

Test Report

Electromagnetic Compatibility (EMC)



Equipment Under Test: Droplet generator for laboratory use

Model(s): Samplix Xdrop

Manufacturer/Customer: Samplix ApS
Mileparken 28
DK-2730 HERLEV
DENMARK

Tests have been performed according to the following standard(s)

FCC CFR 47 Part 15 (October 2019)	Subpart B	Class A
ICES (Issue 6 + update April 2019)	003	Class A

Date: 22 November 2019

Issued by:

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Testing Engineer

Date:

22 November 2019

Checked by:

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Equipment Under Test (EUT)

Droplet generator for laboratory use

Model: Samplix Xdrop
Trademark: Xdrop™
Structure code: PR5
Serial: SAM190020

Description of the EUT

The Xdrop droplet generator is compatible with Samplix dPCR cartridges for production of dPCR droplets and for Samplix dMDA cartridges for amplification of DNA. The Xdrop droplet generator is used for generating both dPCR and dMDA droplets.

Type of the EUT

The EUT will be tested as a table-top unit.

Power requirements

AC mains	
Rated voltage:	110-240 V (tested with 120 V)
Rated current:	2.3 A
Rated frequency:	50/60 Hz (tested with 60 Hz)

Highest (Clock) frequency

1 GHz.

Cable lengths and types

Name	Cable lenght	Cable Shielded	Comments
AC Mains cable	1.8 m	No	L/N/PE H05VV-F 3G0.75mm ²

Note: The EUT has USB port for service use (not under test). No other I/O ports or other ports (except AC-input) are in the EUT.

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EUT Test Conditions During EMC-Testing

During the testing the EUT was generating dPCR droplets to dPCR cartridge continuously. The operating loop last 120 minutes and it was restarted after that.

The test conditions proposed (supplied) by the customer.

SUMMARY OF TESTING

Measurement/Test	Test Specification	Test Site	Result
AC mains power input port	CFR 47 §15.107 ANSI C63.4 (2014)	K10SAC	PASS
Radiated emissions	CFR 47 §15.109 ANSI C63.4 (2014)	K10SAC	PASS
Possible test case verdicts: Test case does not apply to the EUT: N/A EUT does meet the requirement: PASS EUT does not meet the requirement: FAIL Test was not performed: N/T			

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 ISED CAB identifier: T004	SGS Fimko Ltd Takomotie 8 FI-00380, HELSINKI FINLAND
Test Site:	☐ K10LAB, ISED Canada registration number: 8708A-1 ☒ K5LAB, ISED Canada registration number: 8708A-2 ☐ T10LAB

Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.

Standard:	ANSI C63.4	2014
Tested by:	JLU	
Date:	19 November 2019	
Humidity:	21 °C	
Temperature:	42 %RH	
Barometric pressure:	1010 hPa	
Measurement uncertainty:	± 2.9 dB	Level of confidence 95 % (k = 2)

Test plan

Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and a resolution bandwidth of 9 kHz. The whole frequency range was scanned with Peak and CAverage detectors from the phase and neutral lines of the power supply port. Then the final measurement were carried out on the worst frequencies with a Quasi-peak and CAverage detectors.

