EMC TEST REPORT

FCC Title 47 CFR Part 15B, ISED ICES-003 Issue 7

Report Reference No	G0M-2210-1715 -EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	A2LA - Registration number: 1983.01 (ISED) ISED wireless device testing laboratory: CN 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	SumUp Inc
Address	2000 Central Ave Suite 100 CO 80301 Boulder United States of America
Test Specification Standard(s)	Title 47 CFR Part 15 Subpart B ISED ICES-Gen Issue 1 ; Amendment 1 (February 2021) ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Printer
Model(s)	Solo Printer
Additional Model(s)	None
Brand Name(s)	SumUp Solo Printer
Hardware Version(s)	P0ND3N###-CN
Software Version(s)	1.0.0.1
FCC-ID	2A39U-PRIN001
IC	-
Test Result	**PASSED**

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	N/R	
required by standard but not appl. to test object	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
Testing:		
Date of receipt of test item	2022-07-13	
Report:		
Compiled by	Brahima Drabo	
Tested by (+ signature)	Brahima Drabo	.....
Tested by (+ signature) (Responsible for Test)	Stephan Liebich	.....
Approved by (+ signature) (Test Lab Engineer)	Andreas Pflug	.....
Date of Issue	2022-11-17	
Total number of pages	42	
General Remarks:		
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.** This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		
None		

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T_{NOM}	Nominal operating temperature
V_{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-11-17	Initial Release	

REPORT INDEX

1 Equipment (Test Item) Under Test

Description	Printer		
Intended Use	Mobile receipt printer for card terminal		
Model	Solo Printer		
Additional Model(s)	None		
Brand Name(s)	SumUp Solo Printer		
Hardware Version(s)	P0ND3N###-CN		
Software Version(s)	1.0.0.1		
Number of tested samples	1		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1	40550	15312500100000028
EUT Dimensions [cm]	13 x 6 x 9.5		
FCC-ID	2A39U-PRIN001		
IC	-		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	200 (Clock frequency)		
Protective Earth	No		
Supply Voltage	V_{NOM}	9 V DC via dedicated AC/DC-Adapter 7.6 V DC via internal rechargeable Lithium battery (BAT-00006)	
AC/DC-Adaptor	Model	ACC-00010	
	Manufacturer	sumup	
	Input	100-240V – 50 / 60 Hz 0.5 A	
	Output	5.0 V – 3.0 A (15 W) 9.0 V – 3.0 A (27 W)	
Manufacturer	SumUp Limited Harcourt Center, Charlotte Way D02 K580 Dublin Dublin 2 Ireland		

1.1 Equipment Ports

Name	Type	Attributes		Comment
AC Mains	AC	Count: Cable length [m]: Direction: Service only: Shielded:	1 1.2 In No No	Port of dedicated AC/DC-Adapter
USB2.0 Device	IO	Count: Cable length [m]: Direction: Service only: Shielded:	1 1.2 IO No Yes	For Payment Device terminal/charger only
USB2.0 Host	IO	Count: Cable length [m]: Direction: Service only: Shielded:	1 0 IO No Yes	For card reader only

Description:	
AC	AC mains power input/output port
DC	DC power input/output port
BAT	DC power input port connected to external battery
IO	Input/Output port
TP	Telecommunication port
NE	Non-electrical port

1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Payment Device	SumUp	SUM002	Customer Equipment; Sample-ID: 40738
AE	Cash Register Rolls	unknown	unknown	Customer Equipment; Sample-ID: 40552
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment: --				

1.5 Operational Modes

Mode #	Description
1	EUT is in status powering from internal printer battery and printing receipt every second.
2	EUT is in status charging printer, powering captive card reader and printing receipt every second.
Comment: --	

1.6 EUT Configuration

Configuration #	Description
1	EUT is powered via internal Lithium battery. The Payment Device is connected (inserted) to the EUT. The Cash Register Roll is inserted into the EUT.
2	EUT is powered by 9 V DC via dedicated AC/DC-Adapter(5 V DC Out Port open). Dedicated AC/DC-Adapter is powered via external laboratory power supply unit. The Payment Device is attached to the EUT. The Cash Register Roll is inserted into the EUT.
Comment: --	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dBµV. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyser (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	--
FCC 15.107 ICES-003, 3.2.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	--
Comment: --				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

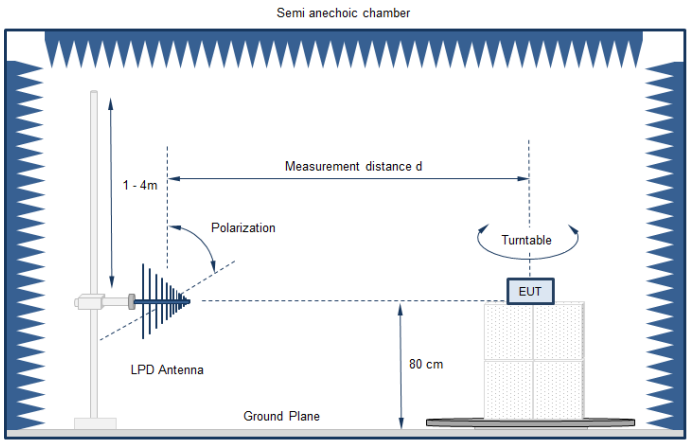
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

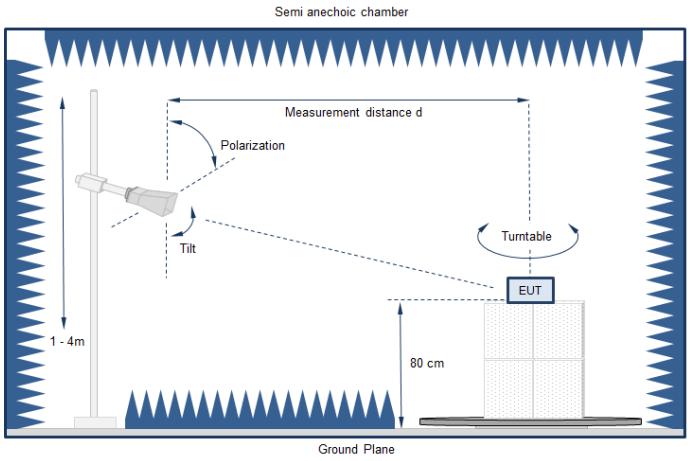
Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	200
Measurement range	30 MHz to 2000 MHz
Temperature [°C]	24 – 26
Humidity [%]	52 – 54
Operator	Brahima Drabo supervised by Stephan Liebich
Date	2022-08-05

