

EMC TEST REPORT

FCC CFR Title 47 / Chapter I / Subchapter A / Part 15 / Subpart B

ISED ICES-003 Issue 7

Report Reference No	G0M-2406-2604-EF0115B-V02
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	Somnium Space LTD.
Address	159 High Street EN5 5SU Barnet England
Test Specification Standard(s)	FCC CFR Title 47 / Chapter I / Subchapter A / 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	Head-Mounted Display / VR headset
Model(s)	VR1
Additional Model(s)	None
Brand Name(s)	Somnium
Hardware Version(s)	VR1
Software Version(s)	FW for radio chips: for nrf_fw_rev1 SHA256 hash for nrf_fw_rev1:F33AA5230BEDA4DA5F58087C1A13EEA29AB2300F8 58B75722C4571C297E7600A
FCC-ID	2BKF7-VR1BESTHMD
IC	32914-VR1BESTHMD
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	2024-09-09	
Report:		
Compiled by	Mahmood Nasor	
Tested by (+ signature) (Responsible for Test)	Stephan Liebich	
Approved by (+ signature) (Senior EMC Test Technician)	Matthias Handrik	
Date of Issue	2024-10-24	
Total number of pages	64	
General Remarks:		
<p>The test results presented in this report relate only to the object tested.</p> <p>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.</p> <p>This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.</p>		
Statement concerning the uncertainty of the measurement systems used for decisions on conformity (decision rule):		
<p>The Decision Rule is applied on the basis of CISPR 16-4-2 and/or IEC 61000-4-x (TR 61000-1-6) and their national publications. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019.</p> <p>Compliance or non-compliance with a disturbance limit is determined in the following manner.</p> <ul style="list-style-type: none"> - If U_{lab} is less than or equal to U_{cisp}, then: compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit. - If U_{lab} is greater than U_{cisp}, then: compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit; non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit. <p>Where appropriate for the test, for example for EMC pulsed immunity tests, the laboratory has demonstrated, by calibrating its equipment and facilities, that it complies with the above requirements and therefore no allowance of uncertainties has been given to the tolerances.</p>		
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	2024-10-15	Initial Release	--
02	2024-10-24	Replaced document: G0M-2406-2604-EF0115B-V01 Replaced by: G0M-2406-2604-EF0115B-V02 Changes: Page 6: <ul style="list-style-type: none">Update of EUT Dimensions [cm] and Highest internal frequency [MHz] information	St. Liebich

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1 Equipment (Test Item) Under Test

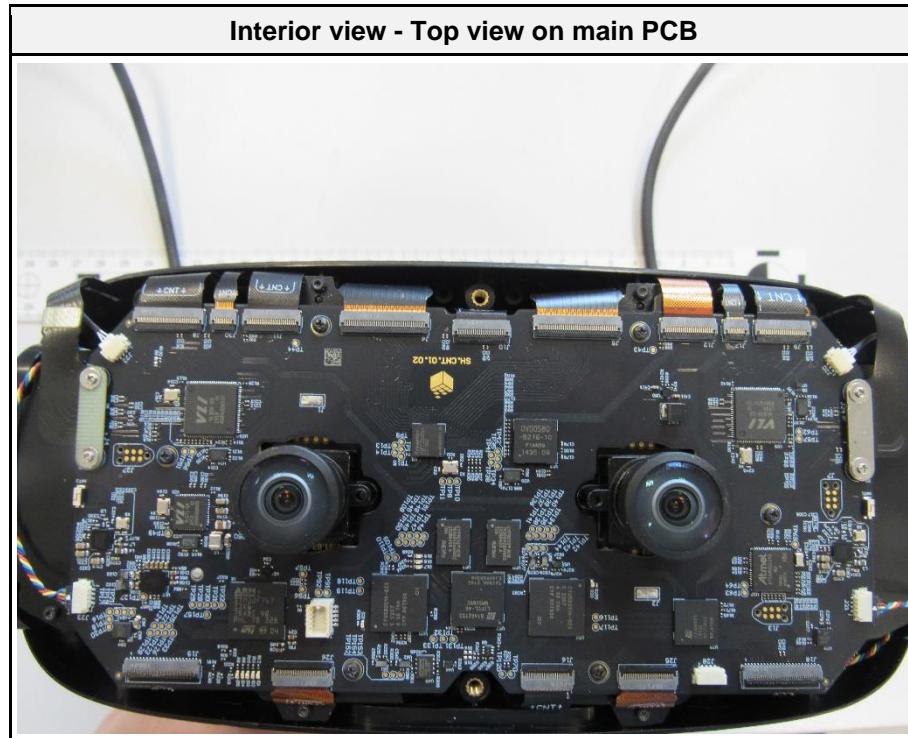
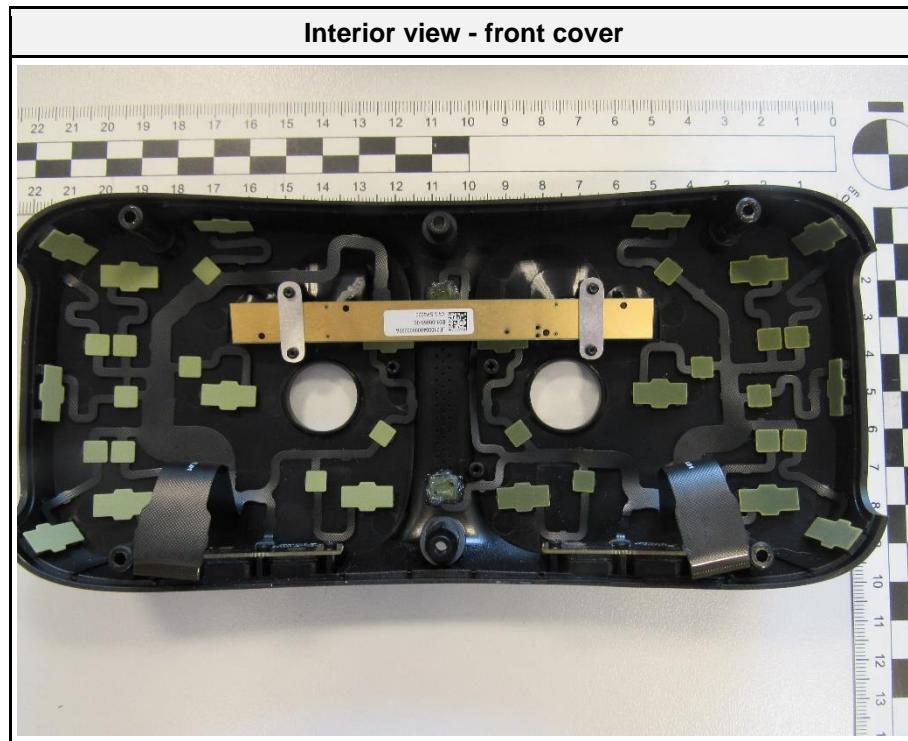
Description	Head-Mounted Display / VR headset		
Intended Use	The equipment under test is the high-resolution Somnium VR1 PCVR headset. This device is equipped with dual high-resolution displays, mixed reality pass-through cameras, and an embedded Ultraleap sensor for hand tracking. Additionally, it features IPD positioning cameras and integrated sensors for Lighthouse outside-in positional tracking. The headset also includes embedded chips for wireless connectivity with controllers, making it ideal for virtual and mixed reality visualization.		
Model	VR1		
Additional Model(s)	None		
Brand Name(s)	Sommium		
Hardware Version(s)	VR1		
Software Version(s)	FW for radio chips: for nrf_fw_rev1 SHA256 hash for nrf_fw_rev1:F33AA5230BEDA4DA5F58087C1A13EEA29AB2300F858B75722C457 1C297E7600A		
Number of tested samples	1		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1	49301	344797DE
EUT Dimensions [cm]	9.4 x 19.1 x 12.4		
FCC-ID	2BKF7-VR1BESTHMD		
IC	32914-VR1BESTHMD		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	5000		
Protective Earth	No		
Functional Earth	No		
Radio Module	Type	2.4GHz Proprietary communication based on Nordic Advanced Shockburst	
	Model	NRF52840	
	Manufacturer	Nordic semiconductor	
	FCC-ID	N/A	
	IC	N/A	
Supply Voltage	V _{NOM}	12 V DC	
AC/DC-Adaptor	Model	SID36-12-UD	
	Vendor	CUI INC	
	Input	100-240	
	Output	12	
Manufacturer	Sommium Space LTD. 159 High Street EN5 5SU Barnet England		