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

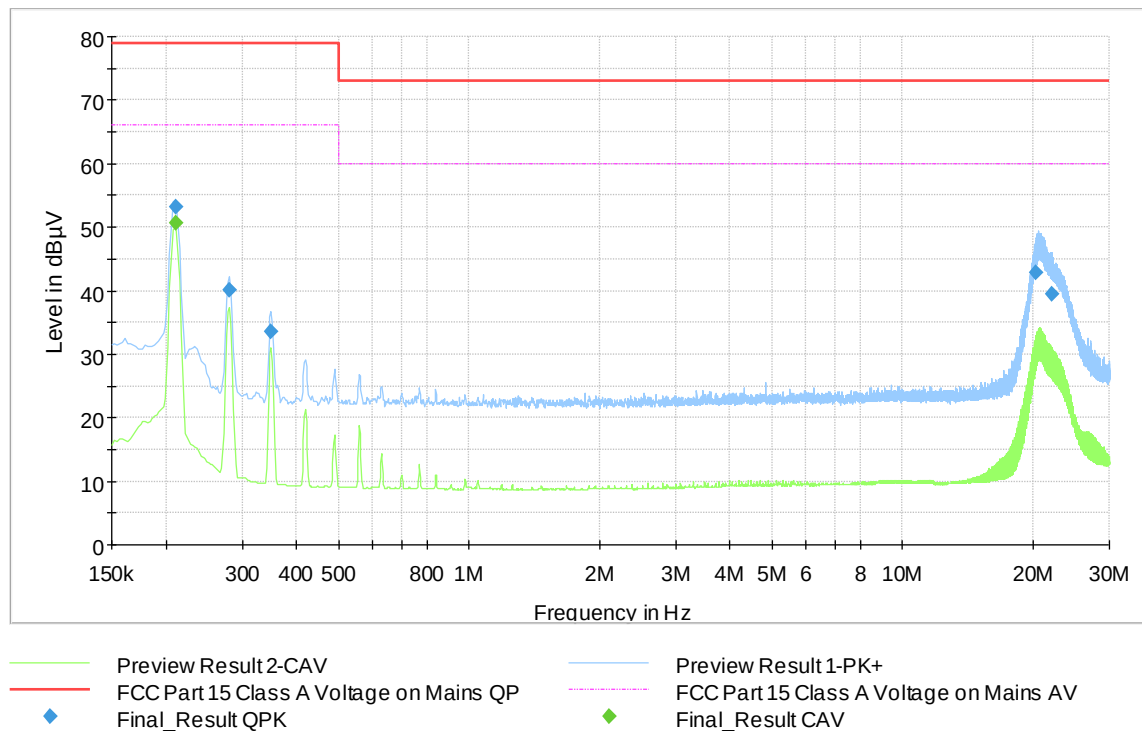
Test results, AC mains


Figure 1. The measured curves with Peak-detector and Average detector measured from N-line.

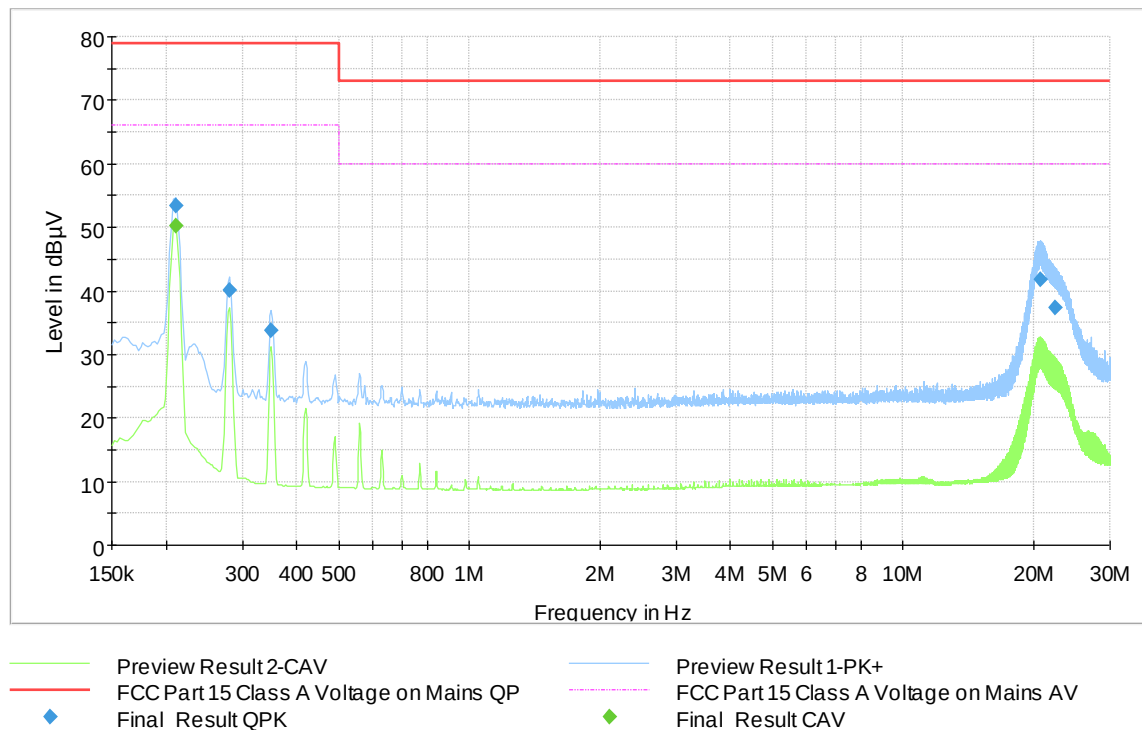


Figure 2. The measured curves with Peak-detector and Average detector measured from L-line.