2.1.2 Setup

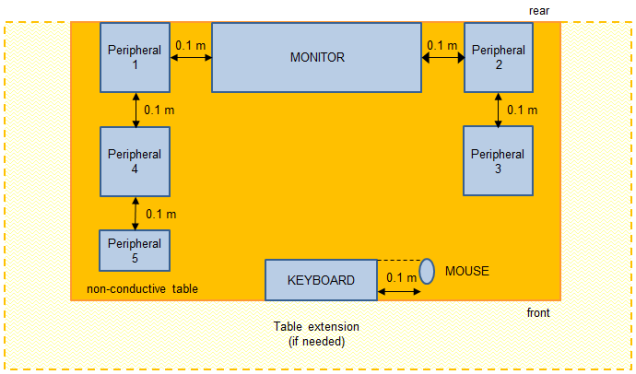
Measurement up to 1 GHz



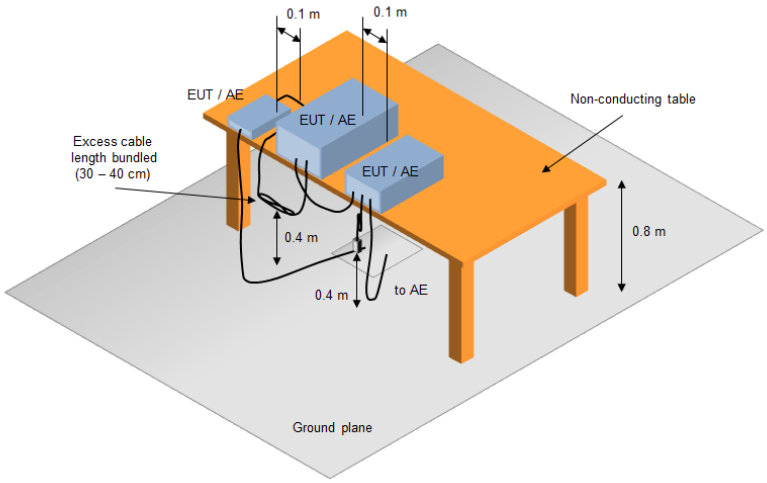
Measurement above 1 GHz



Equipment placement - Table top



Test Setup



2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment AC1					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC1	EF00062	2021-02	2024-02
Anechoic chamber (SVSWR)	Frankonia	AC 1	EF01011	2022-06	2025-06
Programmable AC Source	Chroma ATE Inc.	61604	EF01068	Verification	Verification
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2021-07	2023-01
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2019-10	2022-10
Climatic Sensor	Embedded Data Systems, LLC.	2800100000 25417E	EF01054	2022-04	2023-04

Test Equipment AC6					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC6	EF00910	2021-07	2024-07
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU8	EF00379	2022-07	2023-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
3-phase Electronic Voltage Source	EM Test GmbH (Switzerland)	NetWave 30-400	EF01514	2022-07	2023-07
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2022-07	2023-07

2.1.4 Procedure

Exploratory measurement
1. The EUT was placed on a non-conductive table at a height of 0.8m. 2. The EUT and support equipment, if needed, were set up to simulate typical usage. 3. Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage. 4. The antenna was placed at a distance of 3 or 10 m. 5. The received signal was monitored at the measurement receiver. 6. This procedure has to be performed in both antenna polarizations, horizontal and vertical. 7. The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 2.1.2

Final measurement
1. The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver. 2. A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast. 3. The EUT and cable arrangement were based on the exploratory measurement results. 4. Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded. 5. The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dBµV/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

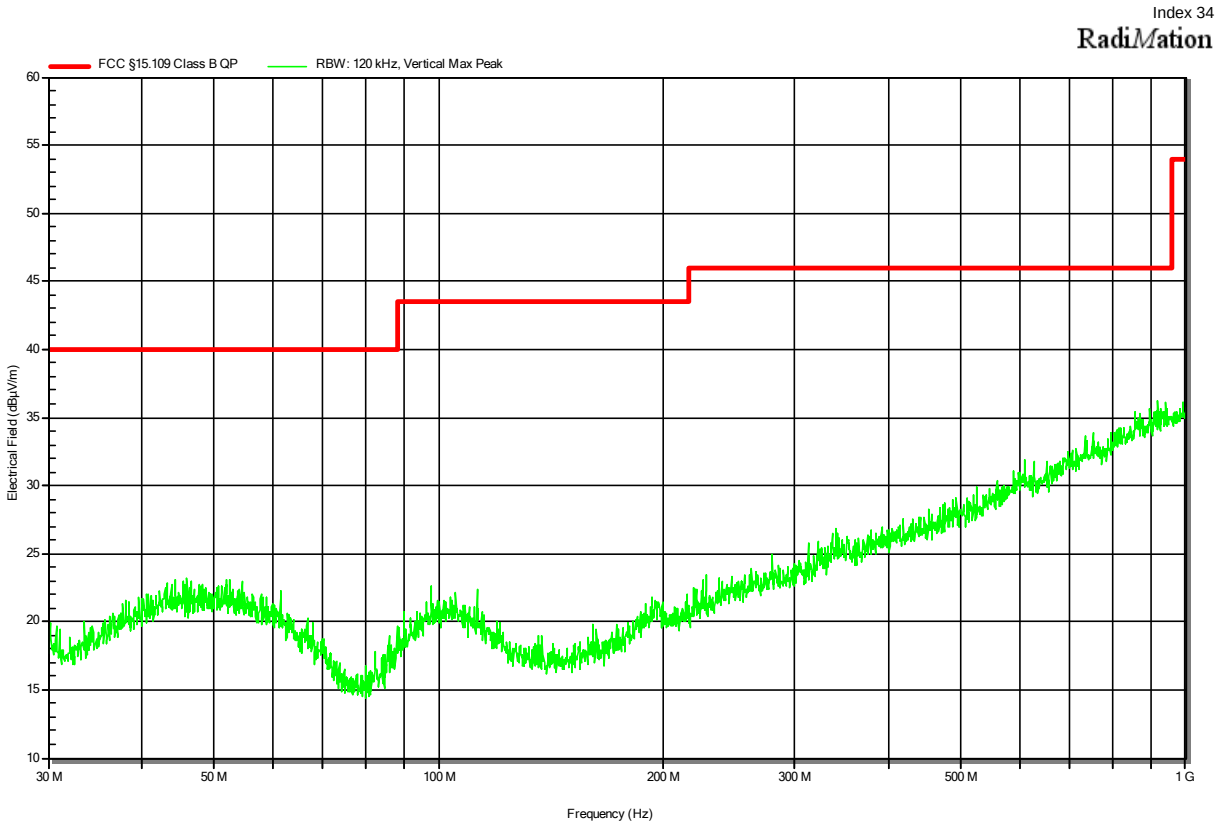
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	--
2	2	PASS	120 V AC / 60 Hz