1.1 Equipment Ports

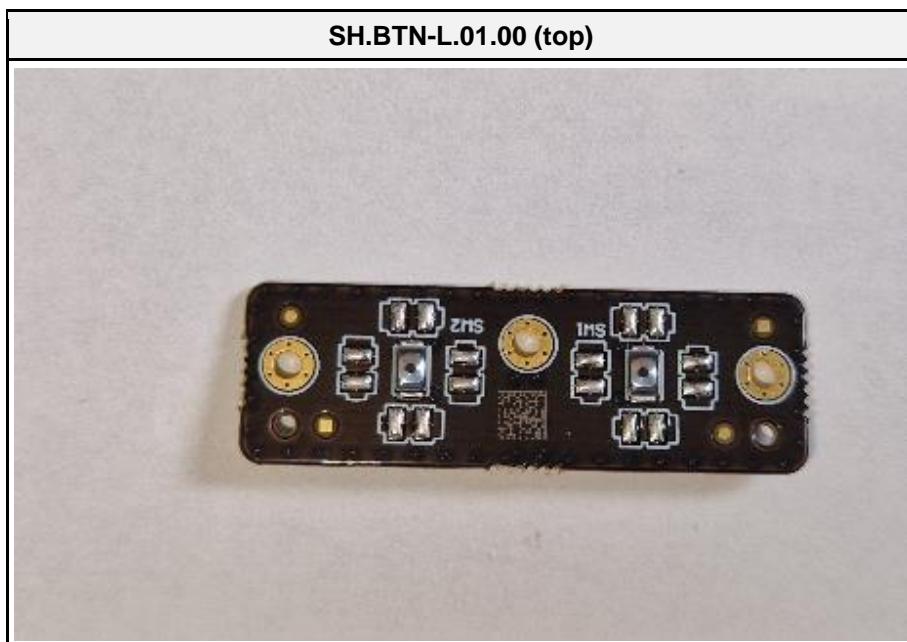
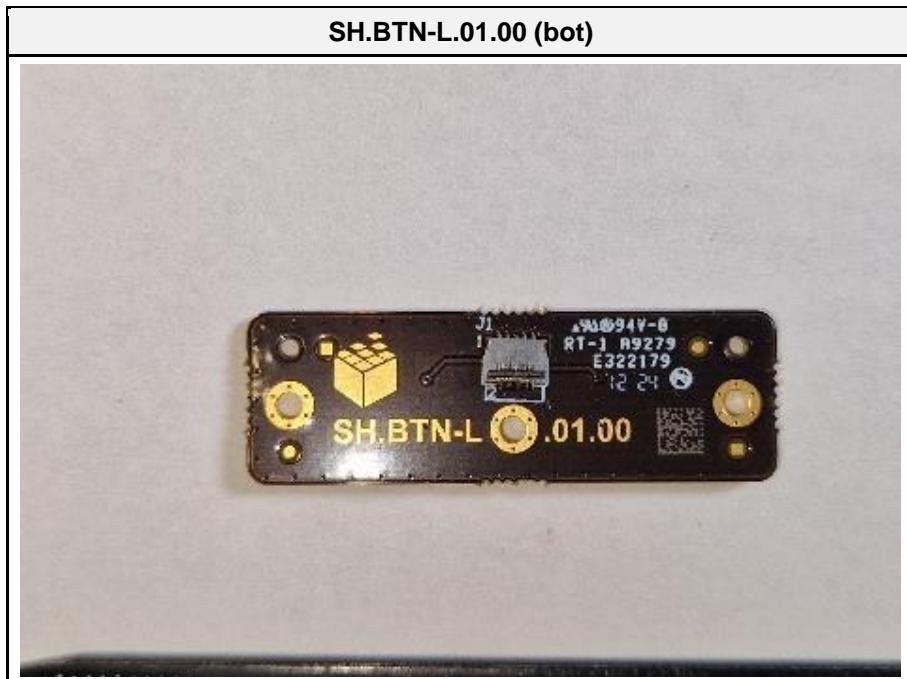
Name	Type	Attributes	Comment
USB3 type C	IO	Count: 3 Cable length [m]: 0 Direction: IO Service only: No Shielded: Yes	Three USB-C ports
Type C custom pinout (MR)	IO	Count: 1 Cable length [m]: 6 Direction: IO Service only: No Shielded: Yes	Type C port for custom MR cable
Type C custom pinout (VR)	IO	Count: 1 Cable length [m]: 6 Direction: IO Service only: No Shielded: Yes	Type C port for custom VR cable
Audio jack	IO	Count: 1 Cable length [m]: 1 Direction: IO Service only: No Shielded: No	3.5" audio jack
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		

1.2 Equipment Photos – Internal

1.2.1 Internal photos made in laboratory



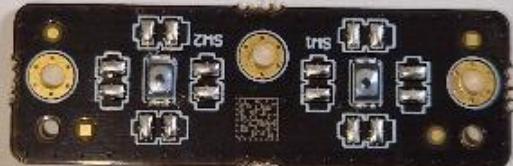
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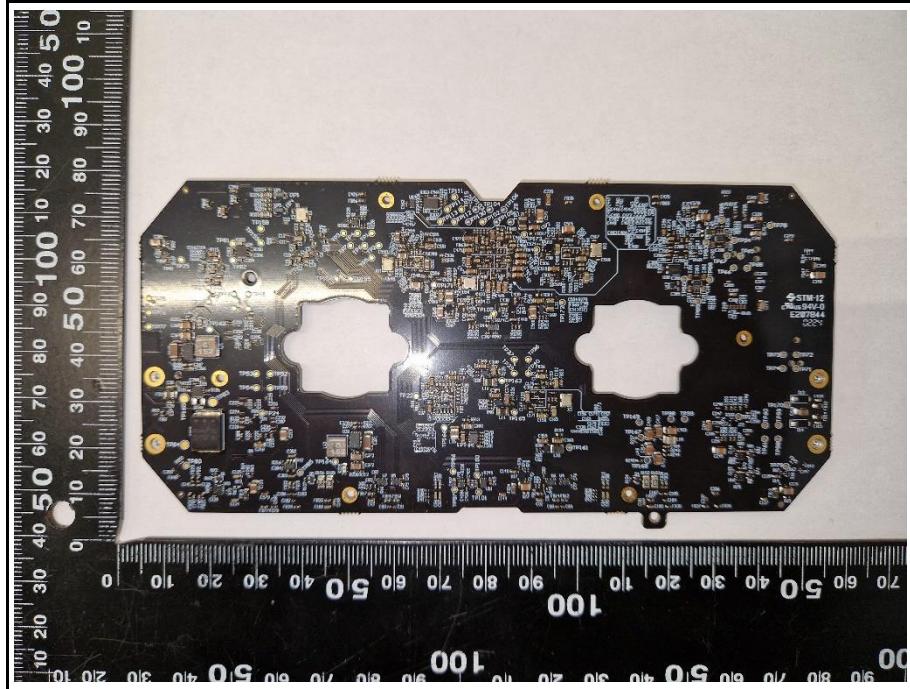
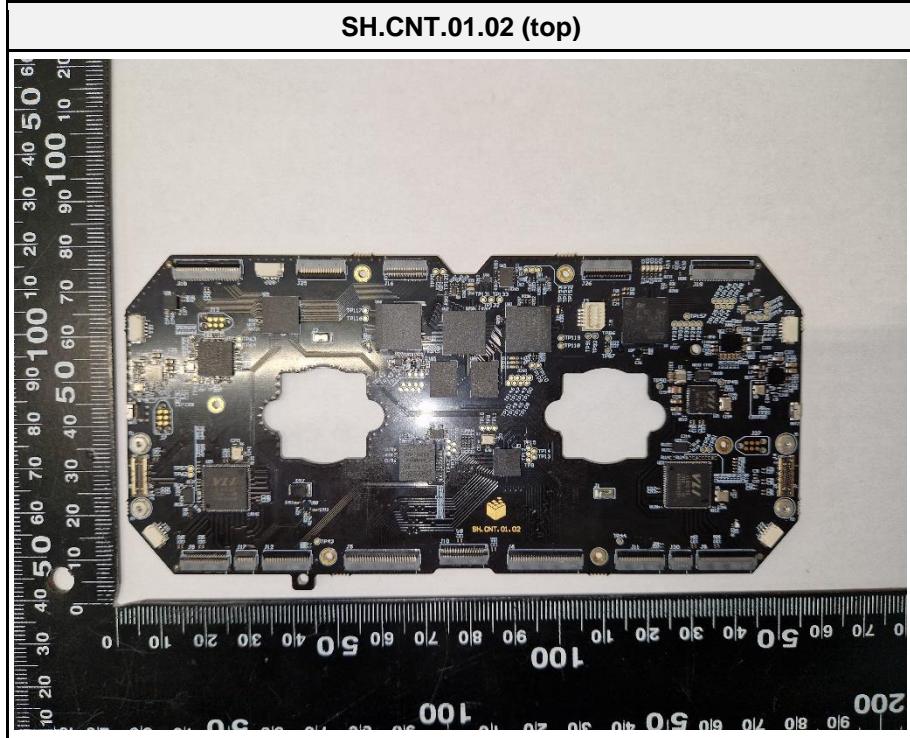