Conducted Emission Test
Test results, AC mains
Table 1. Final Quasi-Peak and Average measurement from the worst frequencies.

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. time (s)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.210750	---	50.30	66.00	15.70	1.0	9.000	N	GND	10.0
0.210750	53.41	---	79.00	25.59	1.0	9.000	N	GND	10.0
0.280500	40.21	---	79.00	38.79	1.0	9.000	N	GND	10.0
0.350250	33.75	---	79.00	45.25	1.0	9.000	N	GND	10.1
20.719500	41.74	---	73.00	31.26	1.0	9.000	N	GND	11.7
22.402500	37.30	---	73.00	35.70	1.0	9.000	N	GND	11.7
0.210750	---	50.60	66.00	15.40	1.0	9.000	L	GND	10.0
0.210750	53.09	---	79.00	25.91	1.0	9.000	L	GND	10.0
0.280500	40.15	---	79.00	38.85	1.0	9.000	L	GND	10.0
0.350250	33.65	---	79.00	45.35	1.0	9.000	L	GND	10.0
20.368500	42.94	---	73.00	30.06	1.0	9.000	L	GND	10.1
22.049250	39.42	---	73.00	33.58	1.0	9.000	L	GND	10.1

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

Quasi-Peak and Average values are the measured values corrected with the correction factor.

Radiated Emissions In The Frequency Range 30 MHz – 5 GHz.

Standard:	ANSI C63.4	2014
Tested by:	JLU/AKA	
Date:	19 November 2019	
Humidity:	21 °C	
Temperature:	42 %RH	
Barometric pressure	1000 - 1010 hPa	
Limit	Class A	
Measurement uncertainty	± 5 dB (30 – 200 MHz) ± 4.7 dB (200 – 1000 MHz) ± 4.9 dB (1 – 15 GHz)	Level of confidence 95 % (k = 2).

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 10 m for the frequencies below 1 GHz and 3 m for the frequencies above 1 GHz. 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.

Field strength limit in the frequency range of 1-5 GHz were converted to 10 meters measurement according to the FCC CFR 47 Part 15 rules.

Radiated measurement settings

Preliminary testing (30 to 1000 MHz):

Turntable movement: 20 ° step
Turntable position: 10 ° to 350°
Antenna movement: 1.5 m step
Antenna height: 1.0 m to 4.0 m
Antenna polarization: Vertical and horizontal

Final testing (30 to 1000 MHz):

Turntable movement: Continuous
Turntable position: ± 15 °
Antenna movement: Continuous
Antenna height: ± 0.75 m
Antenna polarization: Vertical and horizontal

Preliminary testing (1 to 5 GHz):

Turntable movement: 15 ° step
Turntable position: 0 ° to 360°
Antenna movement: 0.5 m step
Antenna height: 1.0 m to 4.0 m
Antenna polarization: Vertical and horizontal

Final testing (1 to 5 GHz):

Turntable movement: Continuous
Turntable position: ± 15 °
Antenna movement: Continuous
Antenna height: 1.0 m to 4.0 m
Antenna polarization: Vertical and horizontal

