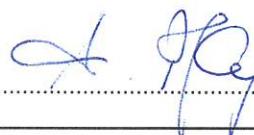


## EMC TEST REPORT

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

<b>Report Reference No</b>	G0M-2202-1347-EF0115B-V01		
<b>Testing Laboratory</b>	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		
<b>Applicant</b>	Emberion Oy		
Address	Metsänneidonkuja 8 02130 Espoo Finland		
<b>Test Specification</b> 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		
<b>Equipment under Test (EUT):</b>			
Product Description	VIS-SWIR Camera		
Model(s)	VS20 CL		
Additional Model(s)	None		
Brand Name(s)	None		
Hardware Version(s)	<b>Description</b>	<b>HW Version</b>	
	Sensor board	EMB000043B	
	Front-end board	EMB000040A	
	Front-end flex	VMNF 02	
	Processing board	VMN 02	
	Camera link rigid-flex	VMNC 02	
Software Version(s)	1.10.4		
FCC-ID	2A7MFVS20CL		
IC	-		
<b>Test Result</b>	<b>PASSED</b>		

<b>Possible test case verdicts:</b>		
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)	
<b>Testing:</b>		
Date of receipt of test item	2022-06-22	
<b>Report:</b>		
Compiled by	Stephan Liebich	
Tested by (+ signature) (Responsible for Test)	Stephan Liebich	
Approved by (+ signature) (Senior Test Lab Technician)	Andreas Pflug	
Date of Issue	2022-08-03	
Total number of pages	42	
<b>General Remarks:</b>		
<p><b>The test results presented in this report relate only to the object tested.</b></p> <p><b>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.</b></p> <p>This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.</p>		
<b>Additional Comments:</b>		
None		

**ABBREVIATIONS AND ACRONYMS**

<b>Acronyms</b>	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T <sub>NOM</sub>	Nominal operating temperature
V <sub>NOM</sub>	Nominal supply voltage

## VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-08-03	Initial Release	-

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## 1 Equipment (Test Item) Under Test

Description	VIS-SWIR Camera												
Intended Use	VS20 CL is a VIS-SWIR camera based on a proprietary image sensor technology with wide spectral range up to 2000 nm. The VGA-resolution image sensor comprises a light-absorbing Colloidal Quantum Dots (CQD) layer built monolithically on a tailor-made CMOS readout integrated circuit. The CQDs provide an extremely wide spectral response range spanning from visible (VIS) to near infrared (NIR) and up to short-wave infrared (SWIR) wavelengths. The dynamic operation range of the image sensor is very large, owing both to the low noise and non-saturating characteristics of the photodetector. A stable performance over a wide environmental temperature range is ensured with a thermo-electric cooling (TEC) element built in the image sensor package.												
Model	VS20 CL												
Additional Model(s)	None												
Brand Name(s)	None												
Hardware Version(s)	<table> <thead> <tr> <th>Description</th> <th>HW Version</th> </tr> </thead> <tbody> <tr> <td>Sensor board</td> <td>EMB000043B</td> </tr> <tr> <td>Front-end board</td> <td>EMB000040A</td> </tr> <tr> <td>Front-end flex</td> <td>VMNF 02</td> </tr> <tr> <td>Processing board</td> <td>VMN 02</td> </tr> <tr> <td>Camera link rigid-flex</td> <td>VMNC 02</td> </tr> </tbody> </table>	Description	HW Version	Sensor board	EMB000043B	Front-end board	EMB000040A	Front-end flex	VMNF 02	Processing board	VMN 02	Camera link rigid-flex	VMNC 02
Description	HW Version												
Sensor board	EMB000043B												
Front-end board	EMB000040A												
Front-end flex	VMNF 02												
Processing board	VMN 02												
Camera link rigid-flex	VMNC 02												
Software Version(s)	1.10.4												
Number of tested samples	1												
Sample Identification	EUT #	Sample-ID	Serial Number										
	EUT 1	40249	2123-00001										
EUT Dimensions [cm]	15 x 10 x 10												
FCC-ID	2A7MFVS20CL												
IC	-												
Class	Class A												
Equipment type	Table top												
Highest internal frequency [MHz]	320 MHz (clock frequency)												
Protective Earth	Yes												
Functional Earth	Yes												
Radio Module	None												
Supply Voltage	V <sub>NOM</sub>	12 V DC via dedicated AC/DC-adapter											
AC/DC-Adaptor	Model	FSP040-RHAN3											
	Manufacturer	FSP											
	Input	100 – 240 V AC, 50 – 60 Hz											
	Output	12 V DC											
Manufacturer	Emberion Oy Metsänneidonkuja 8 02130 Espoo Finland												

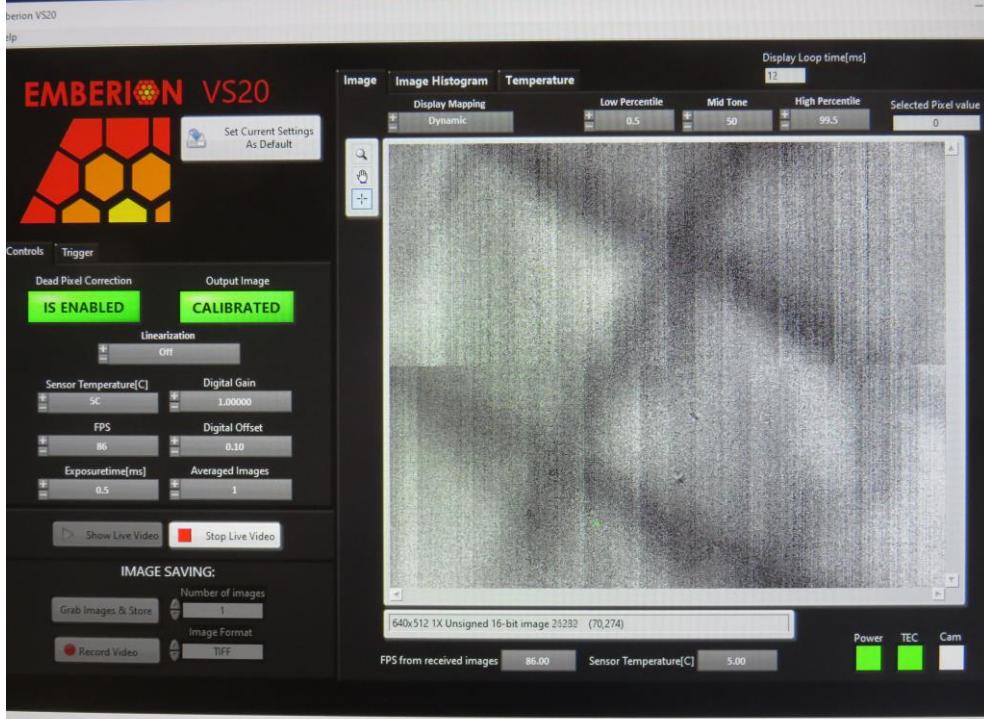
## 1.1 Equipment Ports

Name	Type	Attributes	Comment
AC Mains	AC	Count: 1 Cable length [m]: 3 Direction: IO Service only: No Shielded: No	Port of dedicated AC/DC-adapter
DC Mains	DC	Count: 1 Cable length [m]: 1.5 Direction: In Service only: No Shielded: No	EUT port
Camera Link	IO	Count: 1 Cable length [m]: 5 Direction: IO Service only: No Shielded: Yes	Control / video interface; Cable: 1SF26-L120-00C-500; Cable Length: 5 m
Trigger I/O	IO	Count: 1 Cable length [m]: 5 Direction: IO Service only: No Shielded: Yes	SMA trigger; Cable Length: 3 m;
USB	IO	Count: 1 Cable length [m]: 5 Direction: IO Service only: Yes Shielded: Yes	For FW updates
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		

