

Test Report

Electromagnetic Compatibility (EMC)

HELEM2306000271-1



TESTS ACCORDING TO FCC PART 15 B REQUIREMENTS

| | |
|--------------------------|--|
| Equipment Under Test: | Droplet Generator and Sorter |
| Trademark: | Samplix |
| Model: | Xdrop Sort |
| Customer / Manufacturer: | Samplix ApS Bregnerødvej 96 3460 Birkerød Denmark |
| FCC Rule Part: | FCC CFR 47 Part 15 Subpart B, Class A |

Date: 6 November 2023

Issued by:

A handwritten signature in blue ink, appearing to read 'Henri Mäki'.

Henri Mäki
Testing Engineer

Date:

6 November 2023

Checked by:

A handwritten signature in blue ink, appearing to read 'Rauno Repo'.

Rauno Repo
Senior EMC Specialist

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GENERAL REMARKS

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

RELEASE HISTORY

| Version | Changes | Issued |
|---------|--------------------------|-----------------|
| 1.0 | Initial release | 18 October 2023 |
| 1.1 | Test standards corrected | 6 November 2023 |

PRODUCT DESCRIPTION

Equipment Under Test (EUT)

| EUT information | |
|-----------------------------|------------------------------------|
| General Product Description | Droplet Generator and Sorter |
| Trademark | Samplix |
| Model | Xdrop Sort |
| Type | - |
| Serial number | SAMXS210004 |
| Power input port type | AC, three-wire (L/N/PE) |
| Rated voltage | 110 – 240 V |
| Rated current | 1.3 A |
| Rated frequency | 50 – 60 Hz |
| Rated power | - |
| EUT Highest operation freq. | 1 GHz (System on Module processor) |
| Hardware Version (if any) | - |
| Software Version (if any) | - |
| Mechanical size of the EUT | 364 x 305 x 654 mm, 23.5 kg |
| Parallel models | - |
| Radio module or chip | - |

The EUT was tested as a table-top unit.

General description

The equipment under test is a droplet generator and sorter intended to be used by trained laboratory technicians in a clean laboratory environment for DNA sample preparation and sampling from mixed DNA samples using droplet microfluidics technology. The equipment is operated from a touch screen, and droplet generation and sorting are fully automated.

Samples and modifications

| No. | Name | Description |
|-----|----------|--------------------------------------|
| 1 | Sample 1 | Test sample supplied by the customer |

Ports and cables

| Cable / Port | Description |
|----------------|---|
| AC mains input | Power supply to the EUT, cable length 3 m |
| USB-A | Maintenance port, not used during testing |

Peripherals

| Peripheral | Description / Usage |
|------------|---------------------|
| - | - |

TEST CONDITION

EUT Test Conditions During EMC-Testing

Configuration of the EUT was made to correspond to the actual assembling conditions as far as possible. The EUT was powered on and a test mode was enabled, which simulates the sorting operation of the instrument. Sorting simulation mimics how the valves operate during normal sorting operation. During droplet operation valves are just kept activated for the majority of time. Display was showing test mode screen. The lasers were also enabled, which in real operation are used when the instrument sorts the samples. The input voltage during testing was 120 V, 60 Hz.

The test conditions were proposed by the customer.

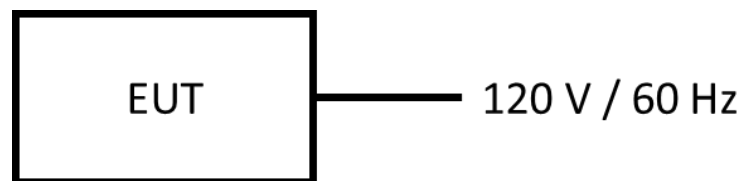


Figure 1: Test setup block diagram

Operation modes

During the tests the EUT was in the following operation modes:

| Mode | Description |
|------|---|
| 1 | Power on, test mode loop enabled (simulation of sorting operation), lasers enabled. |

Emission Measurement Uncertainty

The uncertainties comply with CISPR 16-4-2 ed.2 requirements ($U_{lab} < U_{Cispr}$).

