                                                      | AV [dBµV/m] | Peak [µV/m] | Peak [dBµV/m] or [dBm/MHz] |
| above 1 GHz for frequencies as defined in §15.205 | 500                                                                                                                                                                                                                                                            | 54.0        | 5000        | 74.0 dBµV/m                |

**5.3.3. Test condition and measurement test set-up**

|                                       |                                                                                                                                                                                                                                                                                                                                                    |                                                      |                                                |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------|
| Signal link to test system (if used): | <input type="checkbox"/> air link                                                                                                                                                                                                                                                                                                                  | <input checked="" type="checkbox"/> cable connection | <input checked="" type="checkbox"/> none       |
| EUT-grounding                         | <input checked="" type="checkbox"/> none                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> with power supply           | <input type="checkbox"/> additional connection |
| Equipment set up                      | <input checked="" type="checkbox"/> table top 1.5 m height                                                                                                                                                                                                                                                                                         |                                                      |                                                |
| Climatic conditions                   | Temperature: (25.1 ±3°C)                                                                                                                                                                                                                                                                                                                           |                                                      |                                                |
| EMI-Receiver (Analyzer) Settings      | Scan frequency range: <input checked="" type="checkbox"/> 1 – 6 GHz <input checked="" type="checkbox"/> other: 6 – 7 GHz<br><input type="checkbox"/> 6 dB EMI-Receiver Mode <input checked="" type="checkbox"/> 3 dB spectrum analyser mode<br>Peak / Average<br>1 MHz<br>Mode: Repetitive-Scan, max-hold<br>Scan step 400 kHz<br>Sweep-Time 10 ms |                                                      |                                                |
| General measurement procedures        | Please see chapter "Test system set-up for radiated electric field measurements above 1 GHz"                                                                                                                                                                                                                                                       |                                                      |                                                |

**5.3.4. Measurement Results**

The results are presented below in summary form only. For more information please consult the diagrams included in annex 1.

| Dia-gram no. | Carrier Channel |     | Frequency range | Set-up no. | OP-mode no. | Remark | Used detector                       |                                     |                          | Result |
|--------------|-----------------|-----|-----------------|------------|-------------|--------|-------------------------------------|-------------------------------------|--------------------------|--------|
|              | Range           | No. |                 |            |             |        | PK                                  | AV                                  | QP                       |        |
| 3.01         | nominal         | --  | 1- 6 GHz        | 2          | 1           |        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | passed |
| 4.01         | nominal         | --  | 6- 7 GHz        | 2          | 1           |        | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | passed |

Remark: see diagrams in annex 1 for more details

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**5.4. Measurement uncertainties**

The reported uncertainties are calculated based on the standard uncertainty multiplied with the appropriate coverage factor **k**, such that a confidence level of approximately 95% is achieved.

For uncertainty determination, each component used in the concrete measurement set-up was taken in account and it's contribution to the overall uncertainty according it's statistical distribution calculated.

Following table shows expectable uncertainties for each measurement type performed.

| RF-Measurement                               | Reference    | Frequency range                     | Calculated uncertainty based on a confidence level of 95% | Remarks        |
|----------------------------------------------|--------------|-------------------------------------|-----------------------------------------------------------|----------------|
| Conducted emissions<br>(U <sub>CISPR</sub> ) | CISPR 16-2-1 | 9 kHz - 150 kHz<br>150 kHz - 30 MHz | 4.0 dB<br>3.6 dB                                          | -              |
| Radiated emissions<br>Enclosure              | CISPR 16-2-3 | 30 MHz - 1 GHz<br>1 GHz - 18 GHz    | 4.2 dB<br>5.1 dB                                          | E-Field        |
| Disturbance power                            | CISPR 16-2-2 | 30 MHz - 300 MHz                    | -                                                         | -              |
| Radiated emissions<br>Enclosure              | -            | 150 kHz - 30 MHz                    | 5.0 dB                                                    | Magnetic field |
|                                              |              | 30 MHz - 1 GHz                      | 4.2 dB                                                    | E-field        |
|                                              |              | 1 GHz - 20 GHz                      | 3.17 dB                                                   | Substitution   |