2.1.8 Records

Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-09
Operating Conditions:	ambient temperature: 24 °Celsius
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	3m
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Note 1:	--



Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-09
Operating Conditions:	ambient temperature: 24 °Celsius
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10m converted to 3m
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Note 1:	--

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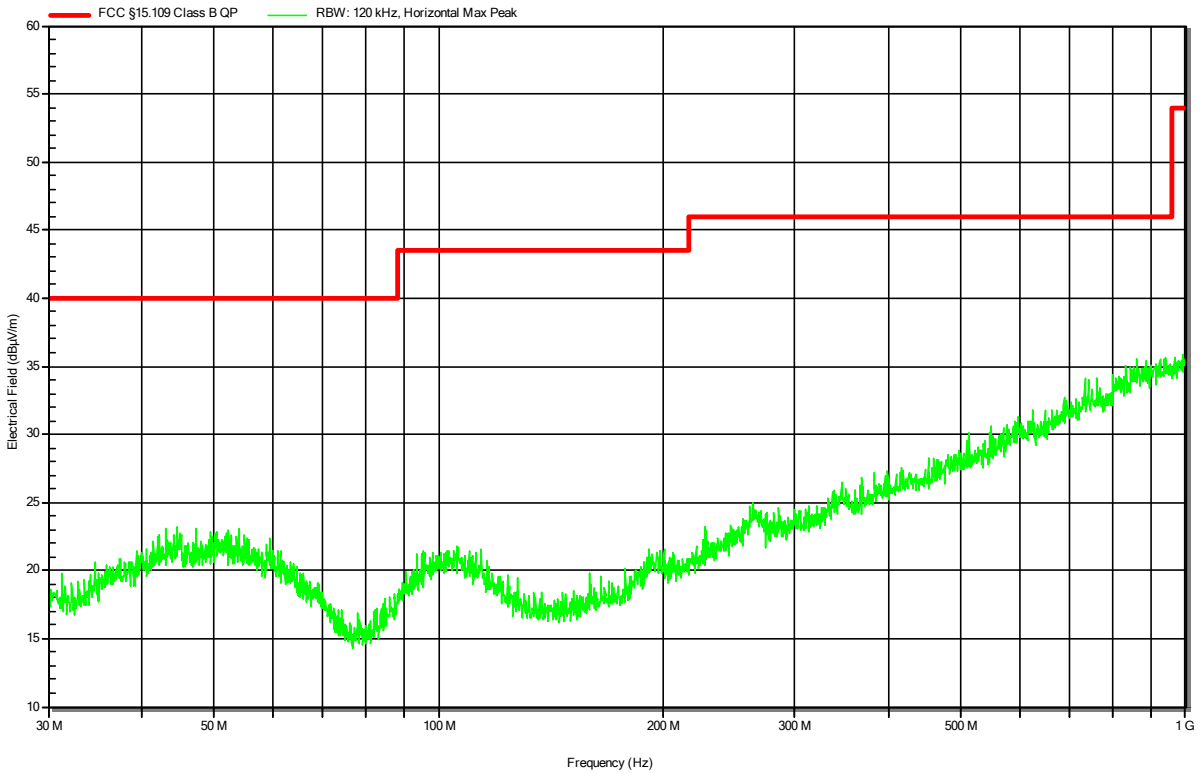
RadiMation



Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-05
Operating Conditions:	ambient temperature: 24 °Celsius
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement Distance:	3m
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Note 1:	--