Summary of Testing

SUMMARY OF TESTING

| Test Specification | Description of Test | Result |
|-------------------------------|------------------------------|--------|
| FCC Part 15 Subpart B §15.107 | Conducted Emissions, Class A | PASS |
| FCC Part 15 Subpart B §15.109 | Radiated Emissions, Class A | PASS |

Decision rule used for the emission tests are defined in standard CISPR 16-4-2 / EN 55016-4-2 clause 4.2.

Test Facility

| | |
|--|---|
| Testing Laboratory / address: FCC designation number: FI0002 | SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI FINLAND |
| Test Site: | <input type="checkbox"/> K10LAB <input checked="" type="checkbox"/> K5LAB <input type="checkbox"/> T10LAB |

EMISSION TESTS**Conducted Emissions**

| | |
|---------------------------------|--|
| Standard: | ANSI C63.4-2014 |
| Tested by: | HEM |
| Date: | 28 August 2023 |
| Temperature: | 23 °C |
| Humidity: | 53 %RH |
| Barometric pressure: | 1008 hPa |
| Measurement uncertainty: | ± 2.9 dB, level of confidence 95 % (k = 2) |

FCC Rule: §15.107(a)**Test Plan**

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors from the phase and neutral lines of the power supply cable.

The EUT was working as described in the section “EUT Test Conditions”.

Class A limits:

| Frequency of emission (MHz) | Conducted limit (dBµV) | |
|-----------------------------|------------------------|---------|
| | Quasi-peak | Average |
| 0.15 – 0.5 | 79 | 66 |
| 0.5 – 30 | 73 | 60 |