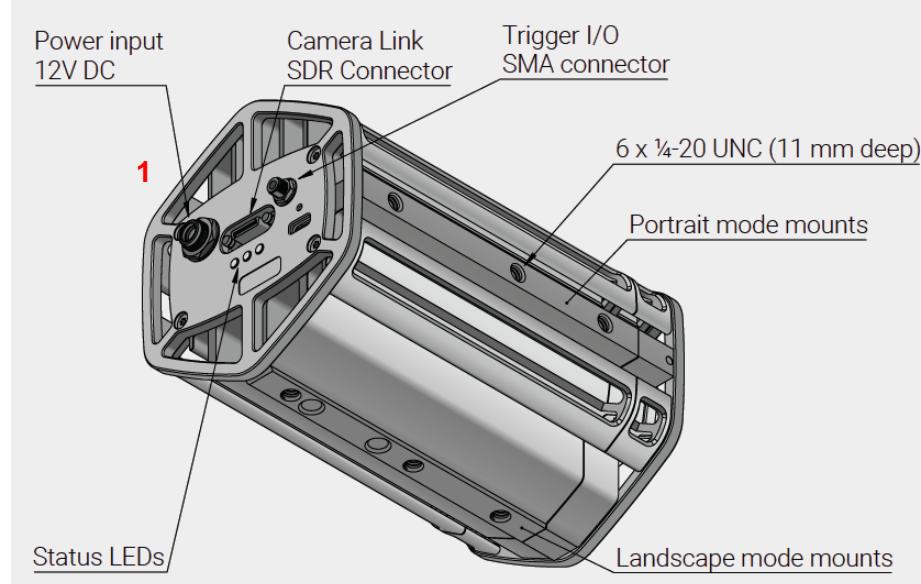
#### 1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	PC	lenovo	P340	Customer Support Equipment; Sample-ID: 40252
AE	Pleora Frame Grabber	Pleora	iPort CL-U3	Customer Support Equipment; Sample-ID: 40255
MON	Monitor	lenovo	T2324pA	--
CBL	HDMI cable	KTL	SU01001-4001	shielded cable; Cable Length: 2 m
SW	Monitoring Software	Emberion	EMBERION VS20	Customer Support Equipment; Version 1.2.0.4
CBL	Trigger cable	Pickering	unspecified	Customer Support Equipment; shielded cable; Cable Length: 3 m; Sample-ID: 40256
CBL	CameraLink cable	3M	1SF26-L120-00C-500	Customer Support Equipment; shielded cable; Cable Length: 5 m
CBL	USB cable	AWM	E357566-ALY-C	Customer Support Equipment; shielded cable; Cable Length: 3 m
CBL	PoCL.MDR to SDR cable	National Instruments	199745B-05	Customer Support Equipment; shielded cable; Cable Length: 5 m; Sample-ID: 40259
AE	Temperature Sensor	Emberion	unspecified	Customer Support Equipment; shielded cable; Cable Length: 3 m; Sample-ID: 40261
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
SW	Software			
Comment: --				

## 1.5 Operational Modes

Mode #	Description
1	<p>EUT is transferring every 0.5 ms a 640x512 unsigned 16-bit image with a FPS of 86 to PC (Monitoring Software).</p> <p>Sensor temperature is +5°C.</p> 
Comment: --	

## 1.6 EUT Configuration

Configuration #	Description
1	<p>EUT is powered by 12 V DC [1] via dedicated AC/DC-adapter [2].  Dedicated AC/DC-adapter is powered by external laboratory power supply unit.  The EUT is grounded via earth potential [3].  EUT is connected to Pleora Frame Grabber [4] via CameraLink cable [5].  Pleora Frame Grabber is connected to PC [6] via USB cable [7].  EUT is connected to PC [6] via Trigger cable [8].  PC is connected to Monitor [9] via HDMI cable [10].  PC is connected to Temperature Sensor [11] via PoCL.MDR to SDR cable [12].</p> <p>Shield of all shielded cables are connected on both sides with EUT or Support Equipment.</p> <p>PC connectors connected to PE.</p> 

## 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 dB $\mu$ V. 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:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of dB $\mu$ V/m). The FCC limits are given in units of  $\mu$ V/m. The following formula is used to convert the units of  $\mu$ V/m to dB $\mu$ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log (\mu\text{V/m})$$

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 +21.5 dB $\mu$ V + 26 dB/m	= Net Reading = 47.5 dB $\mu$ V/m	:	Net reading - FCC limit 47.5 dB $\mu$ V/m - 57.0 dB $\mu$ V/m	= Margin = -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:				

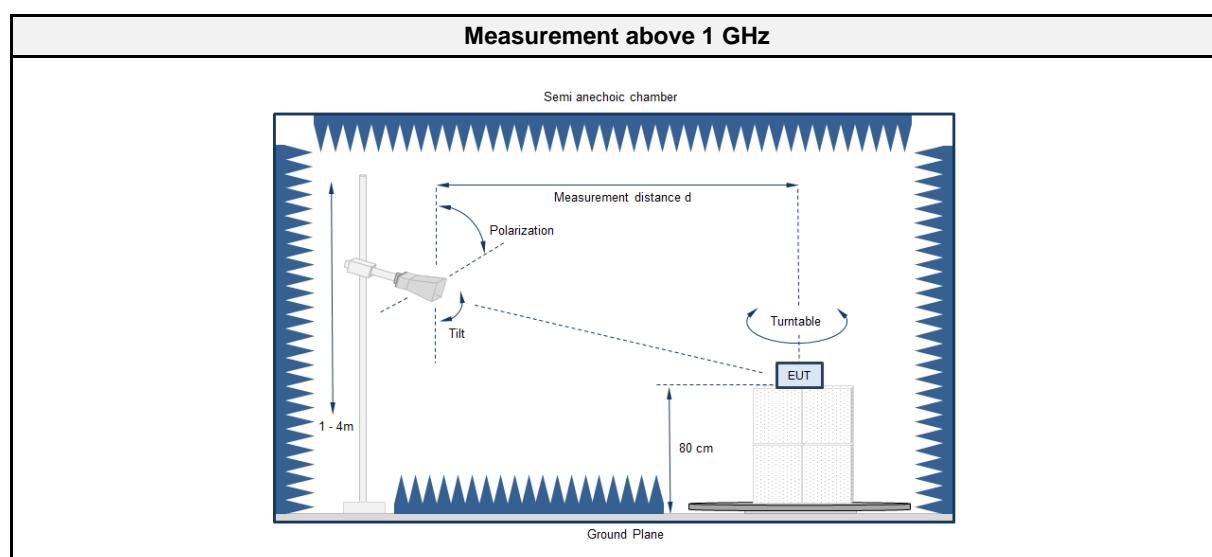
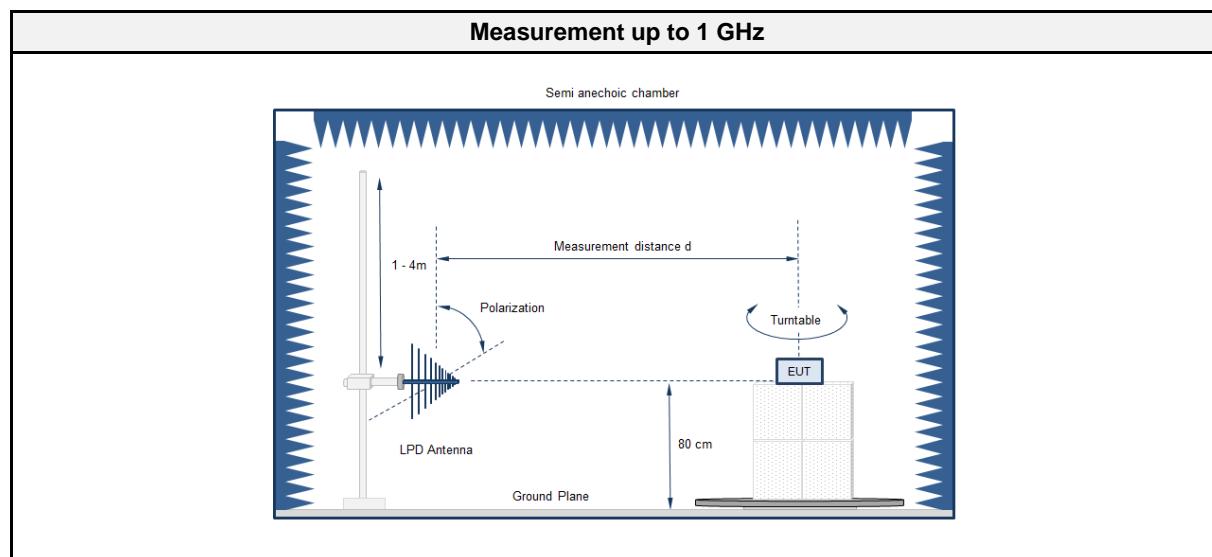
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