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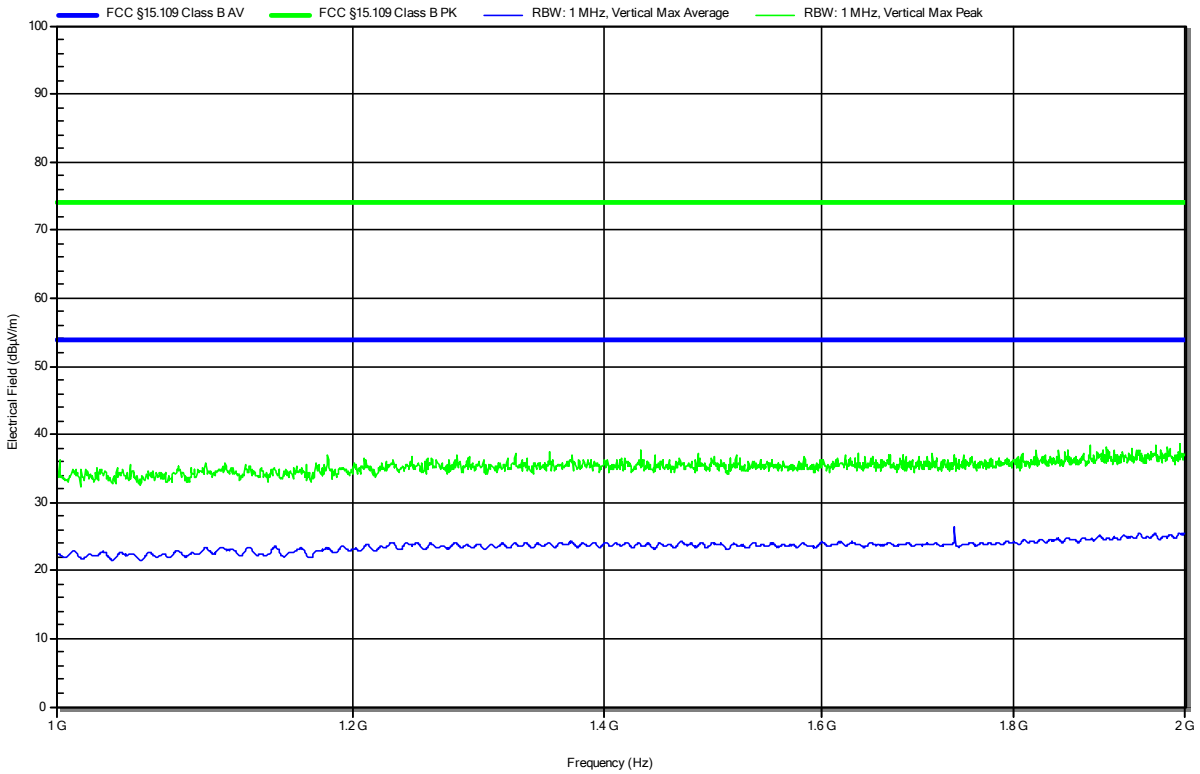
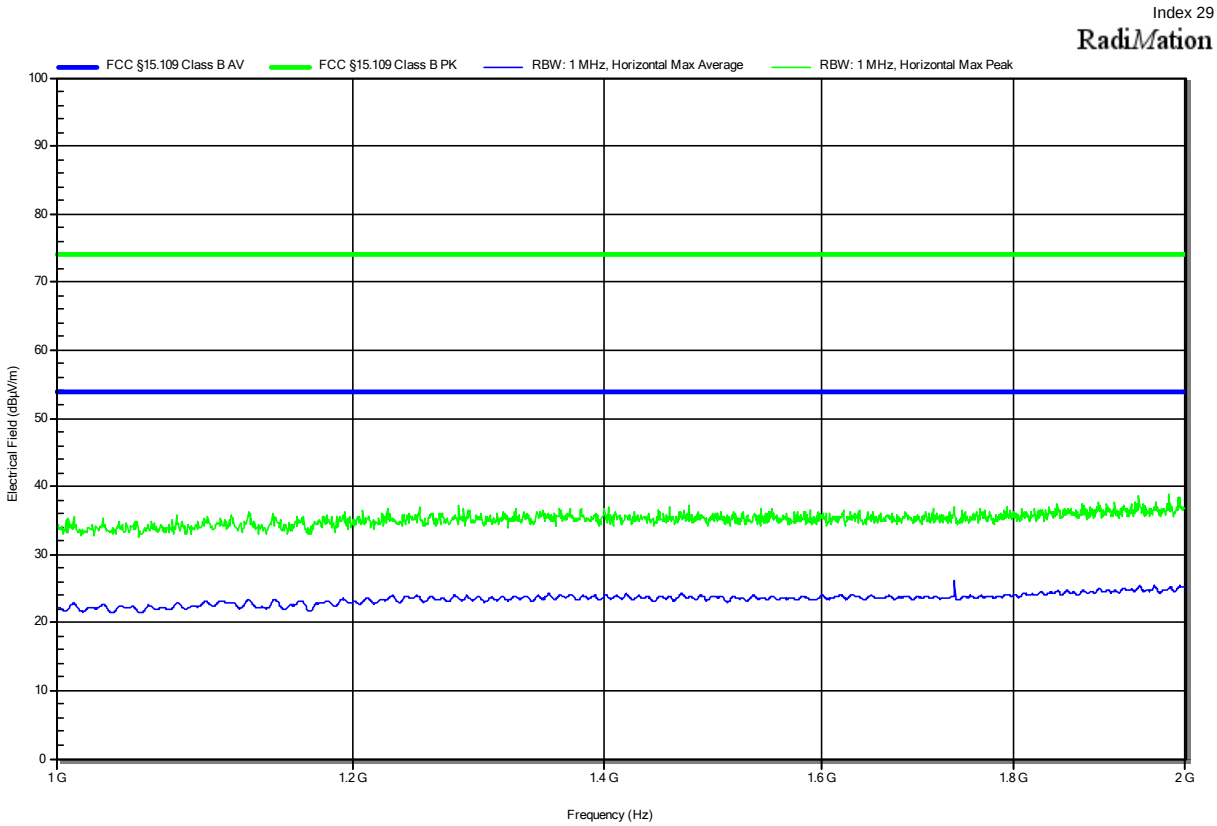
RadiMation



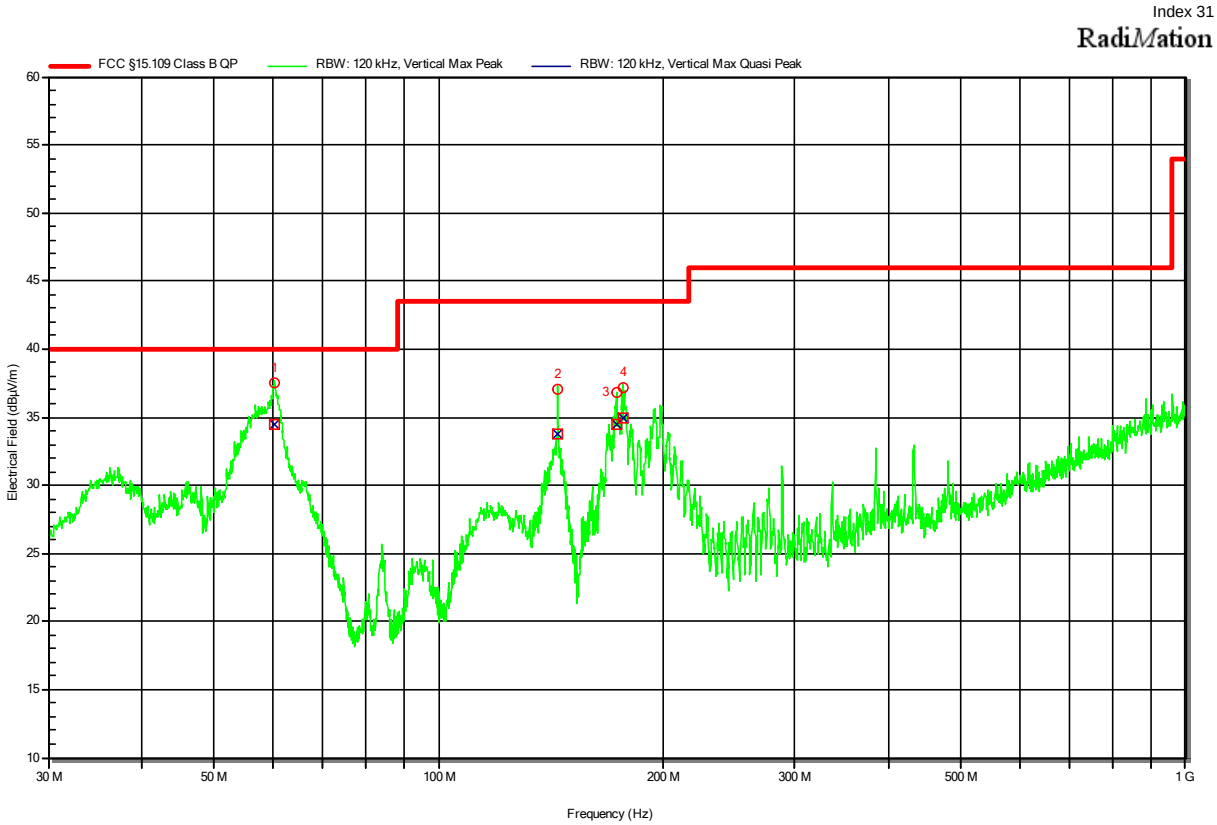
Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-05
Operating Conditions:	ambient temperature: 24 °Celsius
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance:	3m
Operational Mode:	Mode 1
EUT Configuration:	Configuration 1
Note 1:	--