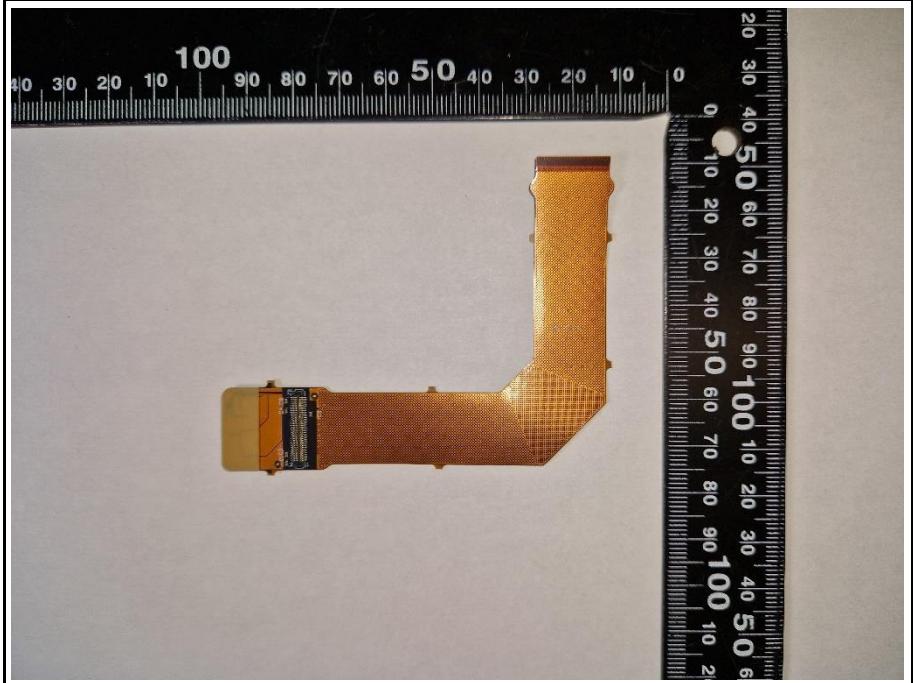
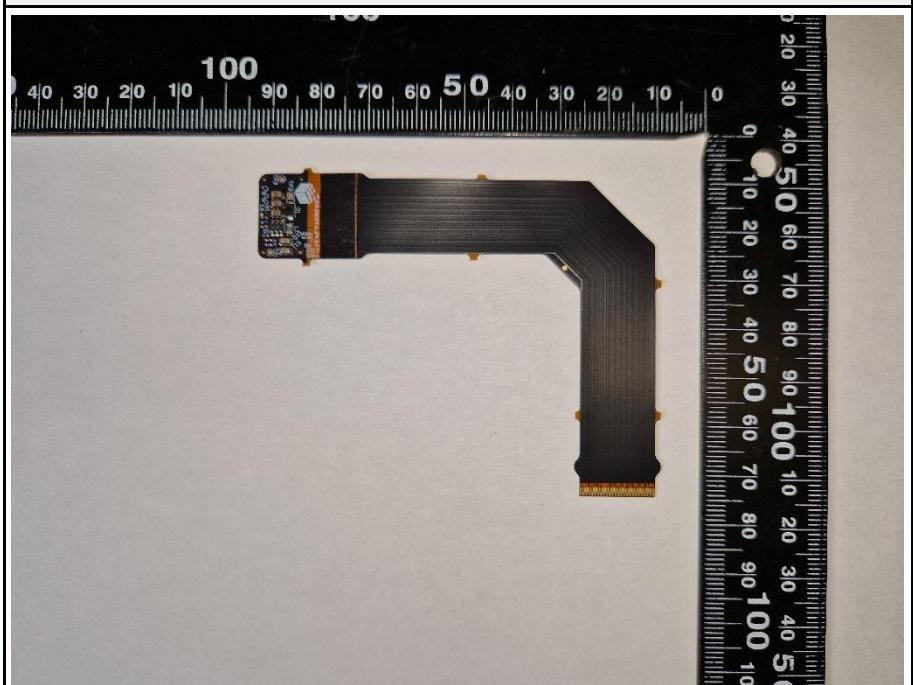
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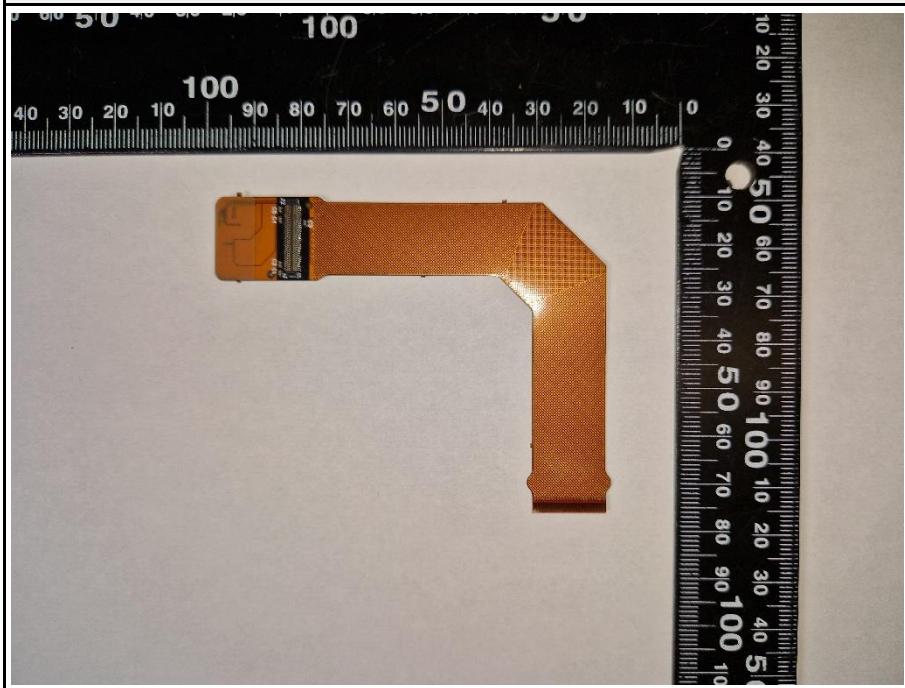
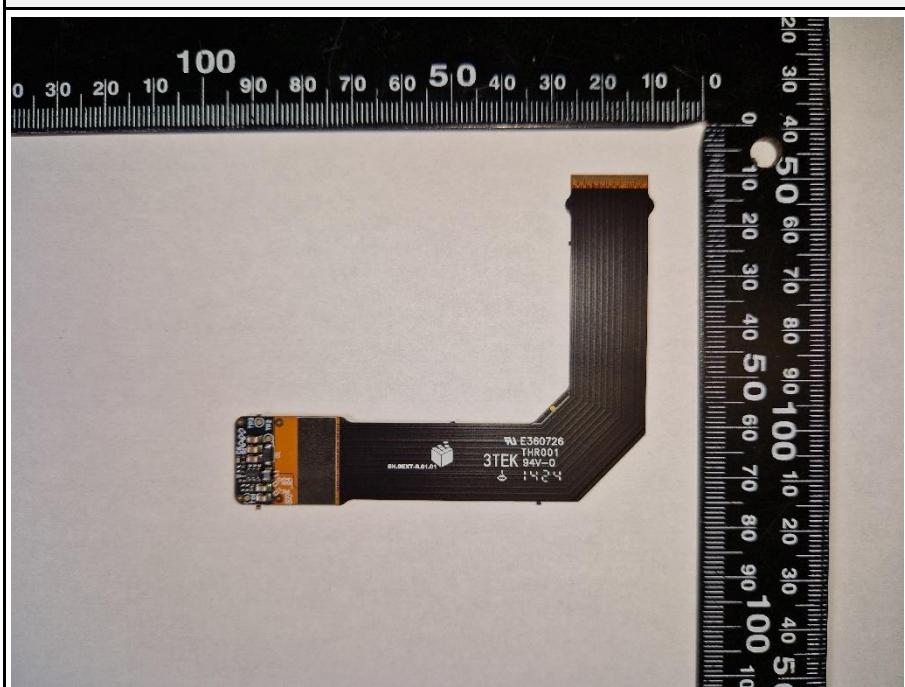