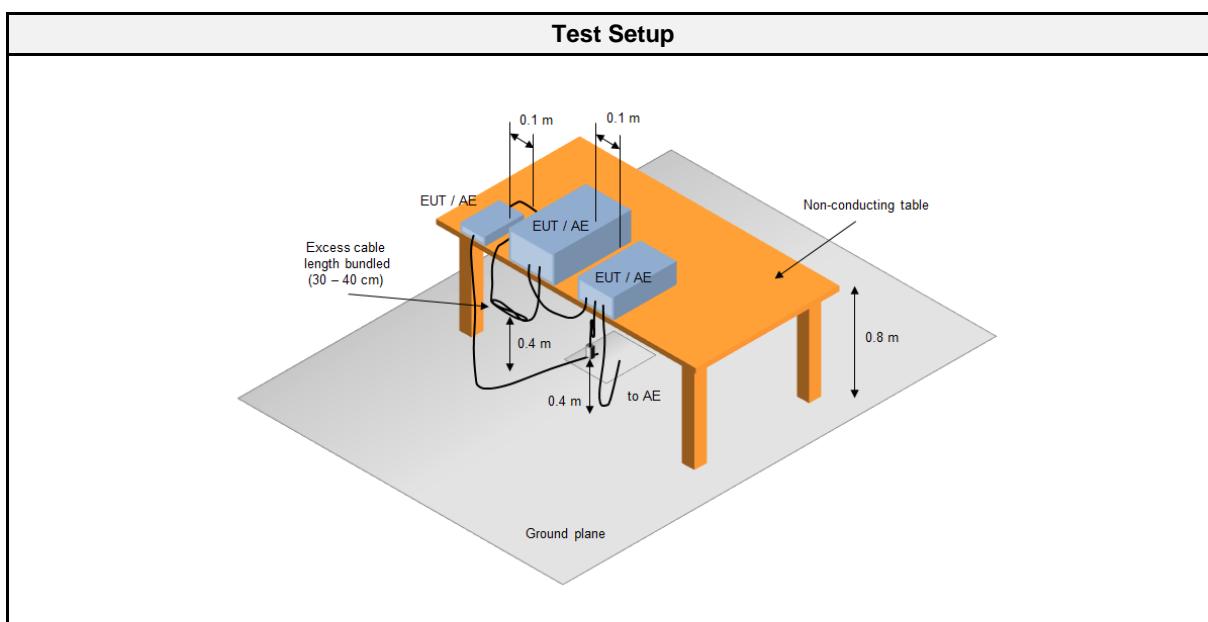
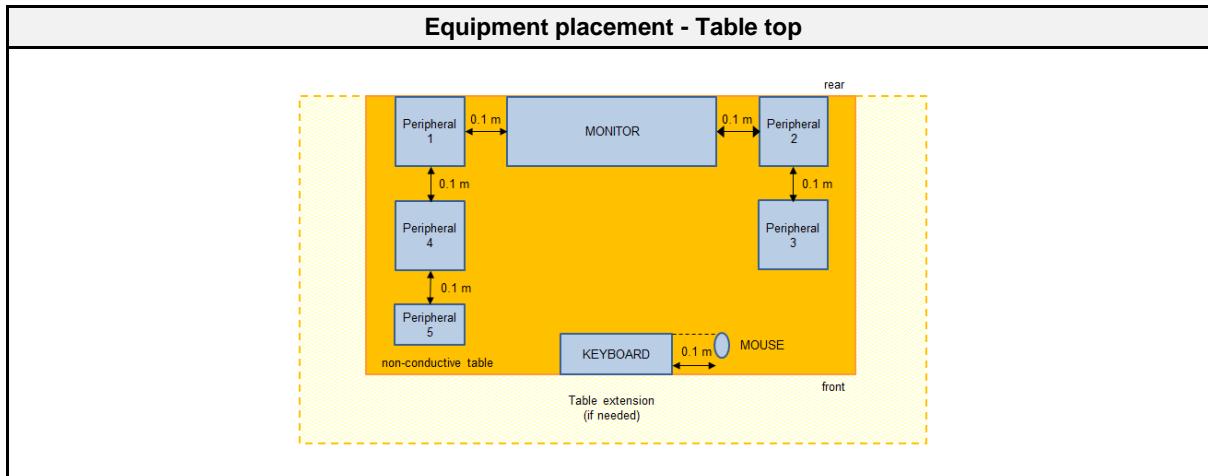
## 2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

### 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 A
Equipment type	Table top
Highest internal frequency [MHz]	320
Measurement range	30 MHz to 6000 MHz
Temperature [°C]	23 – 25
Humidity [%]	35 – 41
Operator	Stephan Liebich
Date	2022-07-05

### 2.1.2 Setup





### 2.1.3 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
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	2021-07	2022-07
EMI Test Receiver	Keysight	N9038A-526/WXP	EF01070	2021-07	2022-07
Biconical Antenna	R&S	HK 116	EF00030	2021-05	2024-05
LPD Antenna	R&S	HL 223	EF00187	2022-06	2025-06
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2019-10	2022-10
Climatic Sensor	Embedded Data Systems, LLC.	280010000254 17E	EF01054	2022-04	2023-04

Test Report No.: G0M-2202-1347-EF0115B-V01

Eurofins Product Service GmbH  
Storkower Str. 38c, D-15526 Reichenwalde, Germany

#### 2.1.4 Procedure

<b>Exploratory measurement</b>
<ol style="list-style-type: none"> <li>1. The EUT was placed on a non-conductive table at a height of 0.8m.</li> <li>2. The EUT and support equipment, if needed, were set up to simulate typical usage.</li> <li>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.</li> <li>4. The antenna was placed at a distance of 3 or 10 m.</li> <li>5. The received signal was monitored at the measurement receiver.</li> <li>6. This procedure has to be performed in both antenna polarizations, horizontal and vertical.</li> <li>7. The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 2.1.2</li> </ol>

<b>Final measurement</b>
<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. The EUT and cable arrangement were based on the exploratory measurement results.</li> <li>4. Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.</li> <li>5. The test data of the worst-case conditions were recorded and shown on the next pages.</li> </ol>

#### 2.1.5 Limits

<b>Class A @ 10 m (3 m for &gt; 1000 MHz)</b>		
Frequency [MHz]	Detector	Limit [dB $\mu$ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak Average	69.5 49.5