Test results

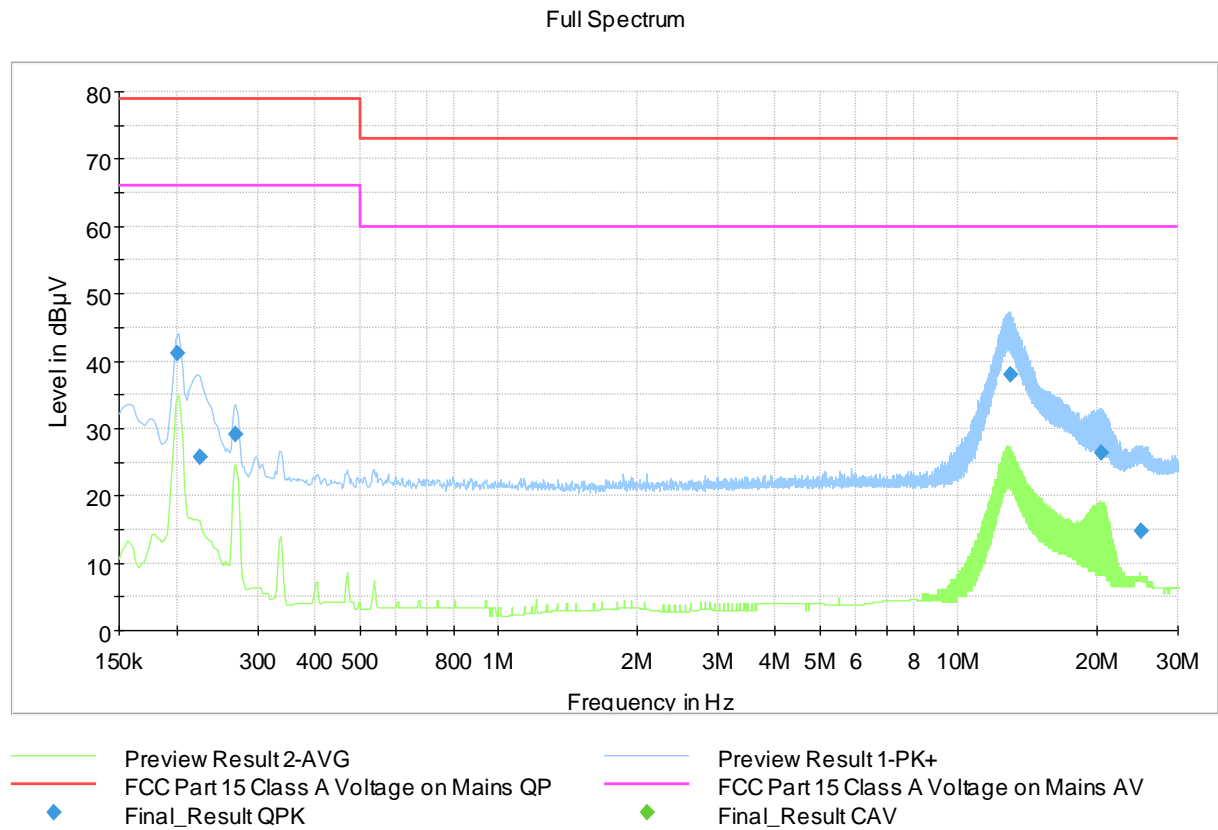


Figure 2: Conducted emissions

Table 1: Test results for conducted emissions

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|------------|
| 0.200750 | 41.13 | --- | 79.00 | 37.87 | 15 x 1000.0 | 9.000 | N | 9.7 |
| 0.224250 | 25.85 | --- | 79.00 | 53.15 | 15 x 1000.0 | 9.000 | N | 9.7 |
| 0.269250 | 29.14 | --- | 79.00 | 49.86 | 15 x 1000.0 | 9.000 | N | 9.7 |
| 12.961250 | 37.93 | --- | 73.00 | 35.07 | 15 x 1000.0 | 9.000 | L1 | 10.3 |
| 20.468250 | 26.36 | --- | 73.00 | 46.64 | 15 x 1000.0 | 9.000 | N | 10.6 |
| 24.873000 | 14.87 | --- | 73.00 | 58.13 | 15 x 1000.0 | 9.000 | L1 | 10.6 |

Correction factor (dB) in the final result table contains the sum of the transducers (cables + LISN).

Measured QuasiPeak and CAverage values include the correction factor.

Radiated Emissions

| | | |
|---------------------------------|----------------------------|----------------------------------|
| Standard: | ANSI C63.4-2014 | |
| Tested by: | HEM | |
| Date: | 28 August 2023 | |
| Temperature: | 23 °C | |
| Humidity: | 53 %RH | |
| Barometric pressure: | 1008 hPa | |
| Measurement uncertainty: | ± 4.9 dB (30 – 200 MHz) | level of confidence 95 % (k = 2) |
| | ± 4.1 dB (200 – 1 000 MHz) | |
| | ± 4.3 dB (1 – 18 GHz) | |

FCC Rule: §15.109(a)

Test plan

The radiated emission measurements were done within a semi anechoic screened chamber. Additional floor absorbers were used on the floor between the EUT and receiving antenna in radiated emission test above 1 GHz. The EUT was placed on a table 0.8 m above the reflecting ground plane. The measurement distance was 3 meters and the results were extrapolated to 10-meter distance using a factor of 20 dB per decade of distance. The worst interferences were determined during measurements by rotating the turntable and adjusting the antenna height. The measurements were done in horizontal and vertical antenna polarizations. The supply voltage to the turntable was fed through the filter.

The EUT was working as described in the section “EUT Test Conditions”.

Radiated measurement settings

| | 30 – 1000 MHz | 1 – 5 GHz |
|-----------------------------|-------------------------|-------------------------|
| Preliminary testing: | | |
| Turntable movement: | 30 ° step | 15 ° step |
| Turntable position: | 15 ° to 345 ° | 0 ° to 345 ° |
| Antenna movement: | 1.5 m step | 1.5 m step |
| Antenna height: | 1.0 m to 4.0 m | 1.0 m to 4.0 m |
| Antenna polarization: | Vertical and horizontal | Vertical and horizontal |
| Final testing: | | |
| Turntable movement: | Continuous | Continuous |
| Turntable position: | ± 30 ° | ± 15 ° |
| Antenna movement: | Continuous | Continuous |
| Antenna height: | ± 1.5 m | ± 1.5 m |
| Antenna polarization: | Vertical and horizontal | Vertical and horizontal |