**Table: measurement uncertainties, valid for conducted/radiated measurements**

**Test Report No.: 19-1-0002901T03a**
**6. Abbreviations used in this report**

| The abbreviations |                                                                                   |
|-------------------|-----------------------------------------------------------------------------------|
| ANSI              | American National Standards Institute                                             |
| AV , AVG, CAV     | Average detector                                                                  |
| EIRP              | Equivalent isotropically radiated power, determined within a separate measurement |
| EGPRS             | Enhanced General Packet Radio Service                                             |
| EUT               | Equipment Under Test                                                              |
| FCC               | Federal Communications Commission, USA                                            |
| IC                | Industry Canada                                                                   |
| n.a.              | not applicable                                                                    |
| Op-Mode           | Operating mode of the equipment                                                   |
| PK                | Peak                                                                              |
| RBW               | resolution bandwidth                                                              |
| RF                | Radio frequency                                                                   |
| RSS               | Radio Standards Specification, Dokuments from Industry Canada                     |
| Rx                | Receiver                                                                          |
| TCH               | Traffic channel                                                                   |
| Tx                | Transmitter                                                                       |
| QP                | Quasi peak detector                                                               |
| VBW               | Video bandwidth                                                                   |
| ERP               | Effective radiated power                                                          |

**7. Accreditation details of CETECOM's laboratories and test sites**

| Ref.-<br>No.                    | Accreditation<br>Certificate             | Valid for laboratory area or test site                                                                                                                                                                                                                                         | Accreditation Body                                                                                |
|---------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| -                               | D-PL-<br>12047-01-01                     | All laboratories and test sites of CETECOM GmbH, Essen                                                                                                                                                                                                                         | DAkKS, Deutsche<br>Akkreditierungsstelle GmbH                                                     |
| 337<br>487<br>558<br>348<br>348 | MRA US-EU<br>0003                        | Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS)<br>Radiated Measurements 30 MHz to 1 GHz, 3 m (SAC)<br>Radiated Measurements above 1 GHz, 3 m (FAR)<br>Mains Ports Conducted Interference Measurements<br>Telecommunication Ports Conducted Interference Measurement. | FCC, Federal Communications<br>Commission<br>Laboratory Division, USA                             |
| 337<br>487<br>550<br>558        | 3462D-1<br>3462D-2<br>3462D-2<br>3462D-3 | Radiated Measurements 30 MHz to 1 GHz, 3 m / 10 m (OATS)<br>Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR)<br>Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR)<br>Radiated Measurements above 1 GHz, 3 m (FAR)                                                                | IC, Industry Canada Certification and<br>Engineering Bureau                                       |
| 487<br>550<br>348<br>348        | R-2666<br>G-301<br>C-2914<br>T-1967      | Radiated Measurements 30 MHz to 1 GHz, 3 m (SAR)<br>Radiated Measurements 1 GHz to 6 GHz, 3 m (SAR)<br>Mains Ports Conducted Interference Measurements<br>Telecommunication Ports Conducted Interference Measurements.                                                         | VCCI, Voluntary Control Council for<br>Interference by Information<br>Technology Equipment, Japan |

OATS = Open Area Test Site, SAC = Semi Anechoic Chamber, FAR = Fully Anechoic Room

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## 8. Instruments and Ancillary

### 8.1. Used equipment

The "Ref.-No" in the left column of the following tables allows the clear identification of the laboratory equipment.