Test results

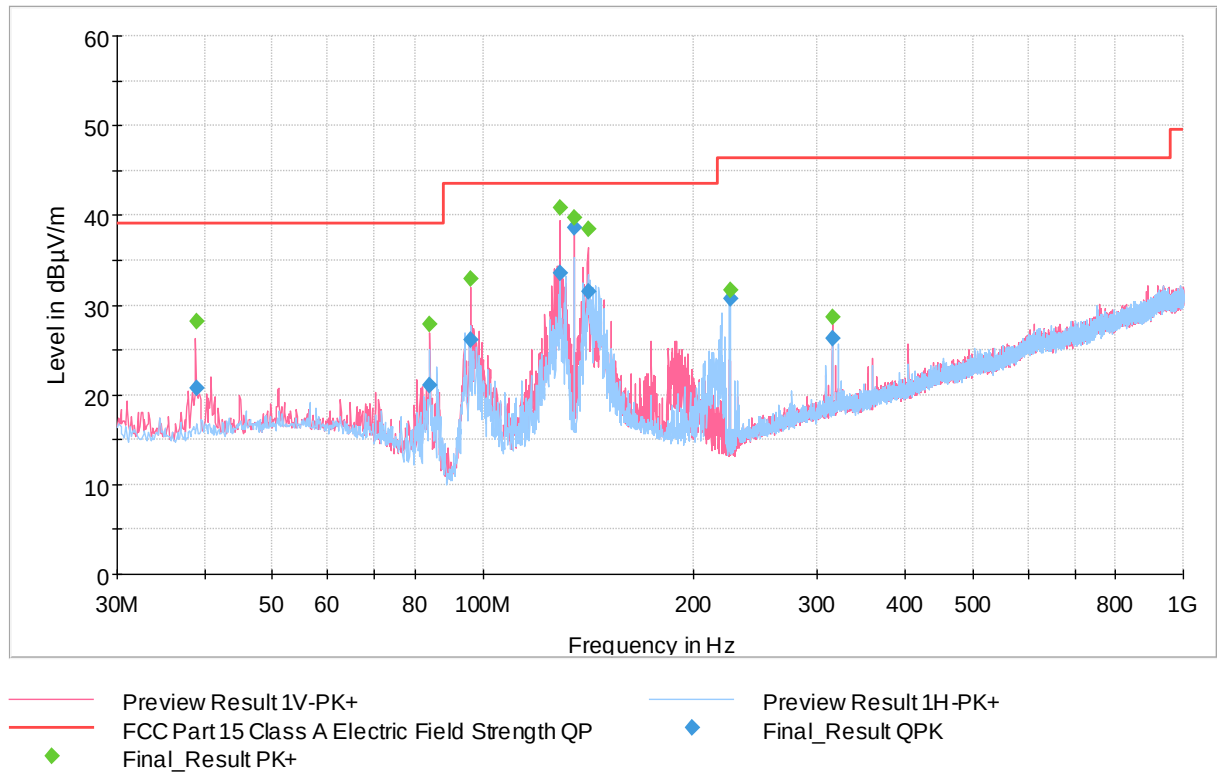


Figure 3: Graphical presentation of the emissions (30 - 1000 MHz). Peak-values measured for informative use only.

Table 2: Final QP measurements from the worst frequencies (30 - 1000 MHz)

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. time (s)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr.** (dB/m)
38.901951	20.76	39.09	18.32	1.0	120.000	175.0	V	295.0	-10.2
83.911463	21.00	39.09	18.08	1.0	120.000	400.0	V	135.0	-15.0
96.097317	26.10	43.52	17.42	1.0	120.000	282.0	V	75.0	-14.1
128.922683	33.52	43.52	10.00	1.0	120.000	175.0	V	3.0	-10.3
135.015610	38.57	43.52	4.95	1.0	120.000	103.0	V	5.0	-9.5
141.106829	31.44	43.52	12.08	1.0	120.000	195.0	V	135.0	-8.8
225.006342	30.67	46.44	15.77	1.0	120.000	359.0	H	105.0	-11.4
315.027073	26.25	46.44	20.19	1.0	120.000	103.0	V	-5.0	-6.8

Notes: *Frequency investigated and QP re-measured manually.

**Correction factor (dB) in the final result tables contains the sum of the attenuations of the system. (Antenna+amplifier+attenuator+cables). QuasiPeak value include the correction factor.