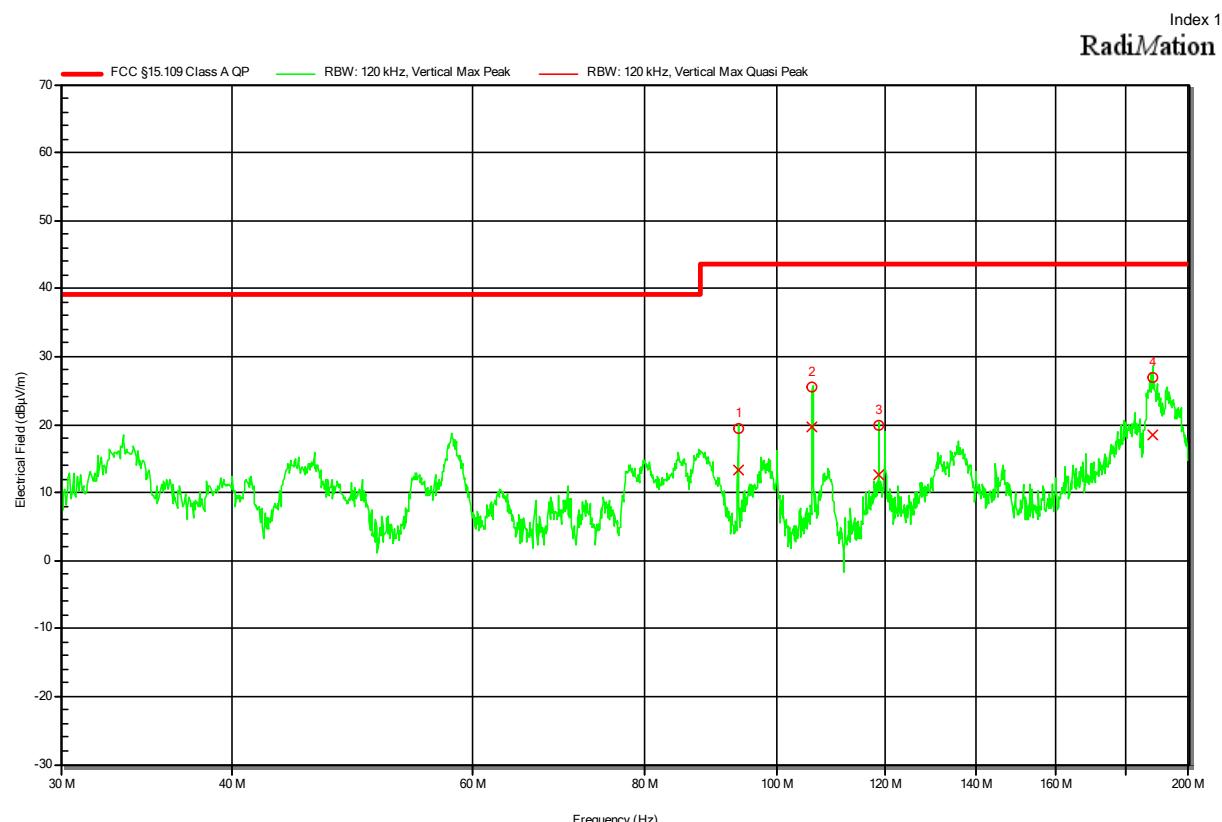
#### 2.1.6 Results

<b>Test Results</b>			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	120 V AC / 60 Hz
Comment: Cable length of functional earth is 1 m.			

### 2.1.8 Records

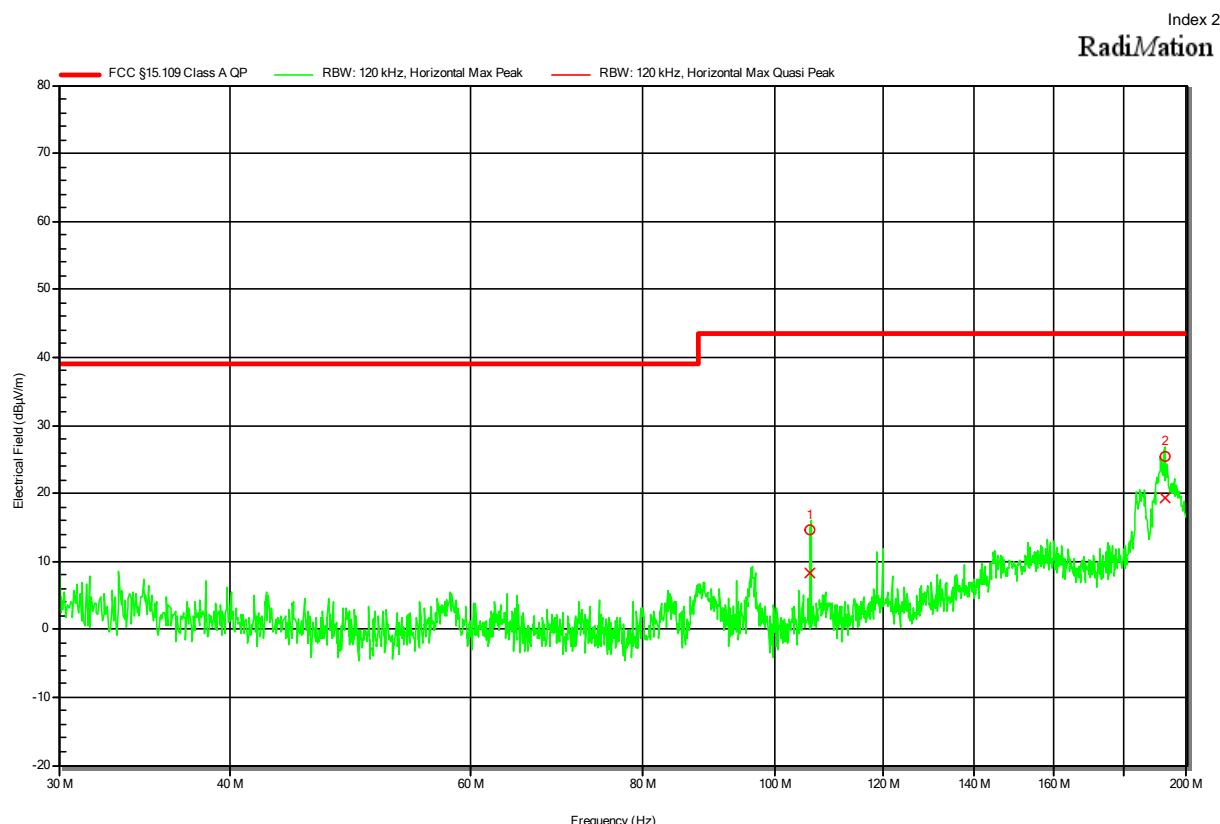
#### Radiated emissions according to FCC part 15B

Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Rohde & Schwarz HK 116, Vertical  
 Measurement Distance: 3m, converted to 10m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --



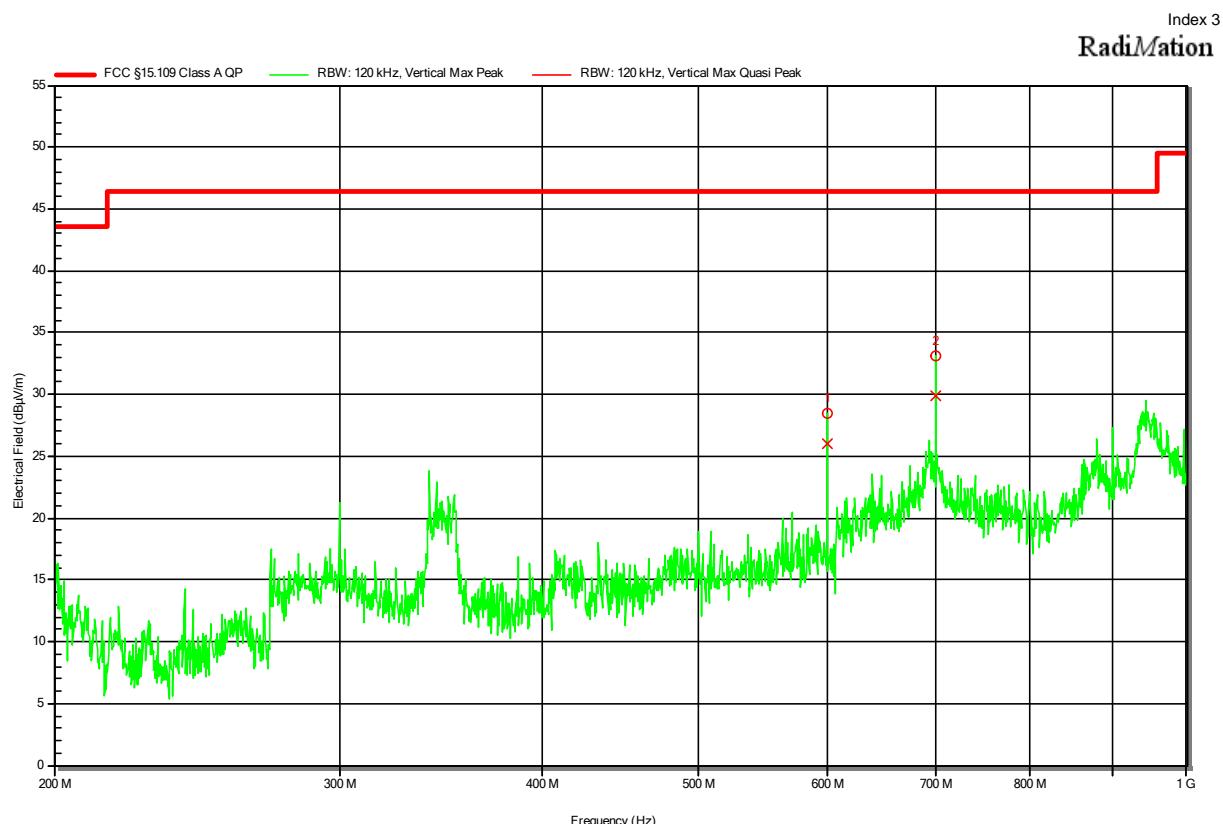
**Radiated emissions  
according to FCC part 15B**

Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Rohde & Schwarz HK 116, Horizontal  
 Measurement Distance: 3m, converted to 10m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --



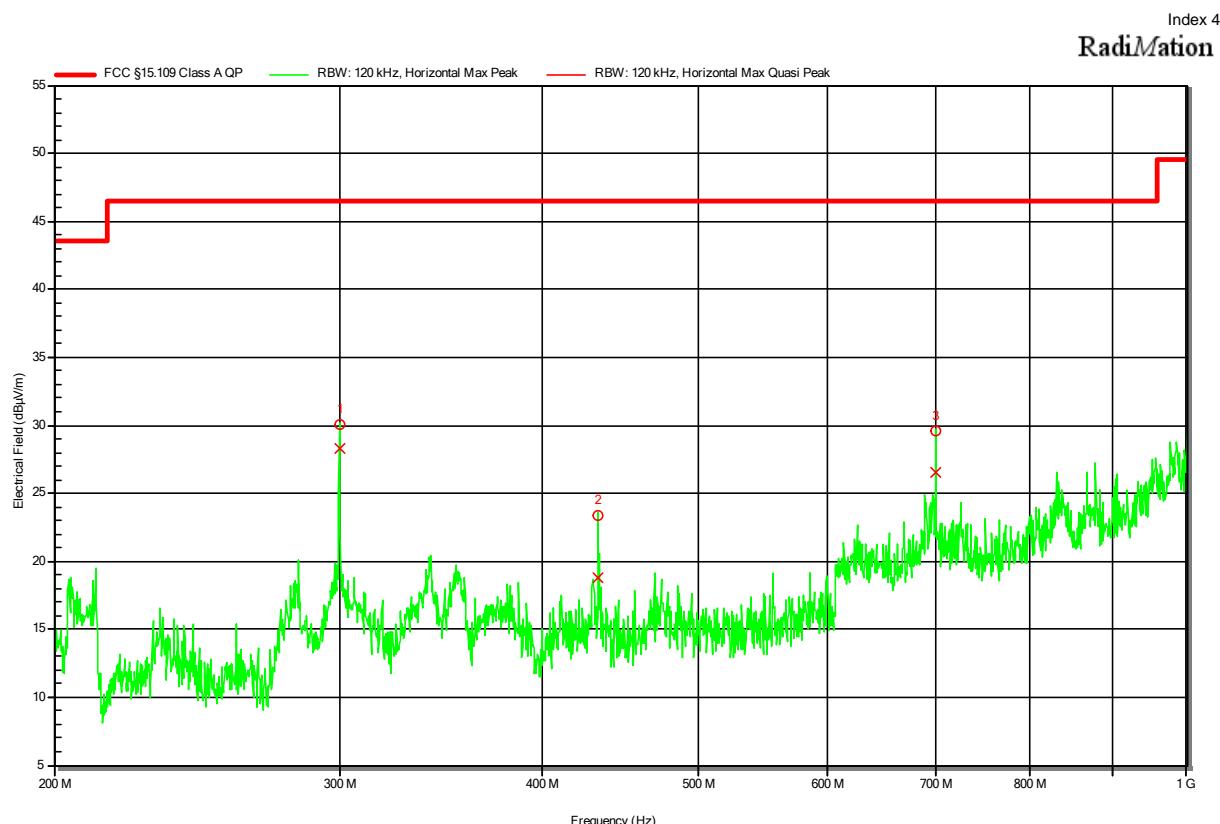
**Radiated emissions  
according to FCC part 15B**

Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Rohde & Schwarz HL 223, Vertical  
 Measurement Distance: 3m, converted to 10m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --



**Radiated emissions  
according to FCC part 15B**

Project Number: G0M-2202-1347  
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 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Rohde & Schwarz HL 223, Horizontal  
 Measurement Distance: 3m, converted to 10m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --

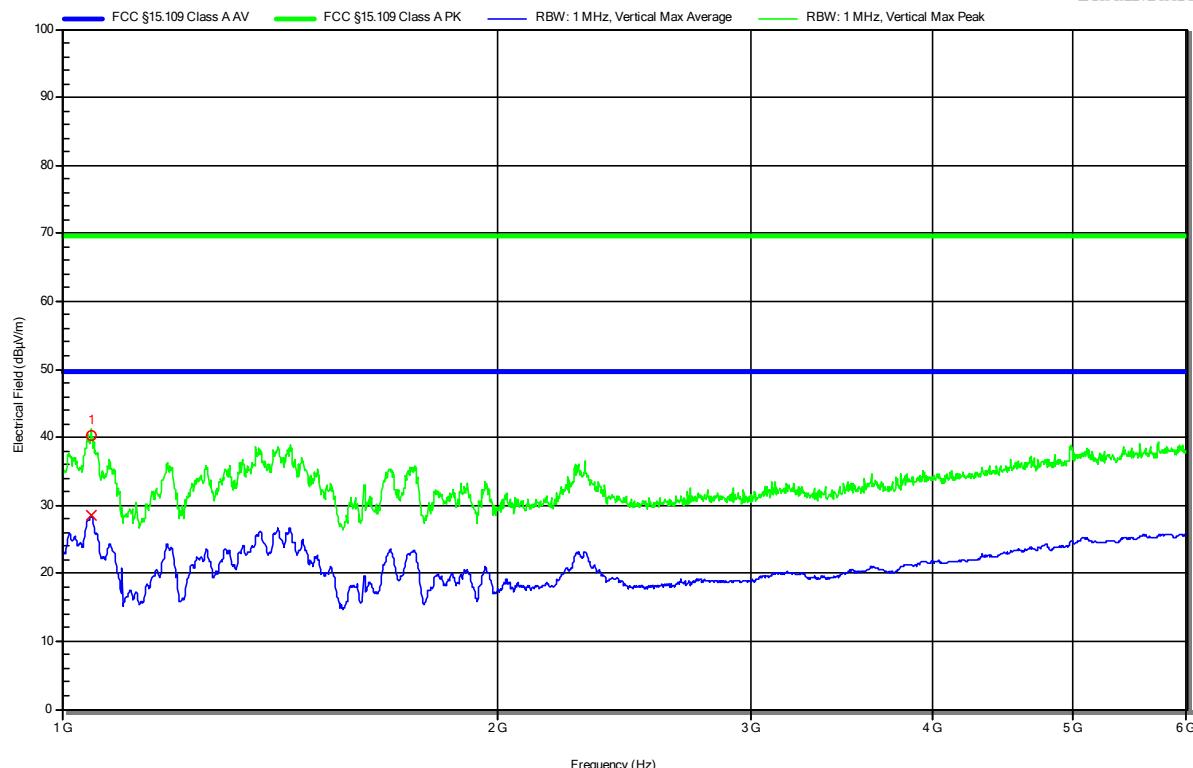


Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	299.995 MHz	28.27 dB $\mu$ V/m	46.44 dB $\mu$ V/m	-18.18 dB	Pass	180 degrees	1 m
2	433.45 MHz	18.81 dB $\mu$ V/m	46.44 dB $\mu$ V/m	-27.63 dB	Pass	180 degrees	1 m
3	699.985 MHz	26.58 dB $\mu$ V/m	46.44 dB $\mu$ V/m	-19.87 dB	Pass	180 degrees	1 m