#### 8.1.1. Test software and firmware of equipment

| Ref.-No. | Equipment                                | Type           | Serial-No.   | Version of Firmware or Software during the test |
|----------|------------------------------------------|----------------|--------------|-------------------------------------------------|
| 358      | Semi Anechoic Chamber                    | Albatross      | No. 5        | - -                                             |
| 348      | EMI Test Receiver                        | ESR 7          | 825132/017   | Firm.= 1.21 , OTP=2.0, GRA=2.0                  |
| 235      | EMI Test Receiver                        | ESCS 30        | 100160       | Firm.= 2.30, OTP= 02.01, GRA= 02.36             |
| 311      | EMI Test Receiver                        | ESU40          | 1000-30      | Firmware=4.43 SP3, Bios=V5.1-16-3, Spec. =01.00 |
| 357      | Ultra-Broadband Antenna                  | HL562E         | 100824       | - -                                             |
| 403      | Ultra-Broadband Antenna                  | HL562E         | 101021       | - -                                             |
| 364      | Double Rigid Horn Antenna                | HF907          | 102488       | - -                                             |
| 352      | Continuous switch Unit                   | OSP            | 100123       | Firmware=06.06                                  |
| 000      | EMI Test Software                        | EMC 32         | -            | EMC 32 Version 9.26                             |
| 021      | Line Impedance Stabilization Network [1] | ESH2-Z5        | 872460/004   | CISPR 16 compliant                              |
| 261      | Line Impedance Stabilization Network [2] | ESH2-Z5        | 871777/041   | CISPR 16 compliant                              |
| 316      | Multifunction AC/DC power Source         | Netwave 20     | V1227113059  | Firmware= 5.03.03                               |
| 360      | Antenna Tower                            | BAM 4.5-P      | 091/17791115 | - -                                             |
| 361      | Controller TT & Tower                    | NCD            | 202/17791115 | Firmware= 0.4.03                                |
| 363      | Turn Table                               | TT 4.0-4t      | 553/17791115 | - -                                             |
| 362      | Measurement table                        | PTT 1.5 x1x0.8 | 127          | - -                                             |

#### 8.1.2. Single instruments and test systems

| Ref.-No. | Equipment                                | Type           | Serial-No.  | Manufacturer    | Interval of calibration | Remark | Cal due   |
|----------|------------------------------------------|----------------|-------------|-----------------|-------------------------|--------|-----------|
| 358      | Semi Anechoic Chamber                    | SAC            | No. 5       | Albatross       | 10 Y                    | -      | 12 / 2019 |
| 348      | EMI Test Receiver                        | ESR 7          | 825132/017  | Rohde & Schwarz | 24 M                    | -      | 04 / 2019 |
| 370      | EMI Test Receiver                        | ESR 7          | 101715      | Rohde & Schwarz | 24 M                    | -      | 06 / 2020 |
| 311      | EMI Test Receiver                        | ESU40          | 1000-30     | Rohde & Schwarz | 24 M                    | -      | 05 / 2019 |
| 357      | Ultra-Broadband Antenna                  | HL562E         | 100824      | Rohde & Schwarz | 24 M                    | -      | 09 / 2020 |
| 403      | Ultra-Broadband Antenna                  | HL562E         | 101021      | Rohde & Schwarz | 36 M                    | -      | 06 / 2021 |
| 364      | Double Rigid Horn Antenna                | HF907          | 102488      | Rohde & Schwarz | 36 M                    | -      | 06 / 2019 |
| 352      | Continuous switch Unit                   | OSP            | 100123      | Rohde & Schwarz | - -                     | -      | - -       |
| 000      | EMI Test Software                        | EMC 32         | -           | Rohde & Schwarz | - -                     | -      | - -       |
| 021      | Line Impedance Stabilization Network [1] | ESH2-Z5        | 872460/004  | Rohde & Schwarz | 24 M                    | 1a     | - -       |
| 261      | Line Impedance Stabilization Network [1] | ESH2-Z5        | 871777/041  | Rohde & Schwarz | 24 M                    | 3      | 07 / 2020 |
| 316      | Multifunction AC/DC power Source         | Netwave 20     | V1227113059 | EM-Test         | 36 M                    | 1g     | 06 / 2021 |
| 360      | Antenna Tower                            | BAM 4.5-P      | 872460/004  | Maturo          | - -                     | -      | - -       |
| 361      | Controller TT & Tower                    | NCD            | 871777/041  | Maturo          | - -                     | -      | - -       |
| 363      | Turn Table                               | TT 4.0-4t      | V1227113059 | Maturo          | - -                     | -      | - -       |
| 362      | Measurement table                        | PTT 1.5 x1x0.8 | 127         | Maturo          | - -                     | -      | - -       |

#### 8.1.3. Legend

|                         |         |                                                                               |
|-------------------------|---------|-------------------------------------------------------------------------------|
| Interval of calibration | 12 M    | 12 month                                                                      |
|                         | 24 M    | 24 month                                                                      |
|                         | 36 M    | 36 month                                                                      |
|                         | 24/12 M | Calibration every 24 months, between this every 12 months internal validation |
|                         | 36/12 M | Calibration every 36 months, between this every 12 months internal validation |
|                         | Pre-m   | Check before starting the measurement                                         |
|                         | -       | Without calibration                                                           |