Test results 30 – 1000 MHz

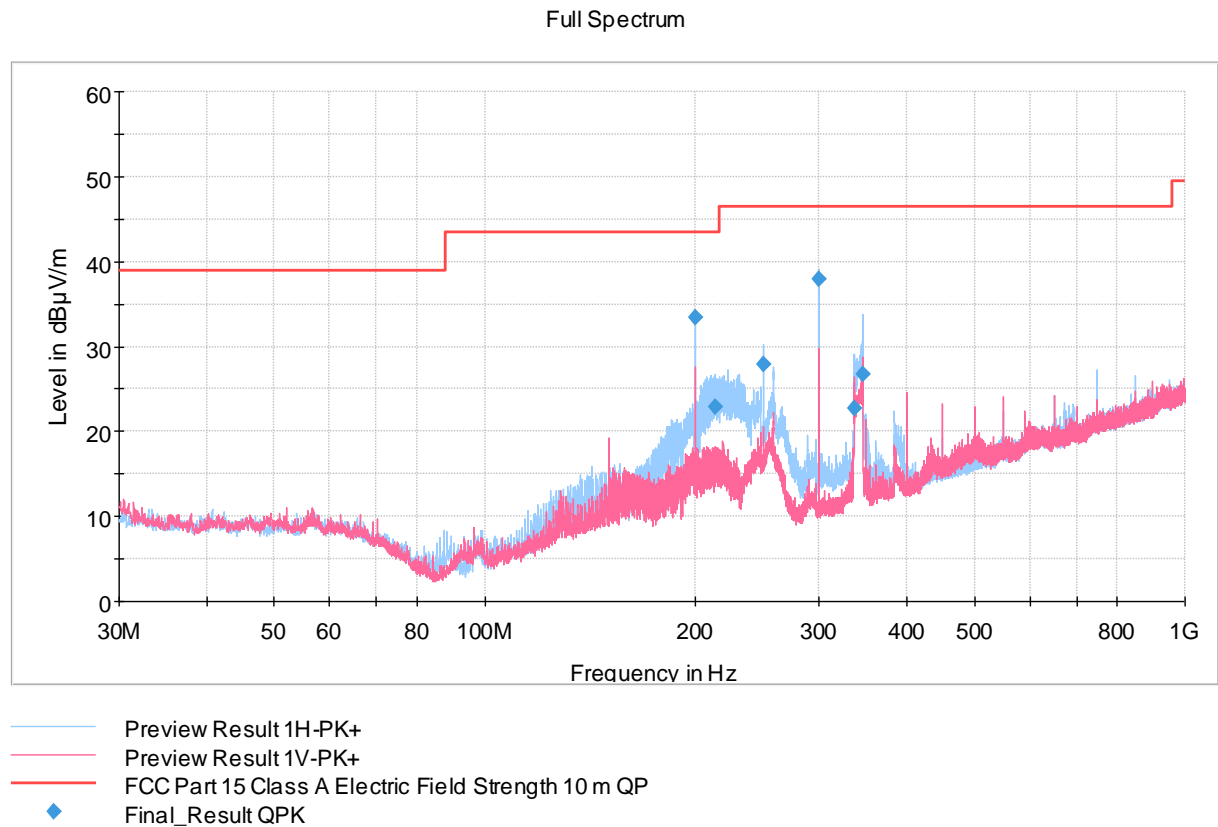


Figure 3: Radiated emissions 30 – 1000 MHz

Table 2: Test results for radiated emissions (30 – 1000 MHz)