Radiated emissions
according to FCC part 15B

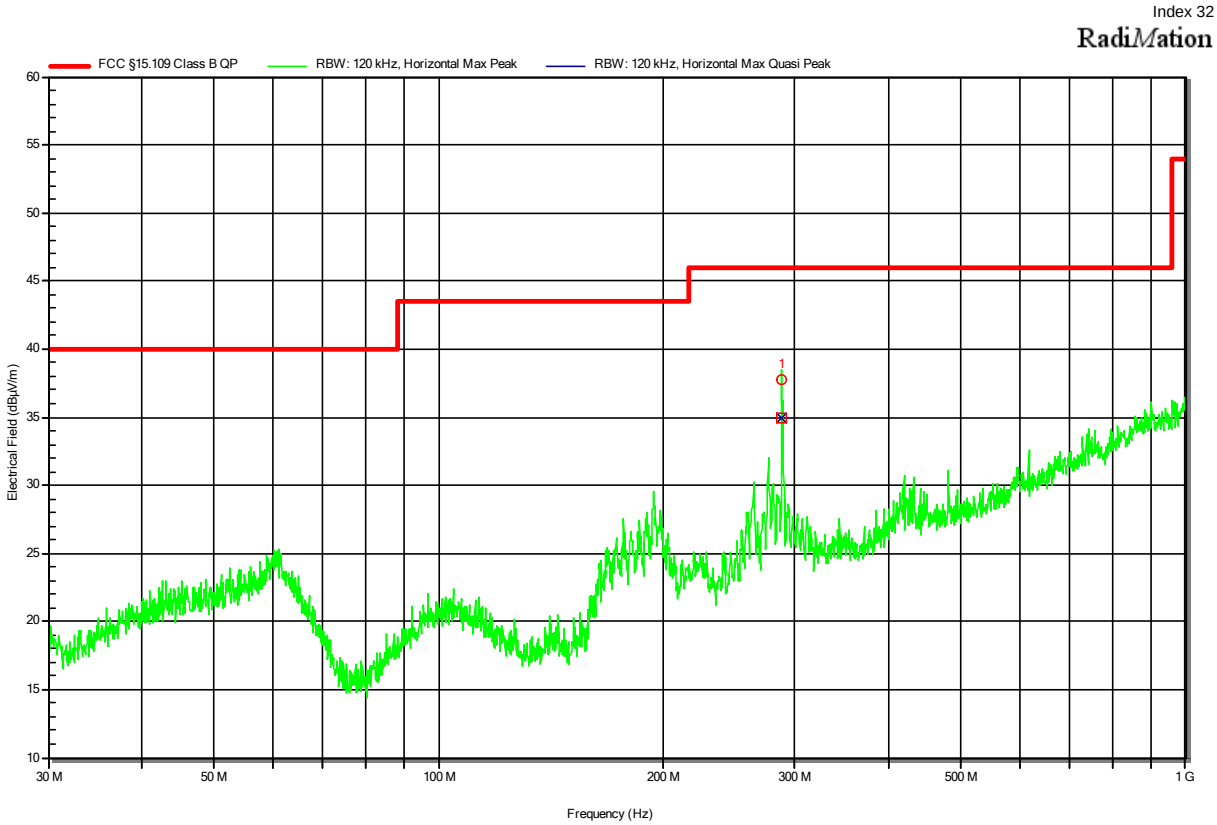
Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-09
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
Antenna:	Schwarzbeck VULB 9162, Vertical
Measurement Distance:	10m converted to 3m
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Note 1:	--



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	60.3 MHz	34.4 dBµV/m	40 dBµV/m	-5.6 dB	Pass	0 degrees	1 m
2	144.18 MHz	33.8 dBµV/m	43.5 dBµV/m	-9.7 dB	Pass	0 degrees	1 m
3	173.34 MHz	34.5 dBµV/m	43.5 dBµV/m	-9.0 dB	Pass	0 degrees	1 m
4	176.34 MHz	35 dBµV/m	43.5 dBµV/m	-8.5 dB	Pass	0 degrees	1 m