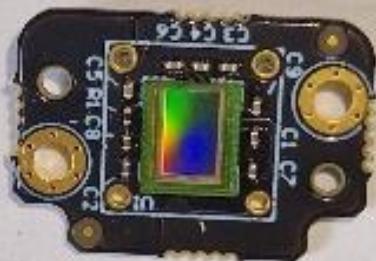
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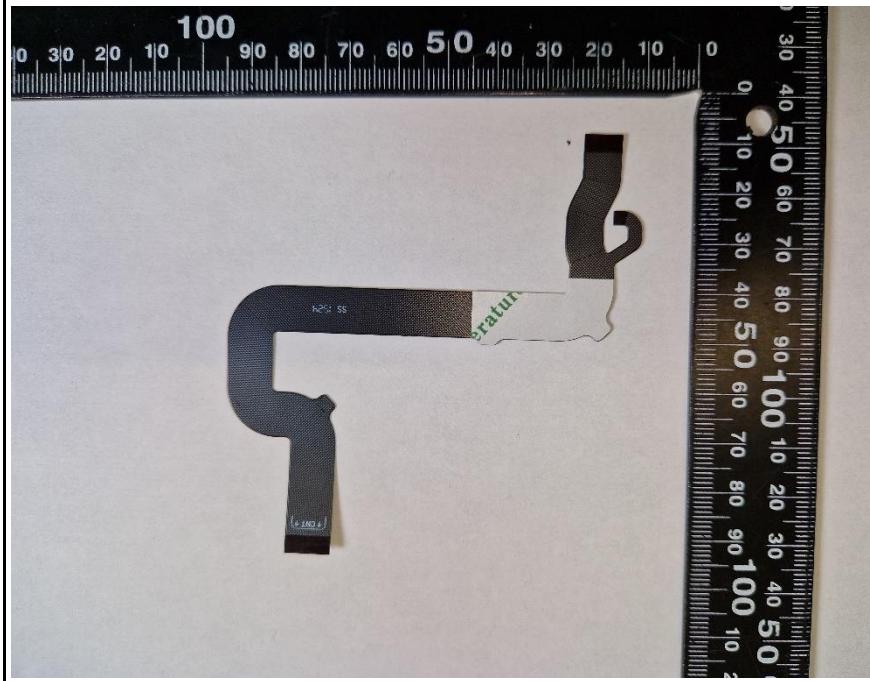
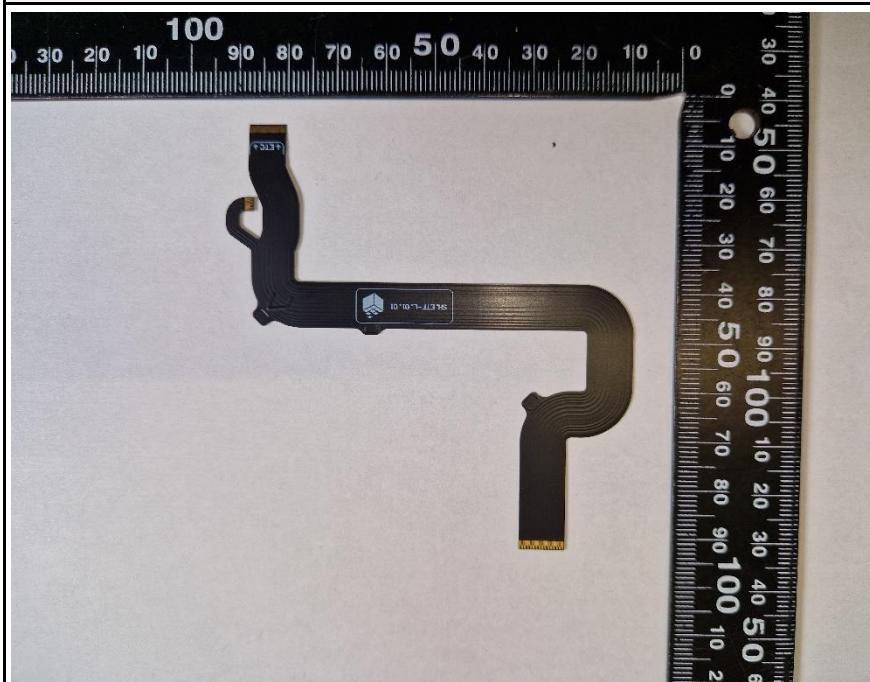