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|
| 200.010000 | 33.41 | 43.50 | 10.09 | 15 x 1000.0 | 120.000 | 122.0 | H | 99.0 | 4.9 |
| 213.600000 | 22.95 | 43.50 | 20.55 | 15 x 1000.0 | 120.000 | 108.0 | H | 241.0 | 5.0 |
| 250.020000 | 27.95 | 46.44 | 18.49 | 15 x 1000.0 | 120.000 | 115.0 | H | 318.0 | 7.1 |
| 300.030000 | 37.97 | 46.44 | 8.47 | 15 x 1000.0 | 120.000 | 108.0 | H | 165.0 | 8.9 |
| 336.740000 | 22.67 | 46.44 | 23.77 | 15 x 1000.0 | 120.000 | 100.0 | H | 113.0 | 10.0 |
| 346.560000 | 26.74 | 46.44 | 19.70 | 15 x 1000.0 | 120.000 | 100.0 | H | 118.0 | 10.1 |

Correction factor (dB) in the final result table contains the sum of the transducers (antenna + cables).

Measured QuasiPeak values include the correction factor.

Test results 1 – 5 GHz

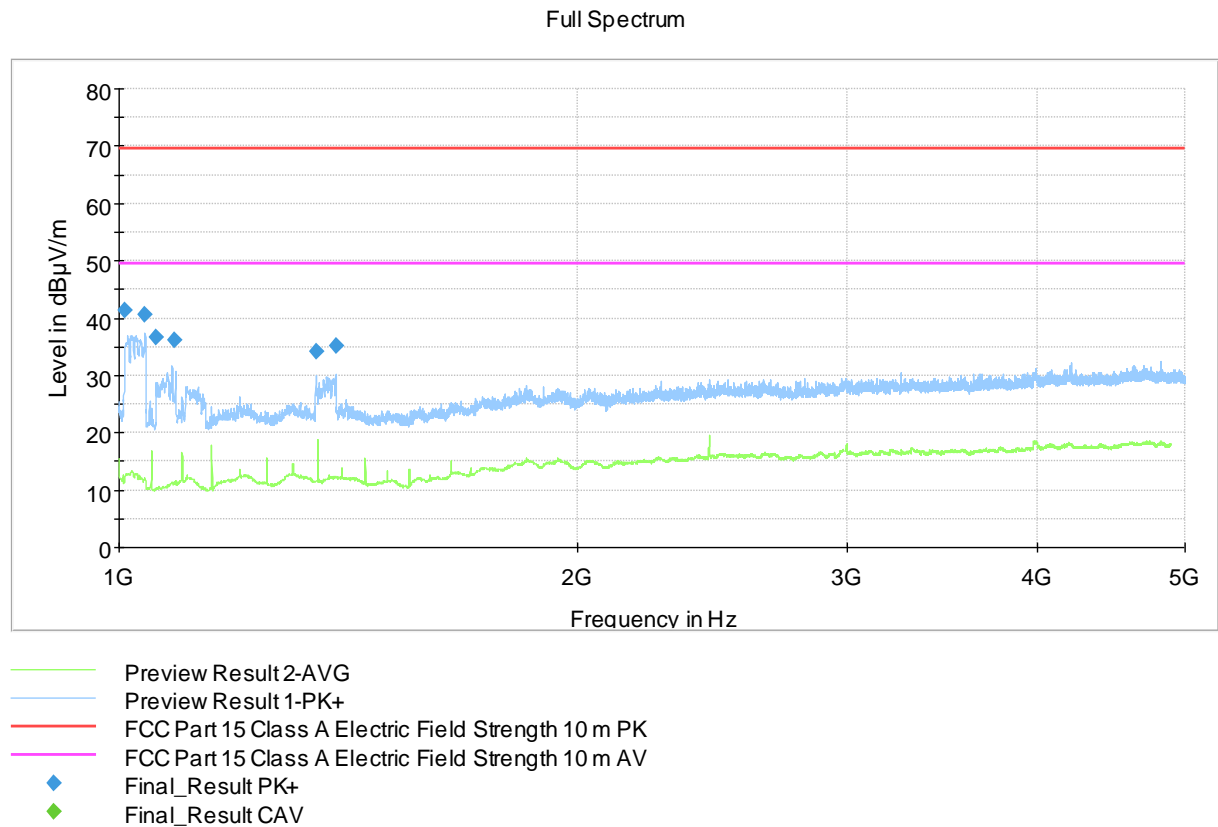


Figure 4: Radiated emissions 1 – 5 GHz

Table 3: Test results for radiated emissions (1 – 5 GHz)