Radiated emissions
according to FCC part 15B

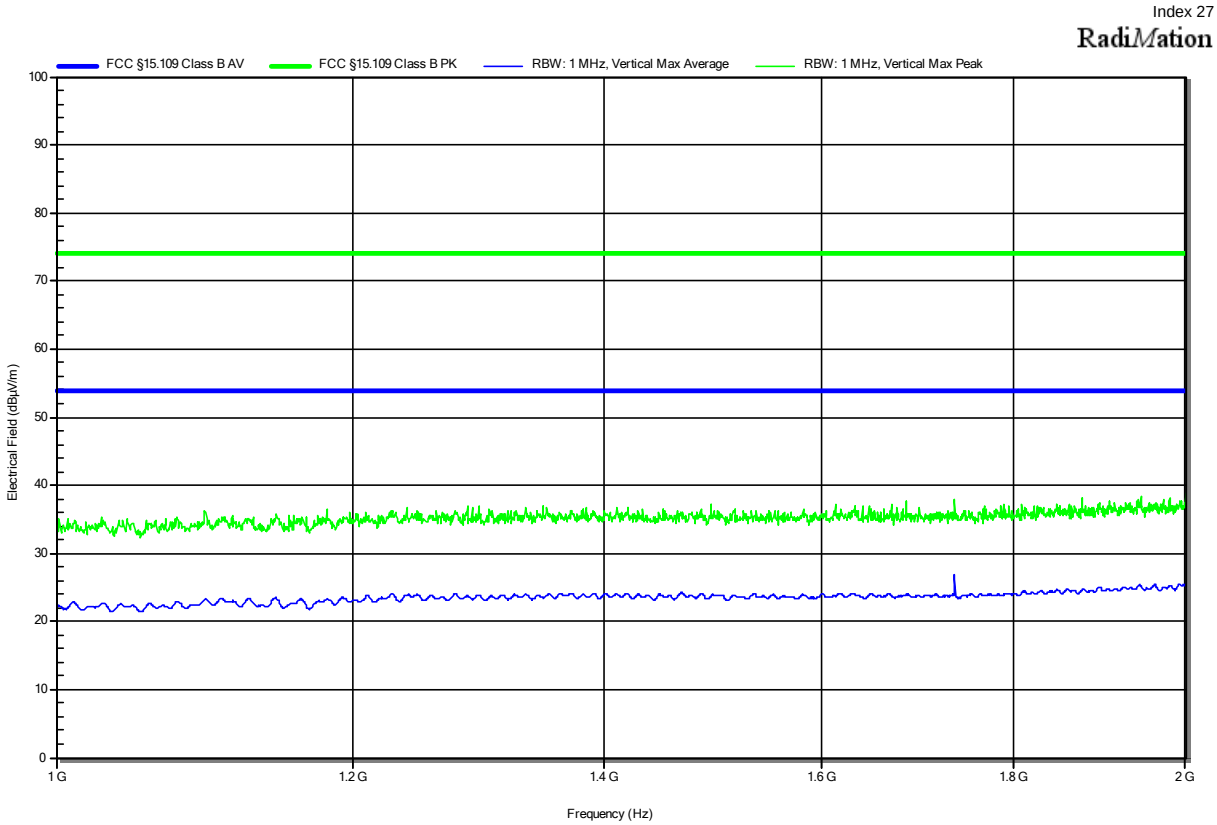
Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Solo Printer
Model:	Printer
Test Sample ID:	Solo Printer
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-09
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
Antenna:	Schwarzbeck VULB 9162, Horizontal
Measurement Distance:	10m converted to 3m
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Note 1:	--



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	288.36 MHz	34.9 dBµV/m	46 dBµV/m	-11.1 dB	Pass	-40 degrees	3.5 m

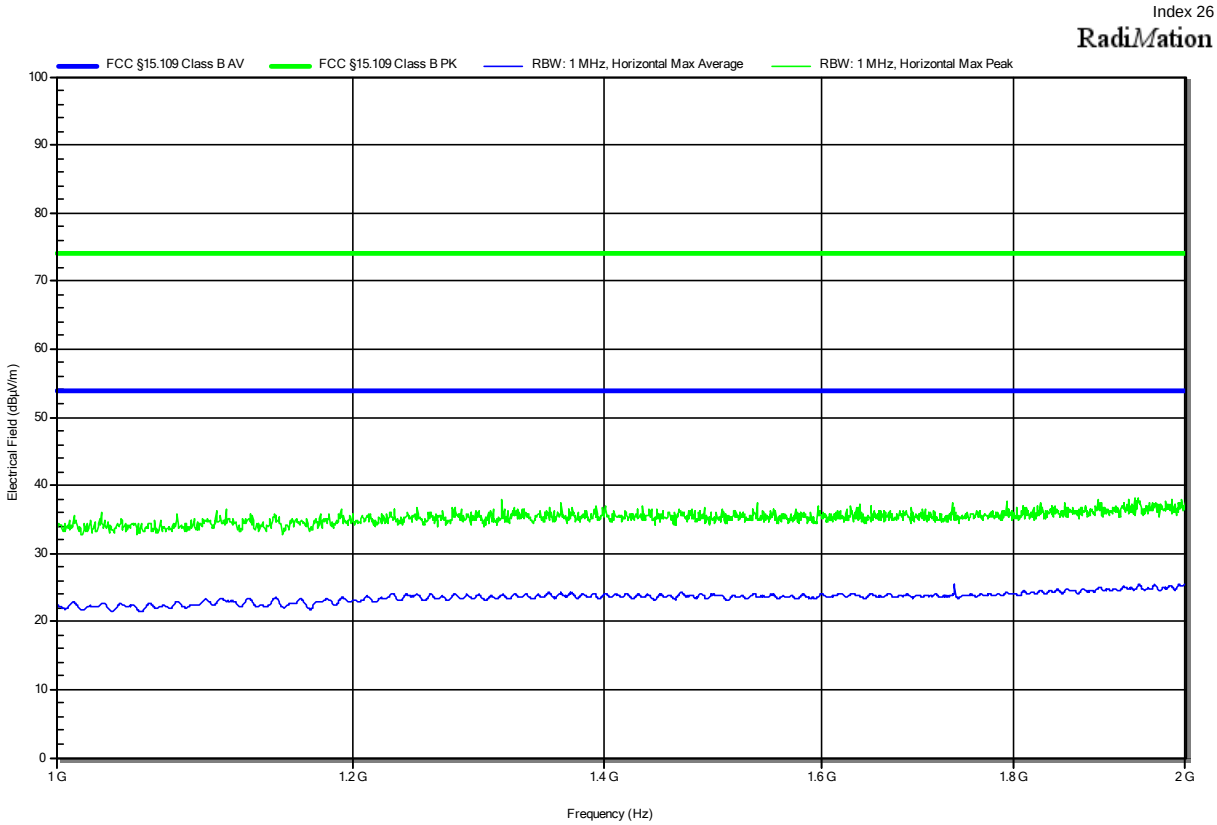
Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Solo Printer
Model:	Printer
Test Sample ID:	Solo Printer
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-05
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
Antenna:	Schwarzbeck BBHA 9120D, Vertical
Measurement Distance:	3m
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Note 1:	--