## 9. Versions of test reports (change history)

| Version         | Applied changes | Date of release |
|-----------------|-----------------|-----------------|
| Initial release | ---             | 2019-08-16      |



Annex 1: DIAGRAMS OF TESTING to  
T E S T R E P O R T  
No.: 19-1-0002901T03a

According to:  
**FCC Regulations**  
Part 15.107 & Part 15.109

for

PPA15 GmbH  
Stollbergstr. 22  
80539 München (Germany)

Cash Point Interface  
sensalytics taprbox

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## 1. Measurement diagrams

## 2. Mains conducted emission in the frequency range 0.15 to 30 MHz

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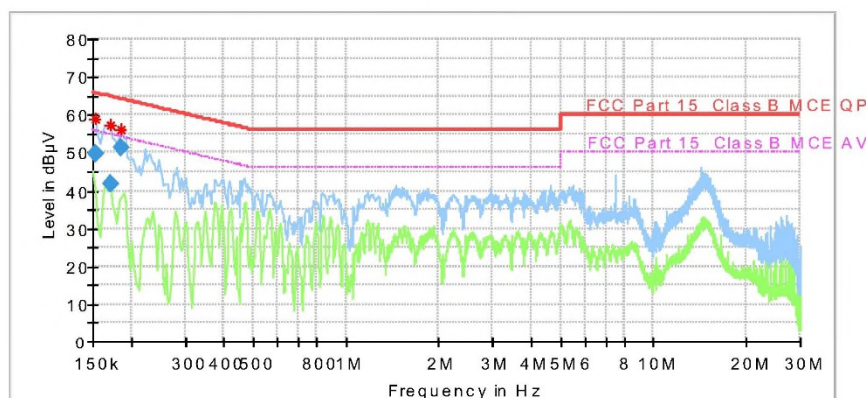
### 1.01\_FCC \_Conducted Emission 0.15 – 30 MHz

Test description: Date: 02.07.2019 Page 1 of 1  
 Test site and distance: Mains conducted emission  
 Shielded Room No. 1  
 Test location: CETECOM GmbH Düsseldorf  
 Version of Test software: EMC32 V10.40.0  
 Test specification: FCC15.107, class B; RSS-Gen.: Issue 4  
 Technical Data: Please see page 2 for detailed data of measurement setup  
 Used filter: LISN  
 Operating Mode: ready to print and continuous ping command over LAN connection  
 Environmental conditions: Humidity: 39%rH; Temperature: 26.9°C  
 Operator: ACh  
 Test Voltage & frequency: AC 120 V / 60 Hz  
 Verdict: passed

#### EUT Information

EUT Name: Taprbox  
 Manufacturer: PPA 15  
 Serial Number: 81AB-0FFA  
 Hardware Rev: 6/ 2019  
 Software Rev: Pi 3 Model B+  
 Comment: EUT contain FCC approved parts

Full Spectrum



#### Final Result

| Frequency (MHz)                                                                    | QuasiPeak (dBµV) | Average (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|------------------------------------------------------------------------------------|------------------|----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.153000                                                                           | 49.76            | ---            | 65.84        | 16.08       | 1000.0          | 9.000           | N    | 0.1        |
| 0.171000                                                                           | 41.87            | ---            | 64.91        | 23.04       | 1000.0          | 9.000           | N    | 0.1        |
| 0.186000                                                                           | 51.33            | ---            | 64.21        | 12.88       | 1000.0          | 9.000           | L1   | 0.1        |
| No further, conspicuous frequency found – margin to limit > 10 dB (Peak & Average) |                  |                |              |             |                 |                 |      |            |

03.07.2019

### 3. Radiated emissions in the frequency range 30 to 1000 MHz

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#### Diagram No. 2.01\_FCC\_30 MHz-1 GHz