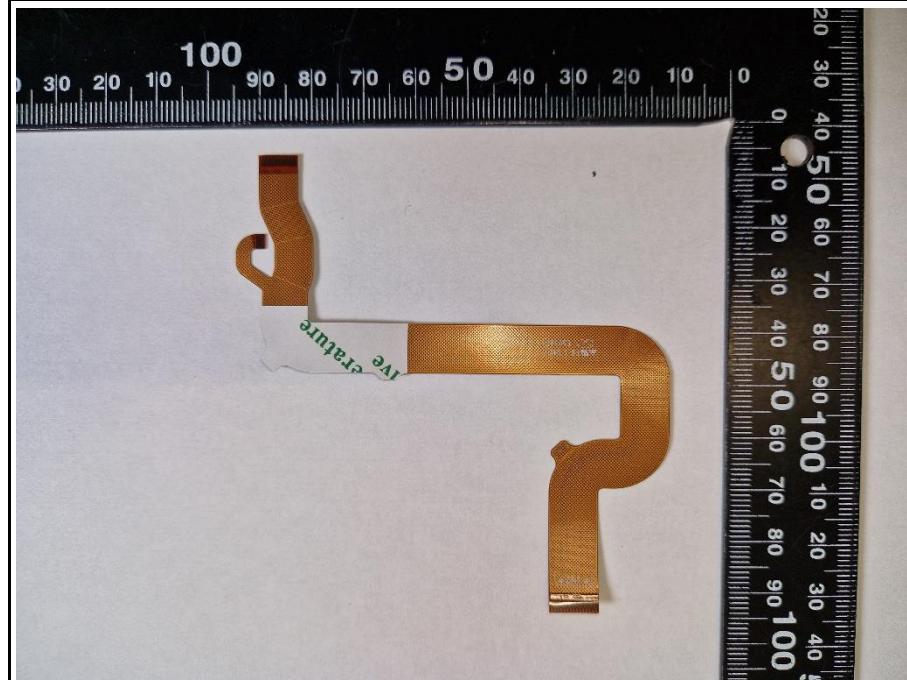
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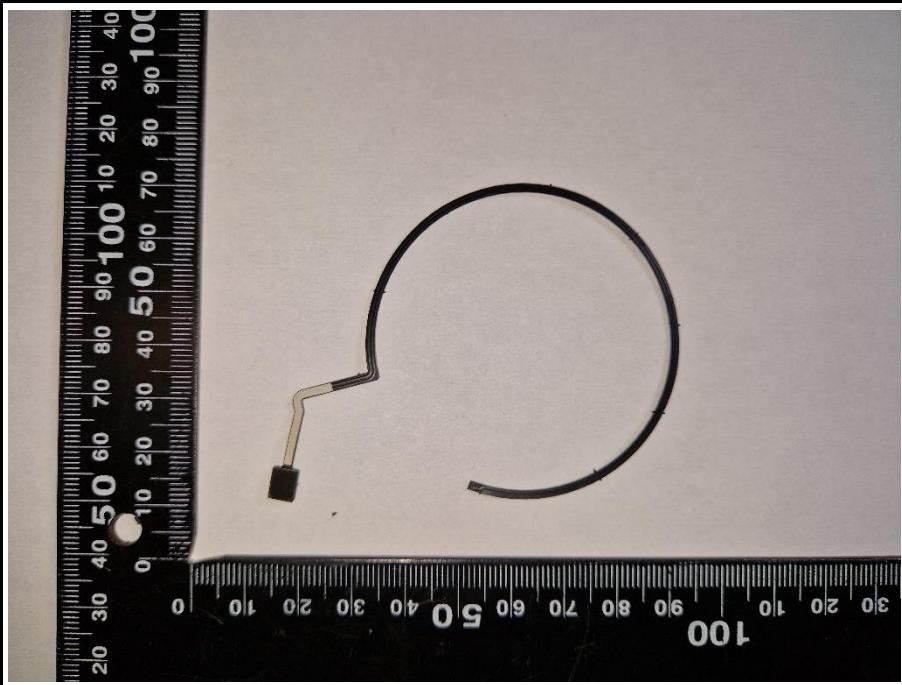
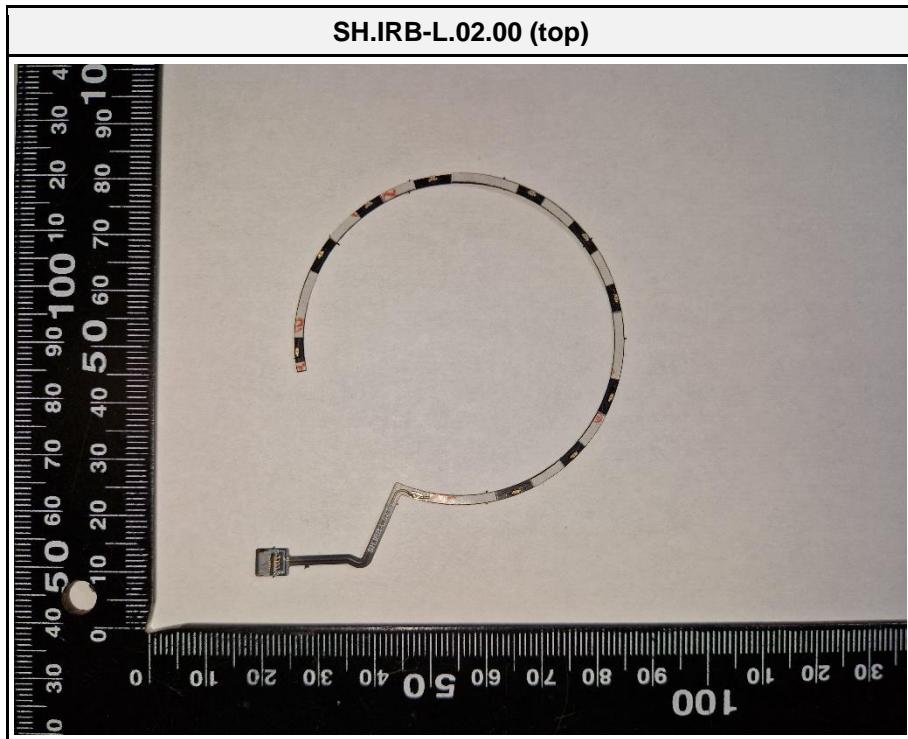
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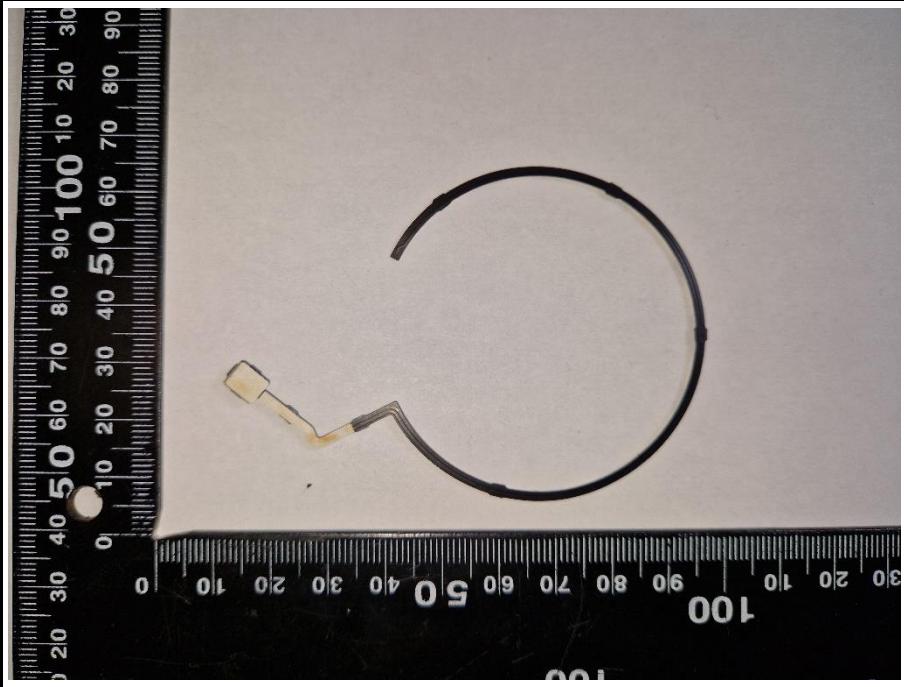
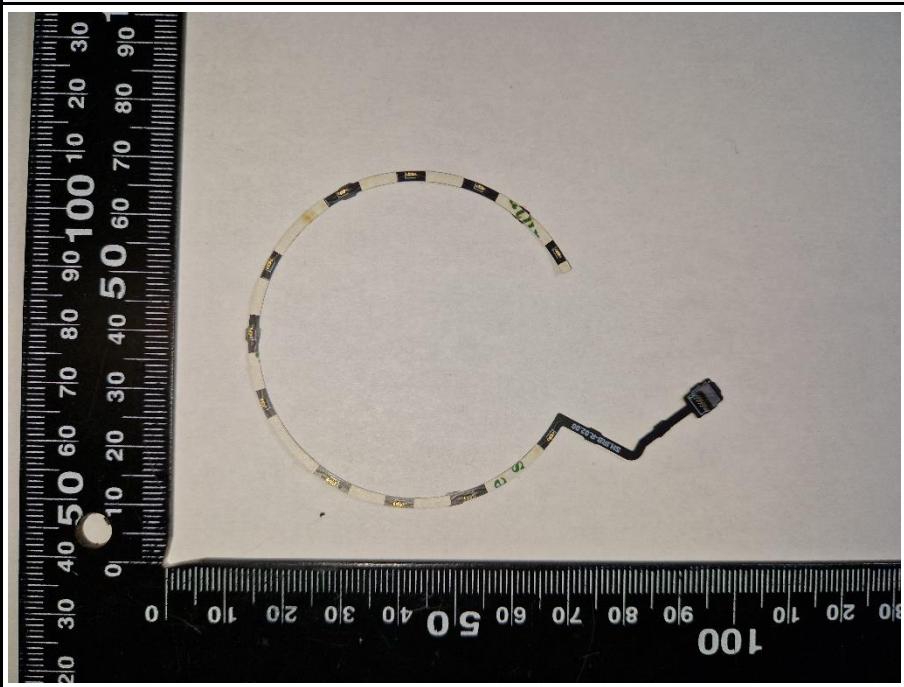
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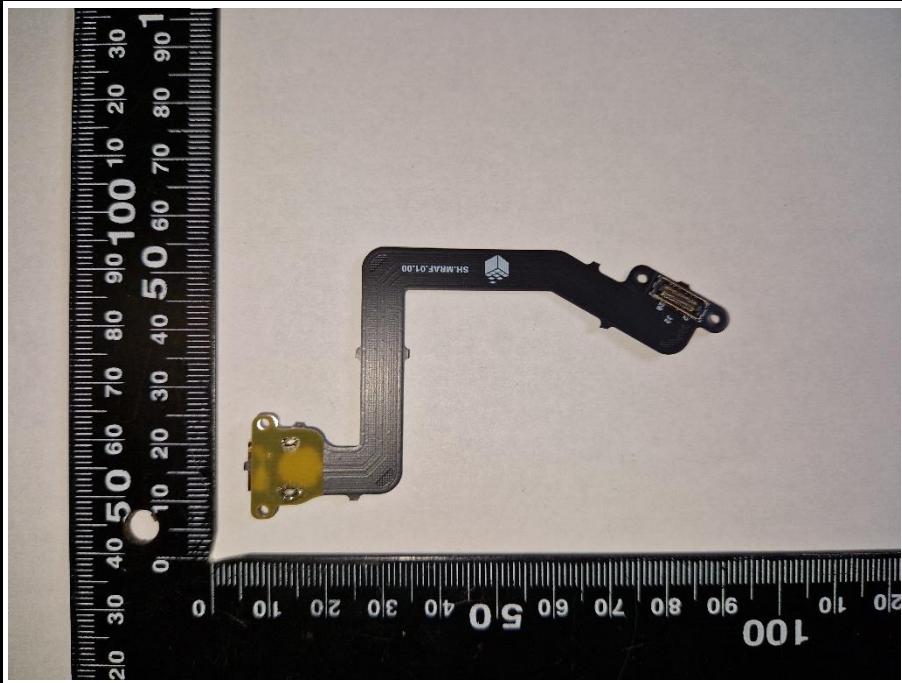
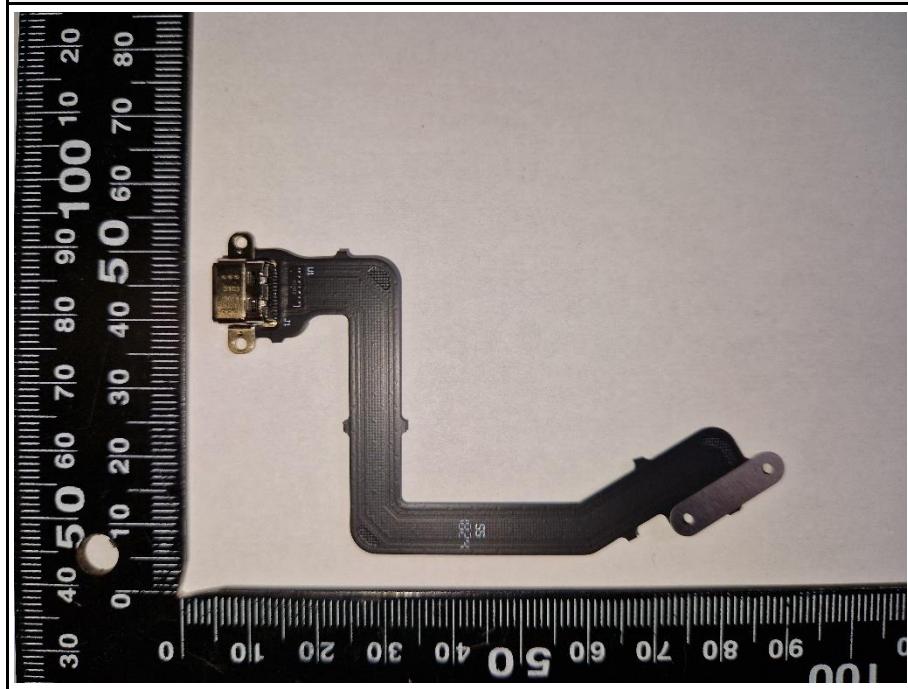
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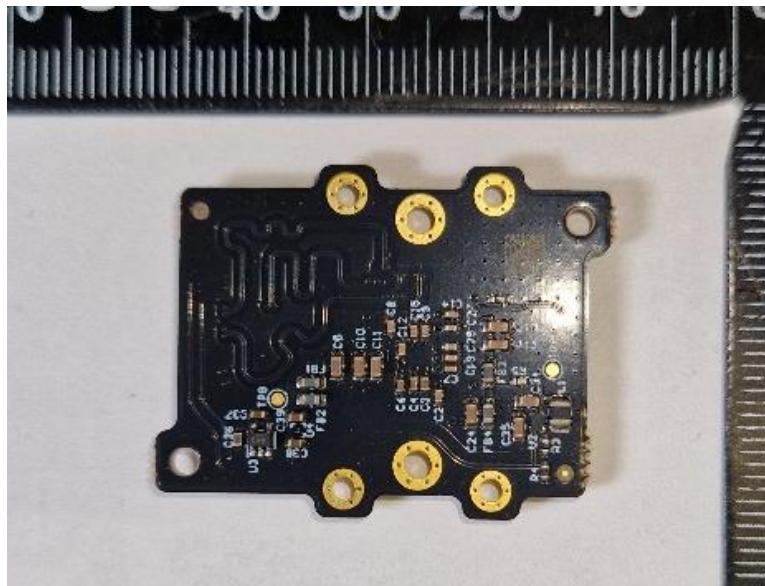
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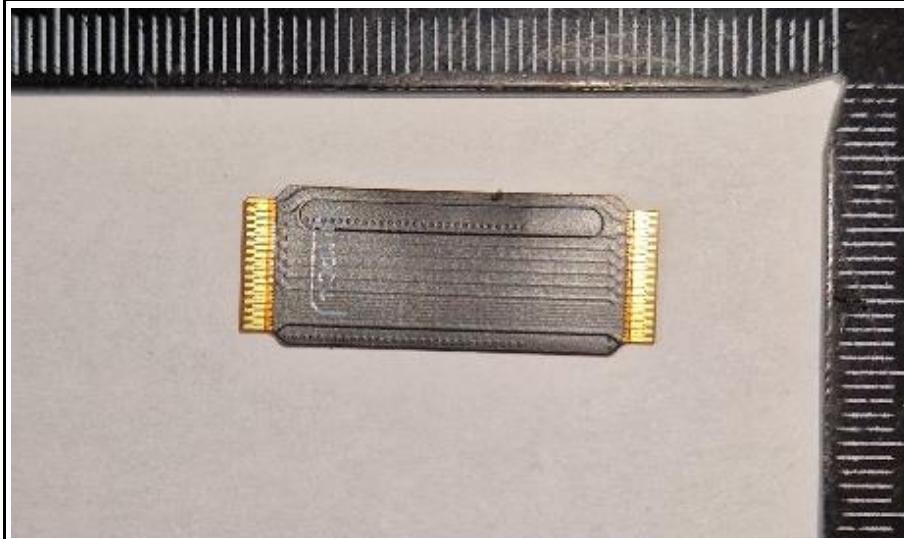
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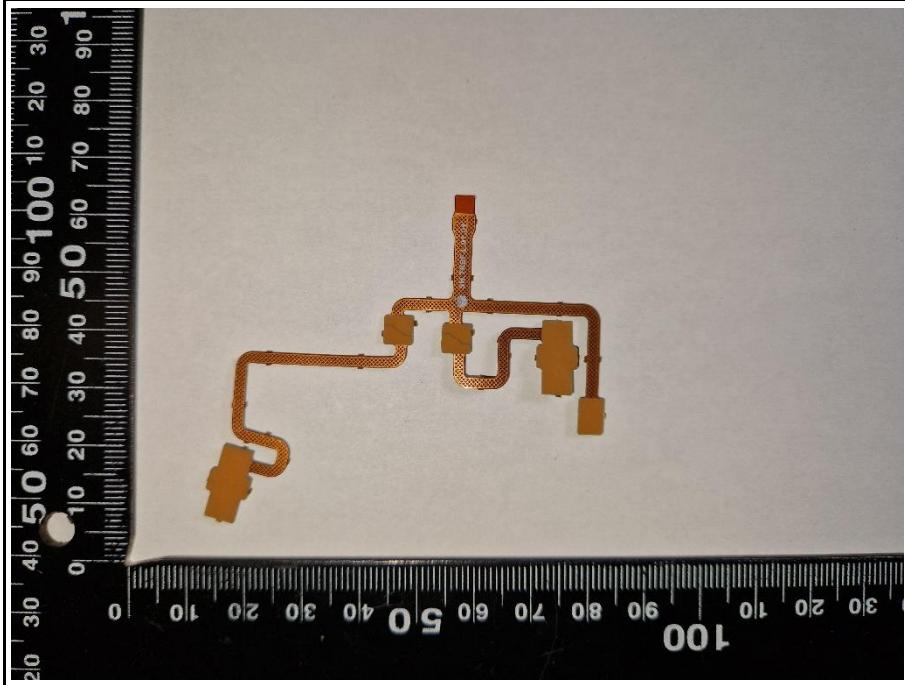
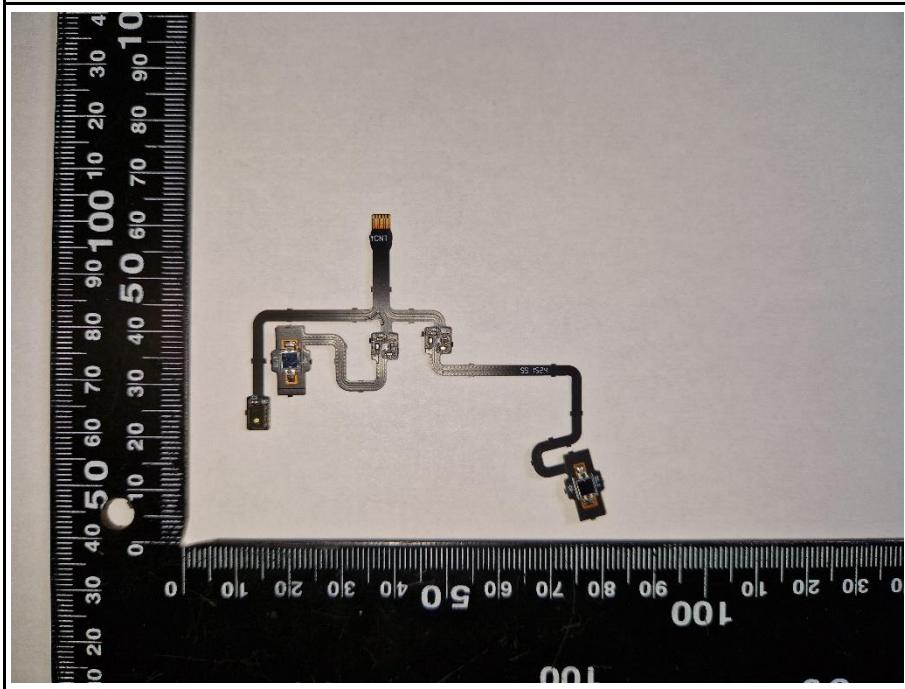