Radiated Emission Test

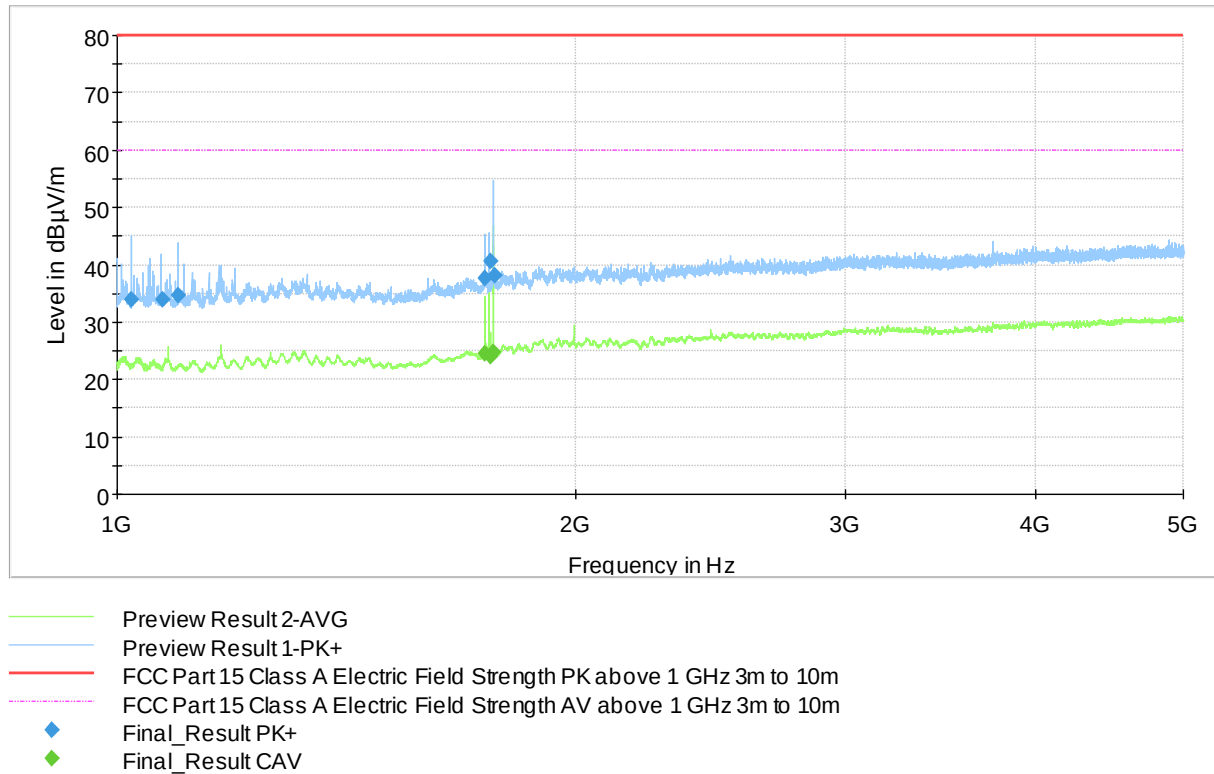


Figure 4: Graphical presentation of the emissions (1 – 5 GHz)

Table 3: Final measurements from the worst frequencies (1 – 5 GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. time (s)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr.* (dB/m)
1021.80000	34.00	---	79.99	45.99	1.0	1000.000	206.0	H	143.0	-5.1
1070.90000	34.01	---	79.99	45.98	1.0	1000.000	138.0	V	211.0	-5.0
1096.85000	34.79	---	79.99	45.20	1.0	1000.000	142.0	V	202.0	-5.0
1741.30000	37.77	---	79.99	42.22	1.0	1000.000	357.0	H	329.0	-1.0
1743.85000	---	24.51	59.95	35.44	1.0	1000.000	362.0	H	331.0	-0.8
1756.25000	40.51	---	79.99	39.48	1.0	1000.000	134.0	V	125.0	-0.9
1756.65000	---	24.11	59.95	35.84	1.0	1000.000	200.0	V	111.0	-0.9
1765.15000	---	24.74	59.95	35.21	1.0	1000.000	174.0	V	37.0	-0.5
1766.50000	38.06	---	79.99	41.93	1.0	1000.000	201.0	V	37.0	-0.6

Note: *Correction factor (dB) in the final result tables contains the sum of the attenuations of the system. (Antenna+amplifier+attenuator+cables).
MaxPeak and CAverage measured 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	2019-06-27	2020-06-26
LISN	ROHDE & SCHWARZ	ESH3-Z5	inv. 7972	2019-05-28	2020-05-28
TRANSIENT LIMITER	ROHDE & SCHWARZ	ESH3-Z2	inv. 8395	2019-11-12	2020-11-12
MULTIMETER	FLUKE	89 IV	inv. 8251	2019-01-31	2020-01-31
POWER SUPPLY	CALIFORNIA INSTR.	15003I-400-RMS	inv. 8548	-	-

Radiated Emissions

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
ANTENNA	SCHWARZBECK	VULB 9168	inv. 8885	2018-05-22	2020-05-22
ANTENNA	ETS LINDGREN	3117	inv. 9569	2019-04-10	2021-04-10
ANTENNA MAST	DEISEL	MA240	inv. 8021	-	-
ATTENUATOR	PASTERNAK	PE 7004-4	inv. 10125	0605/2019	2020-05-06
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW26	inv. 10670	2019-06-27	2020-06-26
MAST & TURNTABLE CONTROLLER	INNCO	CO3000	sn. 749/32121013/L	-	-
MULTIMETER	FLUKE	89 IV	inv. 8251	2019-01-31	2020-01-31
POWER SUPPLY	CALIFORNIA INSTR.	15003I-400-RMS	inv. 8548	-	-
RF PREAMPLIFIER	CIAO	CA118-3123	inv. 10514	2018-11-26	2019-11-26
TURNTABLE	DEISEL	DT445	inv. 10377	-	-