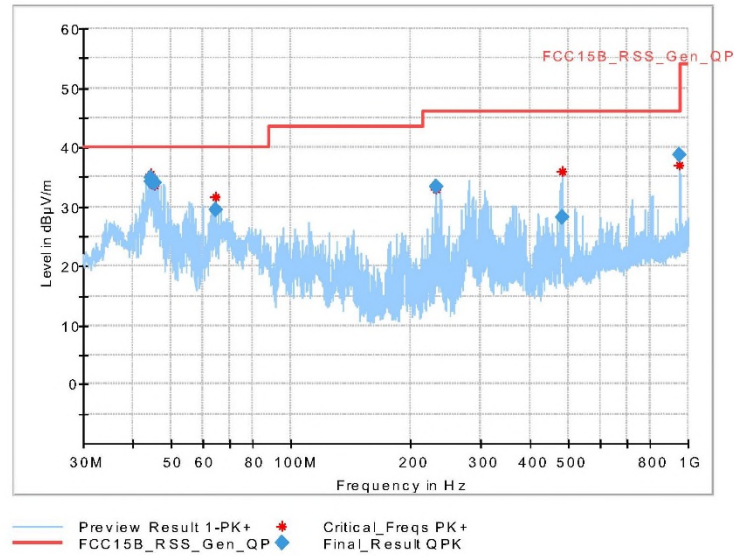
|                           |                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------|
| Test description:         | Date: 03.07.2019      Page 1 of 2                                                                  |
| Test site and distance:   | Electric Field Strength Measurement<br>Semi Anechoic Chamber 2 (SAC5) with 3m measurement distance |
| Test location:            | CETECOM GmbH Düsseldorf                                                                            |
| Version of Test software: | EMC32 V10.40.0                                                                                     |
| Test specification:       | FCC15.109, class B; RSS-Gen.: Issue 4                                                              |
| Distance correction:      | not used                                                                                           |
| Technical Data:           | Please see page 2 for detailed data of measurement setup                                           |
| Used filter:              | none                                                                                               |
| Operating Mode:           | ready to print and continuous ping command over LAN connection                                     |
| Measured sides of EUT:    | front, right, rear, left                                                                           |
| Environmental conditions: | Humidity: 31%rH; Temperature: 27°C                                                                 |
| Operator:                 | GWe                                                                                                |
| Comment 1:                |                                                                                                    |

#### EUT Information

|                |                                |
|----------------|--------------------------------|
| EUT Name:      | Taprbox                        |
| Manufacturer:  | PPA 15                         |
| Serial Number: | 81AB-0FFA                      |
| Hardware Rev:  | 6/ 2019                        |
| Software Rev:  | Pi 3 Model B+                  |
| Comment:       | EUT contain FCC approved parts |

03.07.2019

## Full Spectrum



## Final\_Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-------------|-----|---------------|------------|
| 44.460000       | 34.78              | 40.00          | 5.22        | 120.000         | 106.0       | V   | 280.0         | 11.0       |
| 44.464000       | 34.30              | 40.00          | 5.70        | 120.000         | 100.0       | V   | 231.0         | 11.0       |
| 45.328000       | 33.92              | 40.00          | 6.08        | 120.000         | 106.0       | V   | 321.0         | 10.4       |
| 64.776000       | 29.56              | 40.00          | 10.44       | 120.000         | 188.0       | V   | 76.0          | 7.5        |
| 232.108000      | 33.47              | 46.00          | 12.53       | 120.000         | 171.0       | H   | 35.0          | 10.2       |
| 480.004000      | 28.27              | 46.00          | 17.73       | 120.000         | 274.0       | V   | 202.0         | 15.7       |
| 948.936000      | 38.67              | 46.00          | 7.33        | 120.000         | 100.0       | V   | 288.0         | 20.6       |