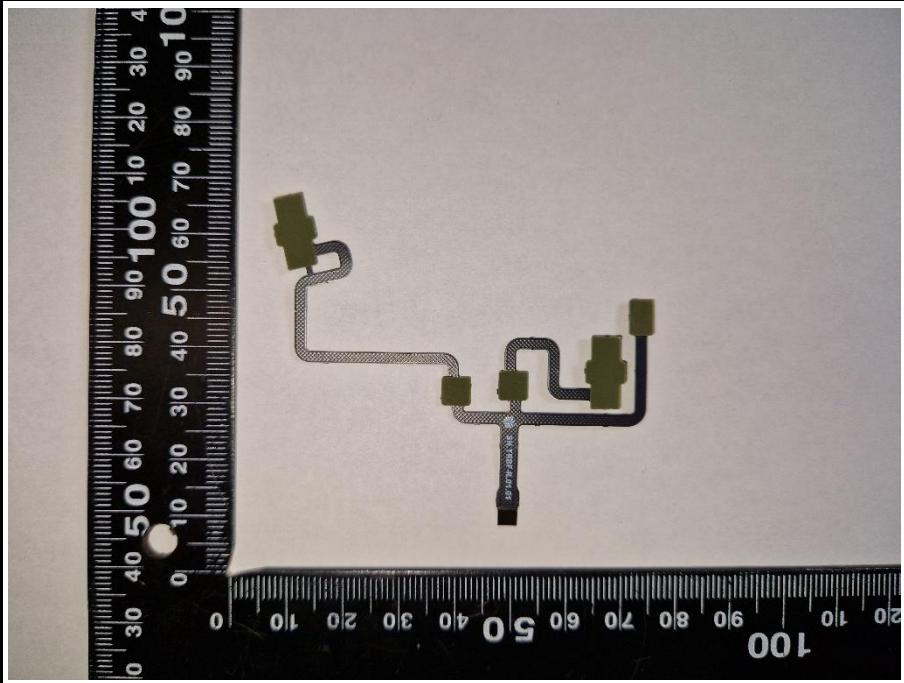
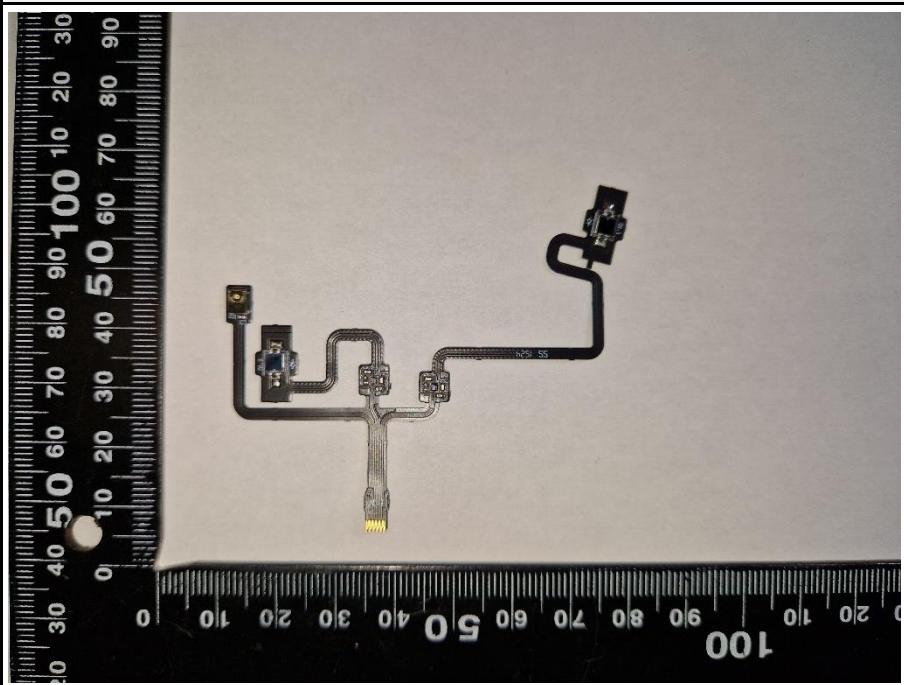
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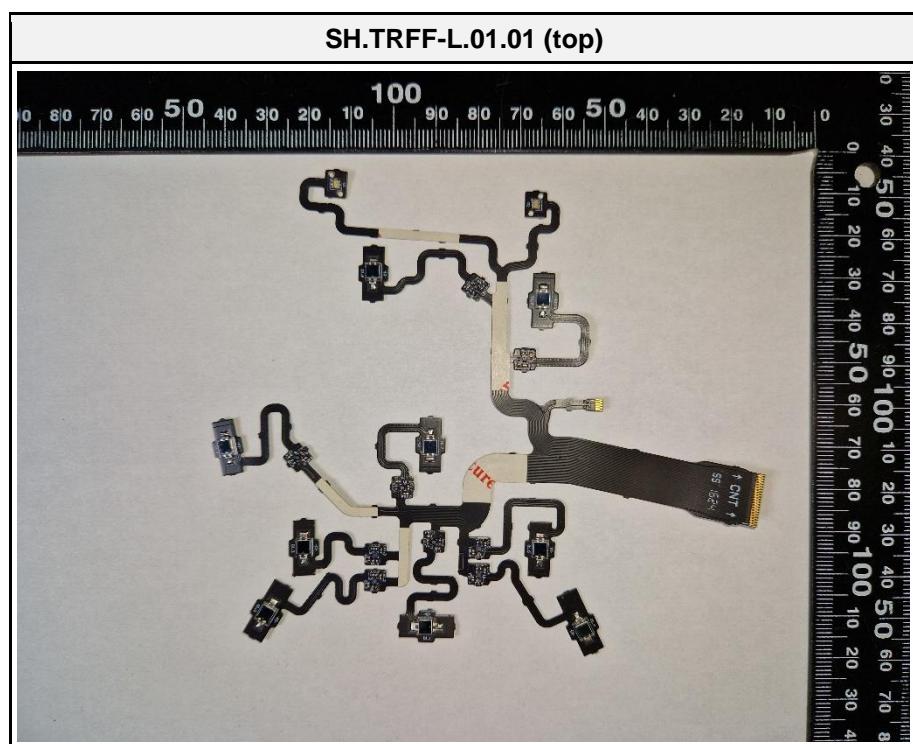
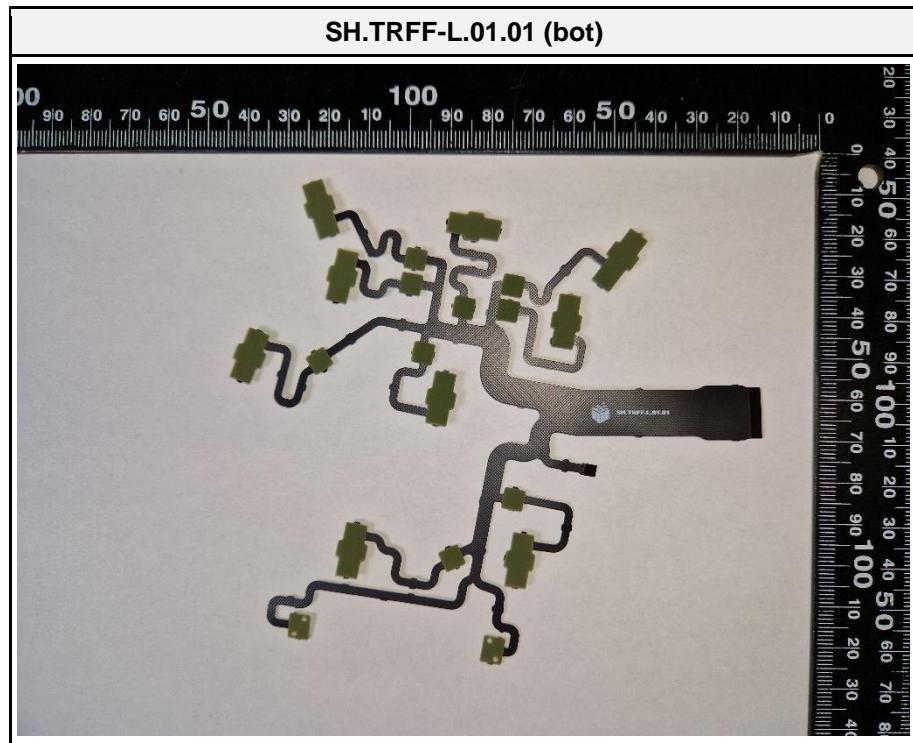