Radiated emissions
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-05
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance:	3m
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Note 1:	--



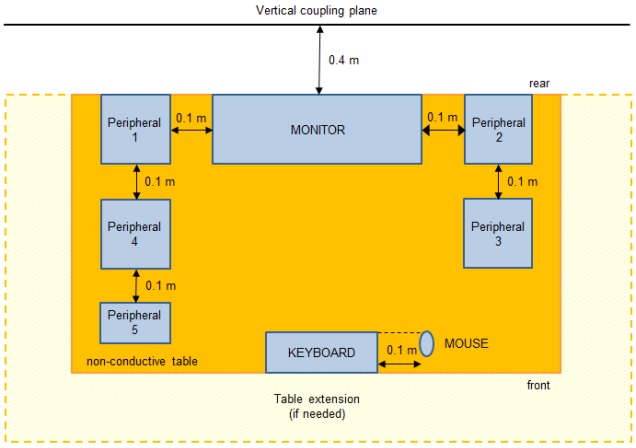
2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

2.2.1 Information

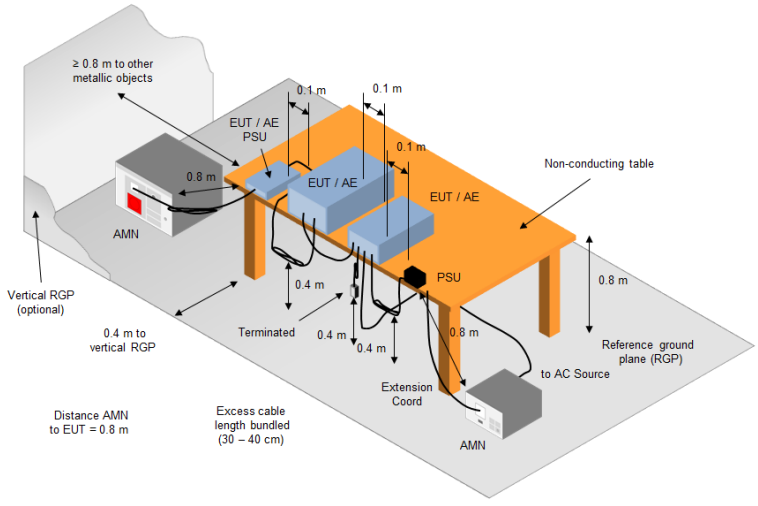
Test Information	
Reference	FCC 15.107, ICES-003, 3.2.1
Reference method	ANSI C63.4:2014+A1:2017 Section 12
Measurement range	150 kHz to 30 MHz
Equipment class	Class B
Equipment type	Table top
Temperature [°C]	24 – 26 v
Humidity [%]	46 – 48
Operator	Brahima Drabo supervised by Stephan Liebich
Date	2022-08-02

2.2.2 Setup

Equipment placement



Test Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Pulse Limiter	R&S	ESH3-Z2	EF01222	2021-07	2023-07
EMI Test Receiver	R&S	ESR 7	EF00943	2021-08	2022-08
AC & DC Power Supply	Chroma ATE Inc.	61604	EF01380	2021-07	2022-07
LISN	Schwarzbeck	NSLK 8127 RC	EF01592	2021-07	2023-07
Climatic Sensor	Embedded Data Systems, LLC.	280010000025417E	EF01054	2022-04	2023-04

2.2.4 Procedure

Exploratory measurement
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. I/O cables were bundled not longer than 0.4 m
6. Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor
7. To maximize the emissions the cable positions were manipulated
8. The worst configuration of EUT and cables is shown on a test setup picture at item 2.2.2

Final measurement
1. The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2. The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3. The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4. The LISN measurement port was connected to a measurement receiver
5. The EUT and cable arrangement were based on the exploratory measurement results
6. The test data of the worst-case conditions were recorded and shown on the next pages