03.07.2019

## 4. Radiated emissions in the frequency range 1 to 6 GHz

19-1-0002901T03, CETECOM GmbH

Page 1

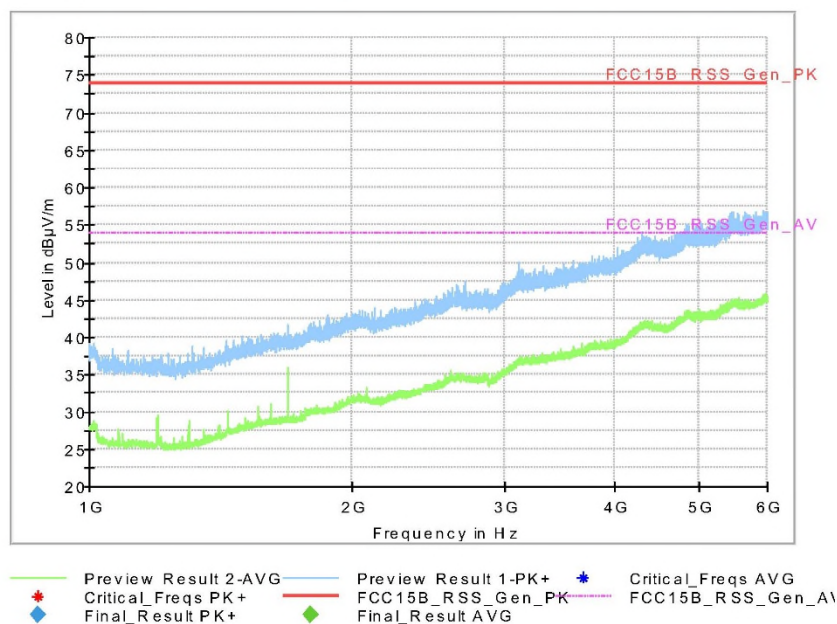
### Diagram No. 3.01\_FCC\_1 - 6 GHz

Date: 08.07.2019 Page 1 of 1  
 Test description: Electric Field Strength Measurement  
 Test site and distance: Semi Anechoic Chamber 2 (SAC5) with 3 m measurement distance  
 Test location: CETECOM GmbH Düsseldorf  
 Version of Test software: EMC32 V10.0.0  
 Test specification: FCC15.109, class B; RSS-Gen.: Issue 4  
 Distance correction: not used  
 Technical Data: Please see page 2 for detailed data of measurement setup  
 Used filter: none  
 Operating mode: ready to print and continuous ping command over LAN connection  
 Measured sides of EUT: front, right, rear, left  
 Environmental conditions: Humidity: 32%rH; Temperature: 25.1°C; Pressure: 1014hPa  
 Operator: A. Ueberbach  
 Comment 1:

#### EUT Information

EUT Name: Taprbox  
 Manufacturer: PPA 15  
 Serial Number: 81AB-0FFA  
 Hardware Rev: 6/ 2019  
 Software Rev: Pi 3 Model B+  
 Comment: EUT contain FCC approved parts

#### Full Spectrum



#### Final Result

| Frequency (MHz)                                          | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|----------------------------------------------------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| No conspicuous frequency found – margin to limit > 20 dB |                  |                  |                |             |                 |                 |             |     |               |            |