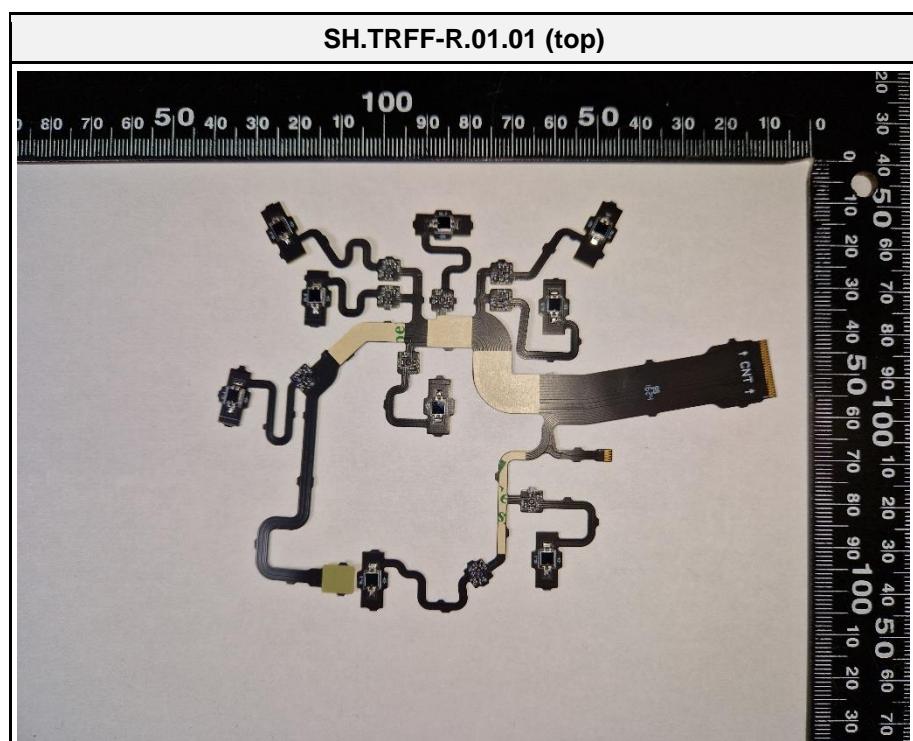
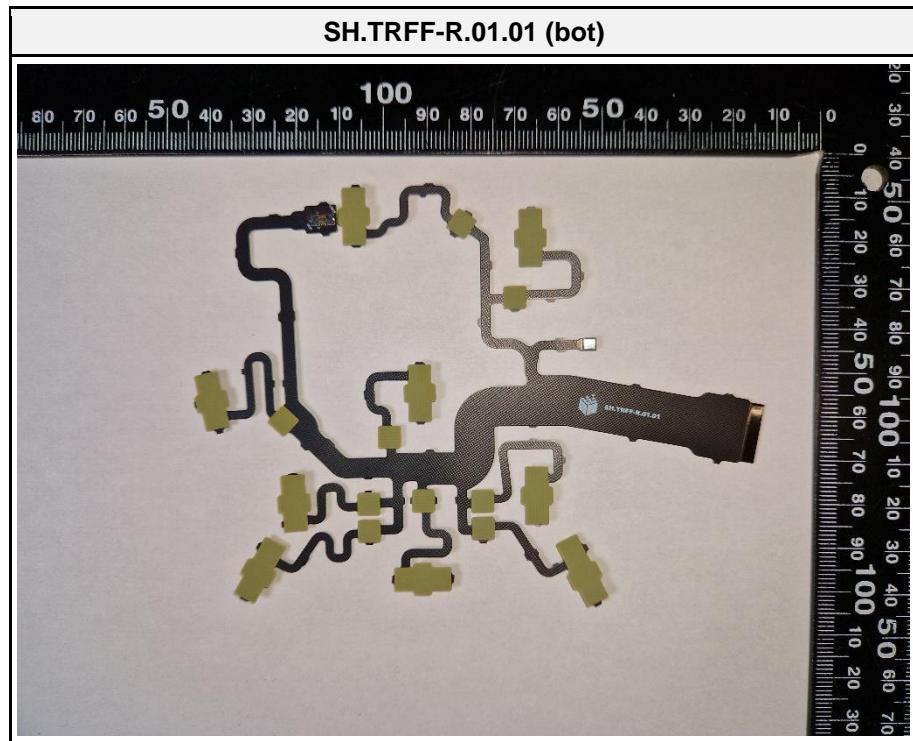
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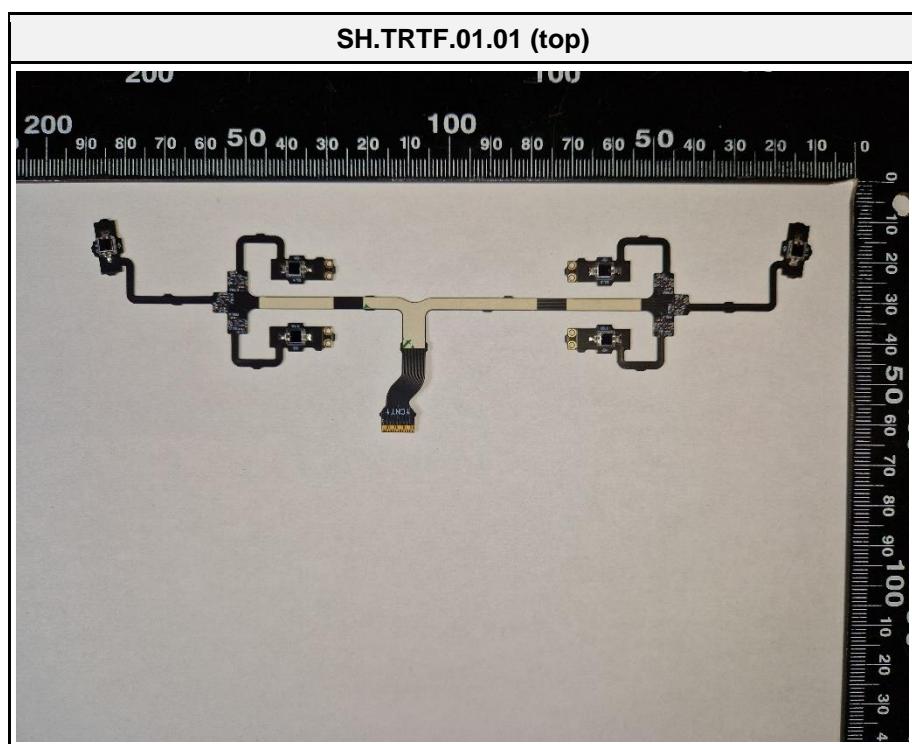
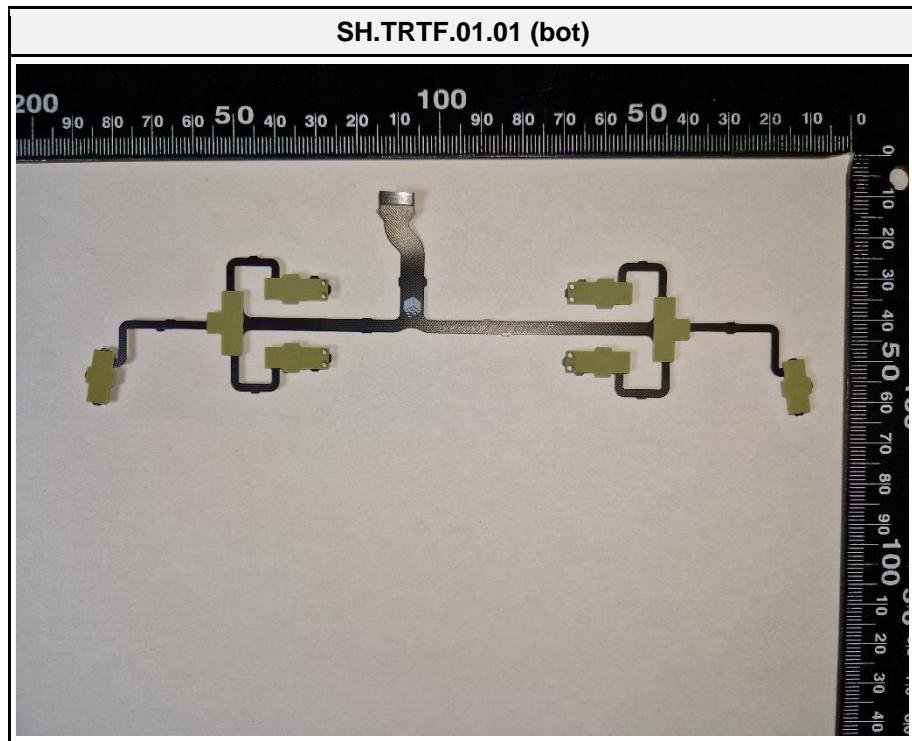