| Frequency (MHz) | MaxPeak (dBµV/m) | CAverage (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) |
|-----------------|------------------|-------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|
| 1009.400000 | 41.47 | --- | 69.50 | 28.03 | 15 x 1000.0 | 1000.000 | 227.0 | V | 317.0 | -11.6 |
| 1040.050000 | 40.50 | --- | 69.50 | 29.00 | 15 x 1000.0 | 1000.000 | 186.0 | H | 146.0 | -12.3 |
| 1057.500000 | 36.70 | --- | 69.50 | 32.80 | 15 x 1000.0 | 1000.000 | 111.0 | V | 261.0 | -12.5 |
| 1088.300000 | 36.15 | --- | 69.50 | 33.35 | 15 x 1000.0 | 1000.000 | 285.0 | V | 327.0 | -12.7 |
| 1345.850000 | 34.29 | --- | 69.50 | 35.21 | 15 x 1000.0 | 1000.000 | 187.0 | V | 327.0 | -10.2 |
| 1386.950000 | 35.22 | --- | 69.50 | 34.28 | 15 x 1000.0 | 1000.000 | 209.0 | H | 200.0 | -10.5 |

Correction factor (dB) in the final result table contains the sum of the transducers (antenna + amplifier + cables). Measured MaxPeak and CAverage values include the correction factor.

TEST EQUIPMENT**Conducted Emissions**

| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
|------------------------------|-------------------|-------------------|------------|------------|------------|
| EMI TEST RECEIVER | ROHDE & SCHWARZ | ESW26 | inv. 10670 | 2023-06-19 | 2024-06-19 |
| LISN | ROHDE & SCHWARZ | ENV216 | inv. 9611 | 2023-02-01 | 2024-02-01 |
| POWER SUPPLY | CALIFORNIA INSTR. | 5001 iX Series II | inv. 7826 | NCR | NCR |
| TEMPERATURE/ HUMIDITY SENSOR | EDS | OW-ENV-TH, K5 SAC | inv. 10517 | 2022-10-27 | 2023-10-27 |
| TEST SOFTWARE | ROHDE & SCHWARZ | EMC-32 | - | - | - |

Radiated Emissions

| Description | Manufacturer | Model | Identifier | Cal. Date | Cal. Due |
|------------------------------|-------------------|-------------------|------------|------------|------------|
| ANTENNA | EMCO | 3117, emi 1-18GHz | inv. 7293 | 2022-06-16 | 2024-06-16 |
| ANTENNA | SCHWARZBECK | VULB 9168 | inv. 8911 | 2022-11-29 | 2024-11-29 |
| ANTENNA MAST | MATURO | TAM 4.0E | inv. 10181 | NCR | NCR |
| ATTENUATOR | PASTERNAK | PE 7004-4 (4dB) | inv. 10126 | 2023-03-13 | 2024-03-13 |
| EMI TEST RECEIVER | ROHDE & SCHWARZ | ESW26 | inv. 10670 | 2023-06-19 | 2024-06-19 |
| MAST & TURNTABLE CONTROLLER | MATURO | NCD | inv. 10183 | NCR | NCR |
| POWER SUPPLY | CALIFORNIA INSTR. | 5001 iX Series II | inv. 7826 | NCR | NCR |
| RF PREAMPLIFIER | CIAO | CA118-3123 | inv. 10278 | 2022-09-21 | 2023-09-21 |
| TEMPERATURE/ HUMIDITY SENSOR | EDS | OW-ENV-TH, K5 SAC | inv. 10517 | 2022-10-27 | 2023-10-27 |
| TEST SOFTWARE | ROHDE & SCHWARZ | EMC-32 | - | - | - |
| TURNTABLE | MATURO | DS430 UPGRADED | inv. 10182 | NCR | NCR |

NCR = No Calibration Required

END OF REPORT