08.07.2019

## 5. Radiated emissions in the frequency range 6 to 7 GHz

19-1-0002901T03, CETECOM GmbH

Page 1

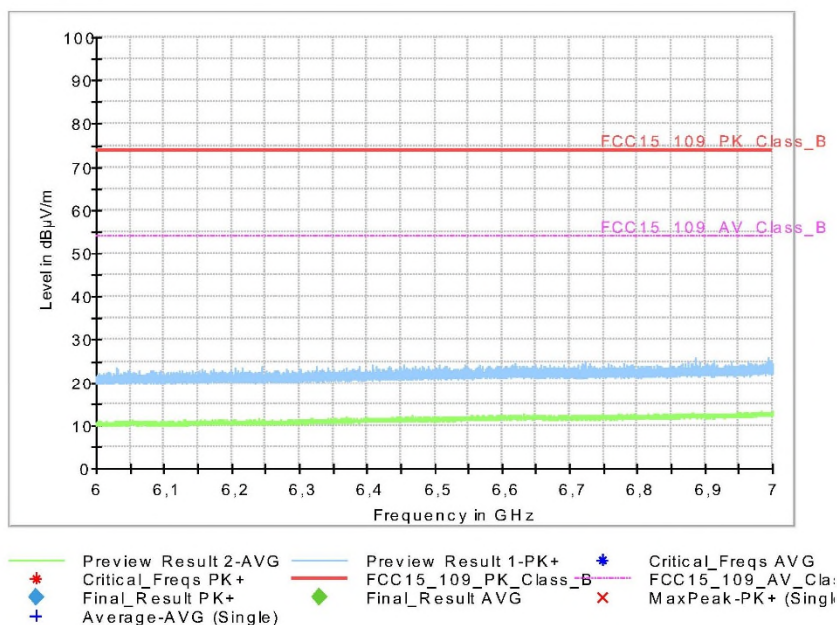
### 4.01\_FCC\_6 - 7 GHz

Date: 08.07.2019 Page 1 of 1  
 Test description: Electric Field Strength Measurement  
 Test site and distance: Semi Anechoic Chamber 2 (SAC5) with 3m measurement distance  
 Test location: CETECOM GmbH Düsseldorf  
 Version of Testsoftware: EMC32 V10.0.0  
 Test specification: FCC15.109, class B; RSS-Gen.: Issue 4  
 Distance correction: not used  
 Technical Data: Please see page 2 for detailed data of measurement setup  
 Used filter: none  
 Operating mode: ready to print and continuous ping command over LAN connection  
 Measured sides of EUT: front, right, rear, left  
 Environmental conditions: Humidity: 32%rH; Temperature: 25.1°C; Pressure: 1014hPa  
 Operator: MBe

#### EUT Information

EUT Name: Taprbox  
 Manufacturer: PPA 15  
 Serial Number: 81AB-0FFA  
 Hardware Rev: 6/ 2019  
 Software Rev: Pi 3 Model B+  
 Comment: EUT contain FCC approved parts

#### Full Spectrum



#### Final Result

| Frequency (MHz)                                          | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|----------------------------------------------------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| No conspicuous frequency found – margin to limit > 20 dB |                  |                  |                |             |                 |                 |             |     |               |            |

08.07.2019

Annex 2: Set-up photographs to  
TEST REPORT  
No.: 19-1-0002901T03a

For

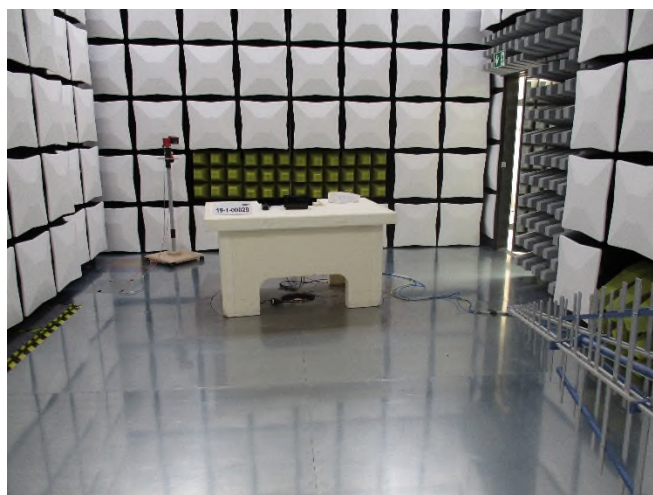
PPA15 GmbH  
Stollbergstr. 22  
80539 München (Germany)

Cash Point Interface  
sensalytics taprbox

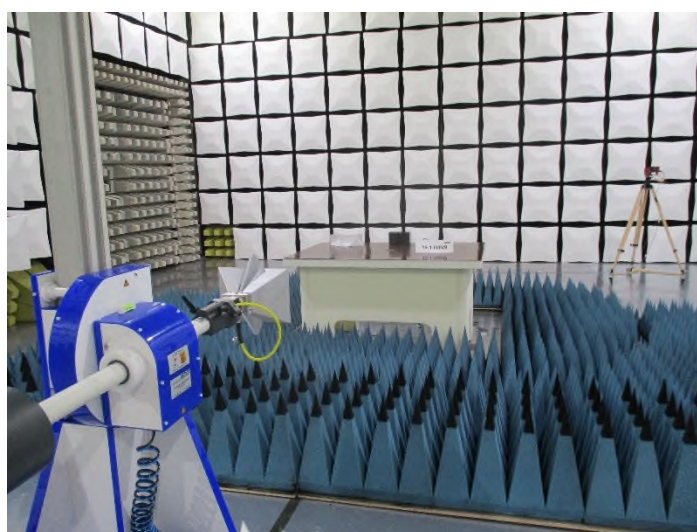




**Photograph 1:** Mains conducted emission measurements test set-up for measurement of frequency up to 30MHz



**Photograph 2:** Radiated emission measurements test set-up for measurement of frequency up to 1000 MHz  
Front side view



**Photograph 3:** Radiated emission measurements test set-up for measurement of frequency up to 7 GHz  
Front side view