**Radiated emissions  
according to FCC part 15B**

Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Schwarzbeck BBHA 9120D, Vertical  
 Measurement Distance: 3m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --

Index 5

**Radiation**


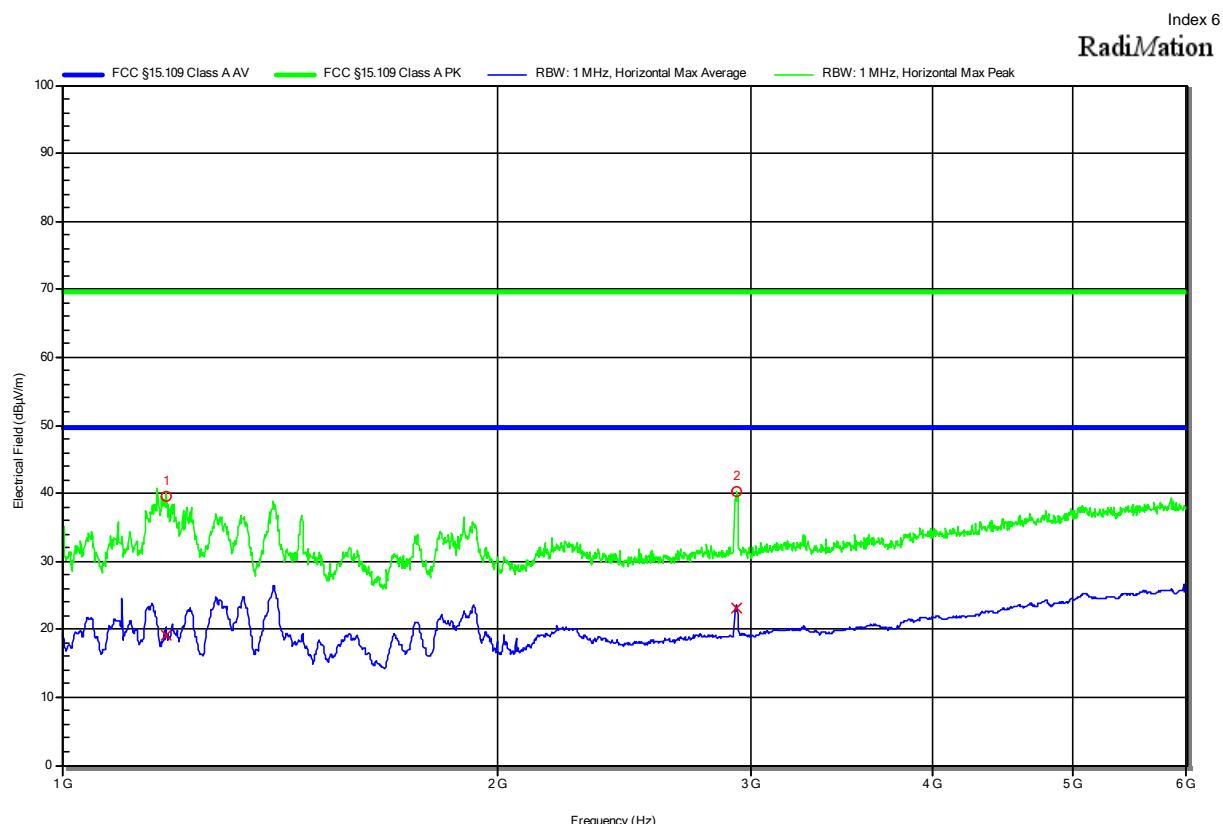
Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.048 GHz	40.35 dB $\mu$ V/m	69.54 dB $\mu$ V/m	-29.19 dB	Pass	-30 degrees	1 m
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.048 GHz	28.43 dB $\mu$ V/m	49.54 dB $\mu$ V/m	-21.11 dB	Pass	-30 degrees	1 m

Test Report No.: G0M-2202-1347-EF0115B-V01

 Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

**Radiated emissions  
according to FCC part 15B**

Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 24 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 Antenna: Schwarzbeck BBHA 9120D, Horizontal  
 Measurement Distance: 3m  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Note 1: --°



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	1.181 GHz	39.55 dB $\mu$ V/m	69.54 dB $\mu$ V/m	-29.99 dB	Pass	160 degrees	1 m
2	2.932 GHz	40.25 dB $\mu$ V/m	69.54 dB $\mu$ V/m	-29.3 dB	Pass	160 degrees	1 m

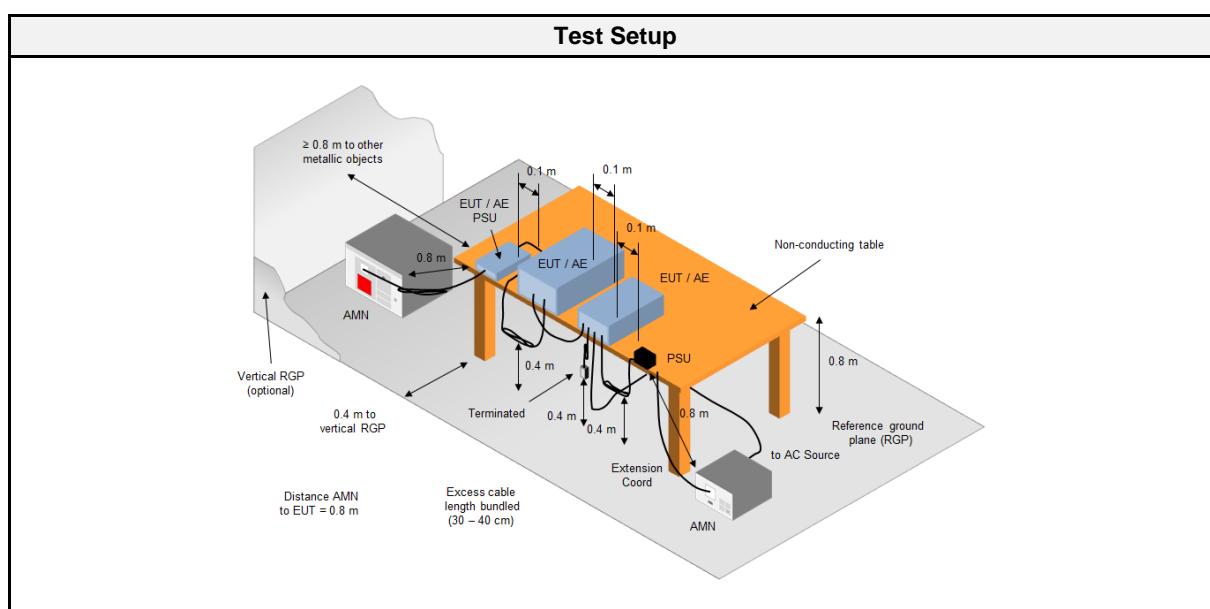
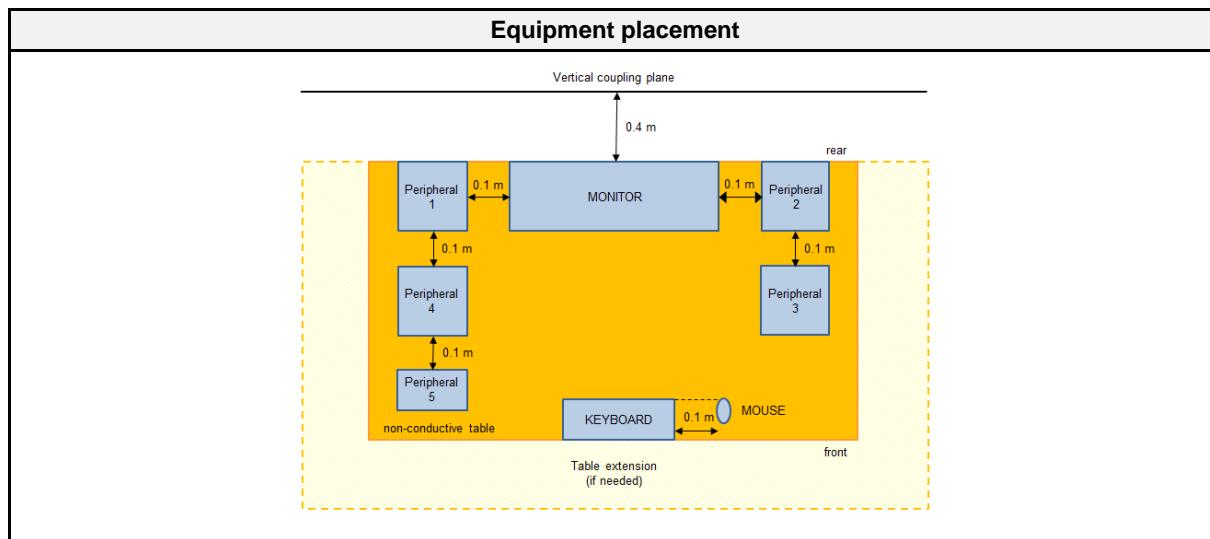
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	1.181 GHz	19.07 dB $\mu$ V/m	49.54 dB $\mu$ V/m	-30.47 dB	Pass	160 degrees	1 m
2	2.932 GHz	23.04 dB $\mu$ V/m	49.54 dB $\mu$ V/m	-26.51 dB	Pass	160 degrees	1 m