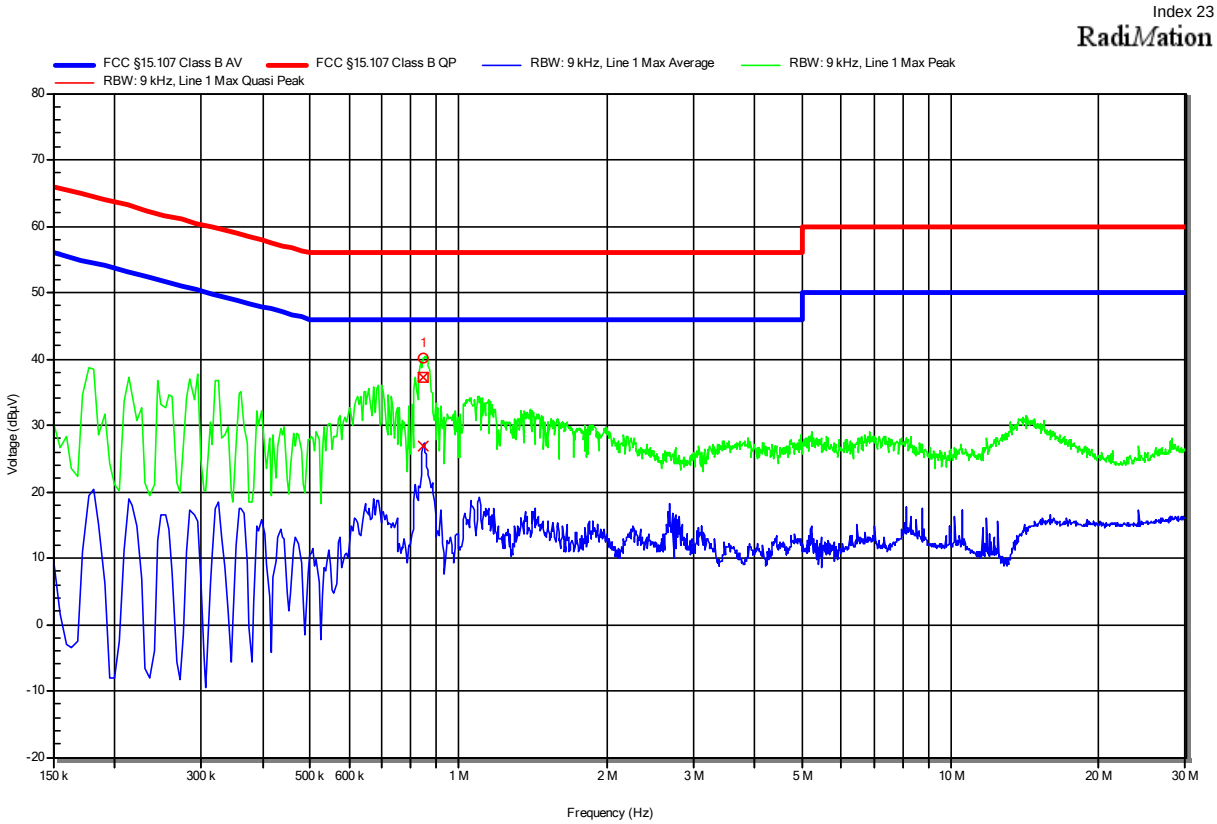
2.2.5 Limits

Class B		
Frequency [MHz]	Quasi-peak Limit [dBµV]	Average Limit [dBµV]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50
* Decreases with the logarithm of the frequency		

2.2.8 Records

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-02
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
LISN:	Schwarzbeck NSLK 8127 RC L1
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Applied to Port:	AC Mains
Note 1:	--



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	847.5 kHz	37.26 dBµV	56 dBµV	-18.74 dB	Pass	Line 1

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	847.5 kHz	26.92 dBµV	46 dBµV	-19.08 dB	Pass	Line 1

Conducted emissions at the mains power port
according to FCC part 15B

Project Number:	G0M-2111-1180
Applicant:	SumUp Limited
Model Description:	Printer
Model:	Solo Printer
Test Sample ID:	40550
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Drabo
Test Date:	2022-08-02
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V AC / 60 Hz
LISN:	Schwarzbeck NSLK N
Operational Mode:	Mode 2
EUT Configuration:	Configuration 2
Applied to Port:	AC Mains
Note 1:	--

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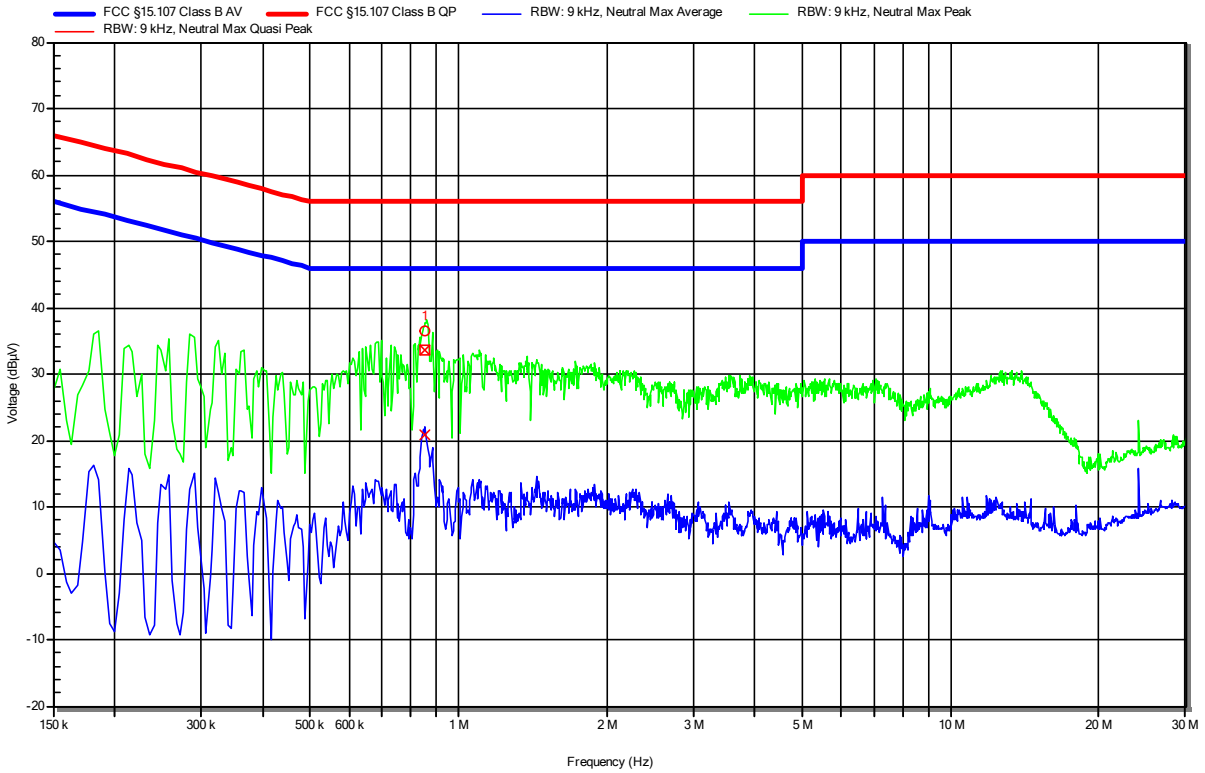
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	852.45 kHz	33.53 dBµV	56 dBµV	-22.47 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	852.45 kHz	20.94 dBµV	46 dBµV	-25.06 dB	Pass	Neutral

3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted emissions at the mains power port	150kHz to 30MHz, 3.35dB
Radiated Emission AC1	30MHz to 200MHz @ 3m, 5.1dB 200MHz to 1GHz @ 3m, 5.3dB >1GHz to 6GHz @3m, 5.95dB

Test Name	Measurement Uncertainty
Radiated Emission AC6	30 MHz to 1 GHz @ 10 m, 6.25 dB 1 GHz to 6 GHz @ 3 m, 4.86 dB 6 GHz to 18 GHz @ 3 m, max. 5.39 dB