## 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
Humidity [%]	36 – 40
Operator	Stephan Liebich
Date	2022-07-05

### 2.2.2 Setup



## 2.2.3 Equipment

<b>Test Software</b>			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

<b>Test Equipment</b>					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8127	EF01592	2021-07	2022-07
AMN	R&S	ESH3-Z5	EF00036	2021-08	2023-08
Pulse Limiter	R&S	ESH3-Z2	EF01063	2021-07	2022-07
EMI Test Receiver	R&S	ESR 7	EF00943	2021-08	2022-08
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2022-04	2023-04

## 2.2.4 Procedure

<b>Exploratory measurement</b>	
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

<b>Final measurement</b>	
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

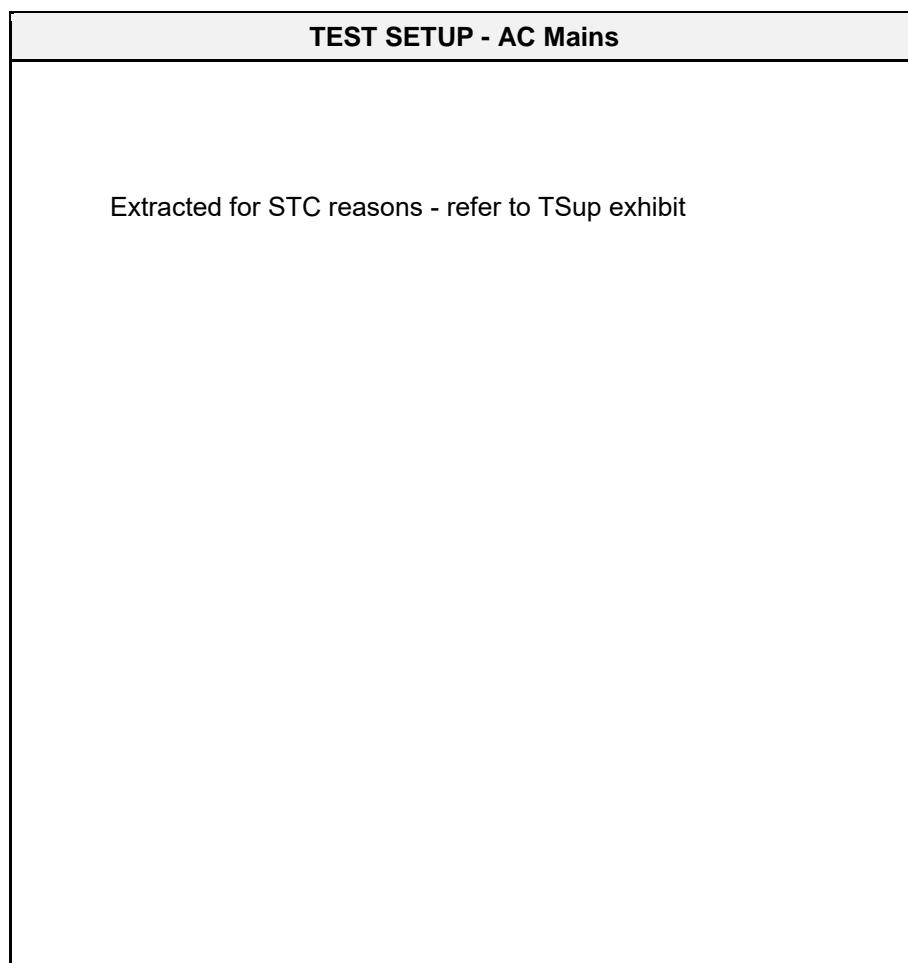
## 2.2.5 Limits

<b>Class A</b>		
Frequency [MHz]	Quasi-peak Limit [dB $\mu$ V]	Average Limit [dB $\mu$ V]
0.15 - 0.5	79	66
0.5 - 30	73	60

2.2.6 Results

<b>AC power line conducted emissions</b>					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
AC Mains	AMN	1	1	PASS	120 V AC / 60 Hz
Comment: Cable length of functional earth is 1 m.					

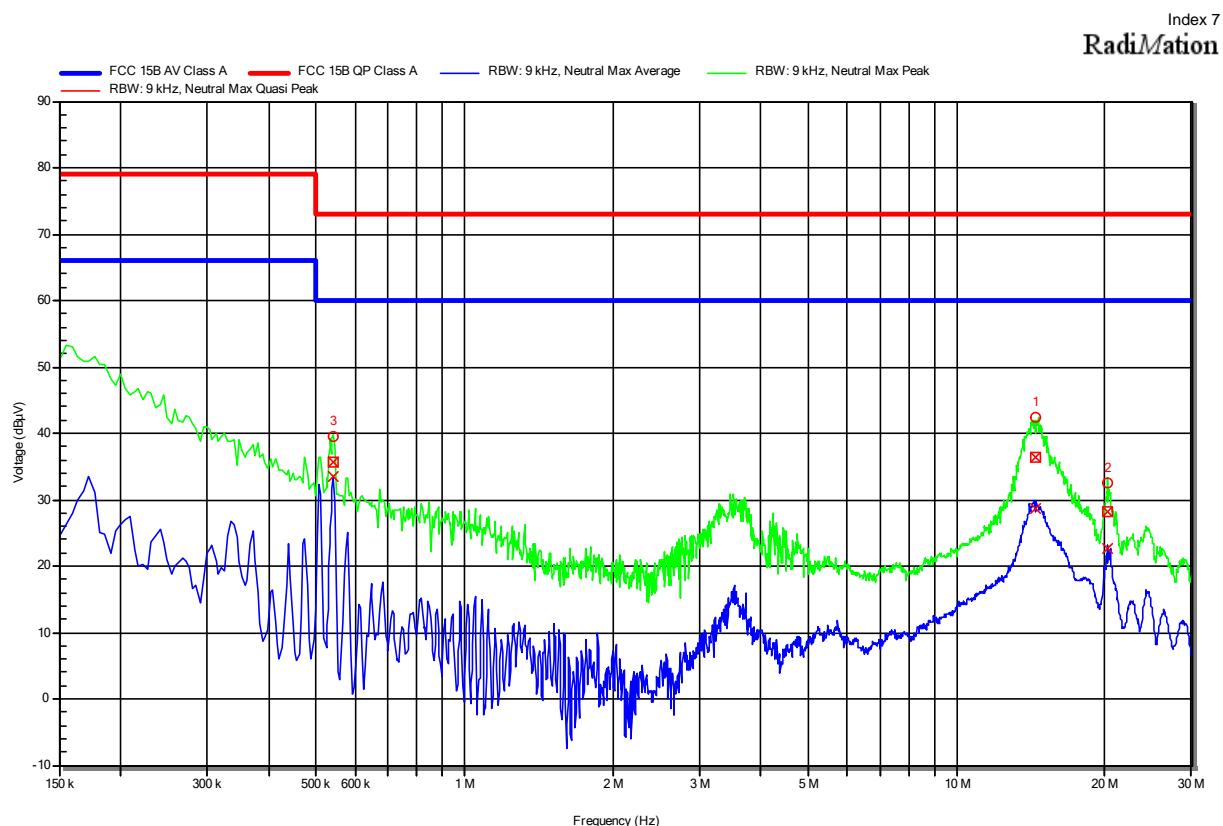
2.2.7 Setup Photos



## 2.2.8 Records

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

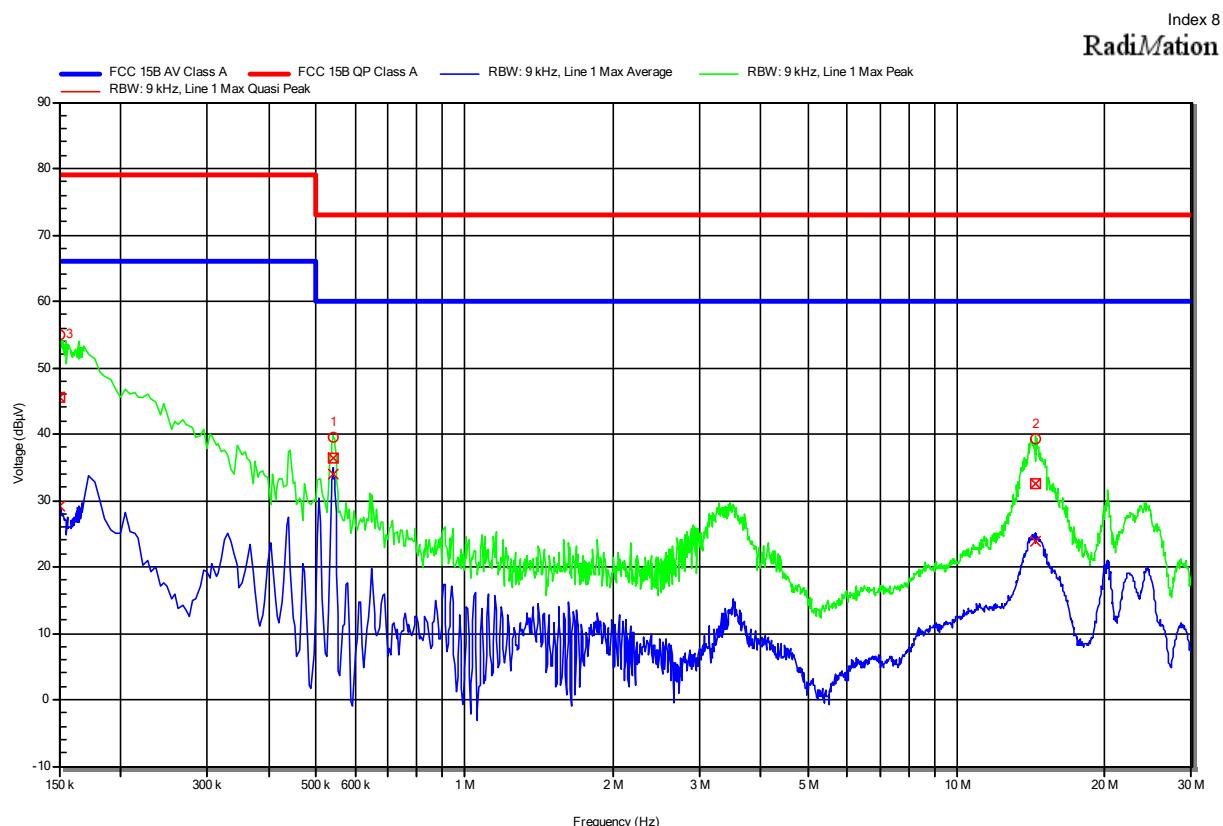
Project Number: G0M-2202-1347  
 Applicant: Emberion Oy  
 Model Description: VIS-SWIR Camera  
 Model: VS20 CL  
 Test Sample ID: 40249  
 Test Site: Eurofins Product Service GmbH  
 Operator: Mr. Liebich  
 Test Date: 2022-07-05  
 Operating Conditions: ambient temperature: 25 °Celsius  
 power input: 12 V DC via dedicated AC/DC-adapter  
 (120 V AC / 60 Hz)  
 LISN: Schwarzbeck NSLK 8127  
 Operational Mode: Mode 1  
 EUT Configuration: Configuration 1  
 Applied to Port: AC Mains  
 Note 1: --



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	14.465 MHz	36.37 dB $\mu$ V	73 dB $\mu$ V	-36.63 dB	Pass	Neutral
2	20.297 MHz	28.3 dB $\mu$ V	73 dB $\mu$ V	-44.7 dB	Pass	Neutral
3	541.05 kHz	35.66 dB $\mu$ V	73 dB $\mu$ V	-37.34 dB	Pass	Neutral
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	14.465 MHz	28.74 dB $\mu$ V	60 dB $\mu$ V	-31.26 dB	Pass	Neutral
2	20.297 MHz	22.66 dB $\mu$ V	60 dB $\mu$ V	-37.34 dB	Pass	Neutral
3	541.05 kHz	33.47 dB $\mu$ V	60 dB $\mu$ V	-26.53 dB	Pass	Neutral

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

Project Number: G0M-2202-1347  
Applicant: Emberion Oy  
Model Description: VIS-SWIR Camera  
Model: VS20 CL  
Test Sample ID: 40249  
Test Site: Eurofins Product Service GmbH  
Operator: Mr. Liebich  
Test Date: 2022-07-05  
Operating Conditions: ambient temperature: 25 °Celsius  
power input: 12 V DC via dedicated AC/DC-adapter  
(120 V AC / 60 Hz)  
LISN: Schwarzbeck NSLK 8127 RC L1  
Operational Mode: Mode 1  
EUT Configuration: Configuration 1  
Applied to Port: AC Mains  
Note 1: --



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	542.85 kHz	36.47 dB $\mu$ V	73 dB $\mu$ V	-36.53 dB	Pass	Line 1
2	14.474 MHz	32.46 dB $\mu$ V	73 dB $\mu$ V	-40.54 dB	Pass	Line 1
3	150 kHz	45.62 dB $\mu$ V	79 dB $\mu$ V	-33.38 dB	Pass	Line 1
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	542.85 kHz	33.87 dB $\mu$ V	60 dB $\mu$ V	-26.13 dB	Pass	Line 1
2	14.474 MHz	23.78 dB $\mu$ V	60 dB $\mu$ V	-36.22 dB	Pass	Line 1
3	150 kHz	29.17 dB $\mu$ V	66 dB $\mu$ V	-36.83 dB	Pass	Line 1

### 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	30MHz to 200MHz @ 3m, 5.1dB 200MHz to 1GHz @ 3m, 5.3dB >1GHz to 6GHz @3m, 5.95dB