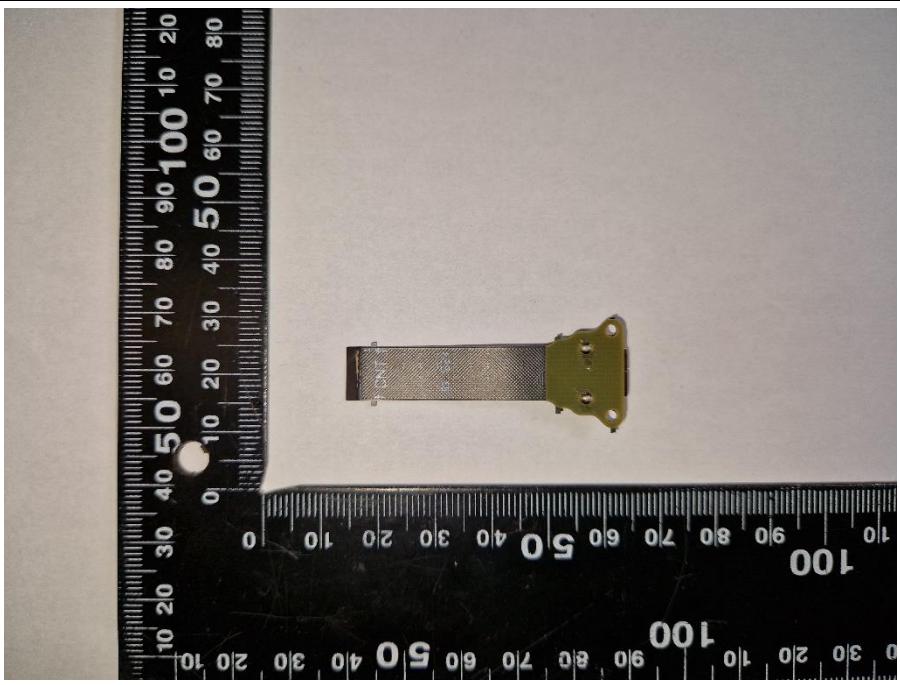
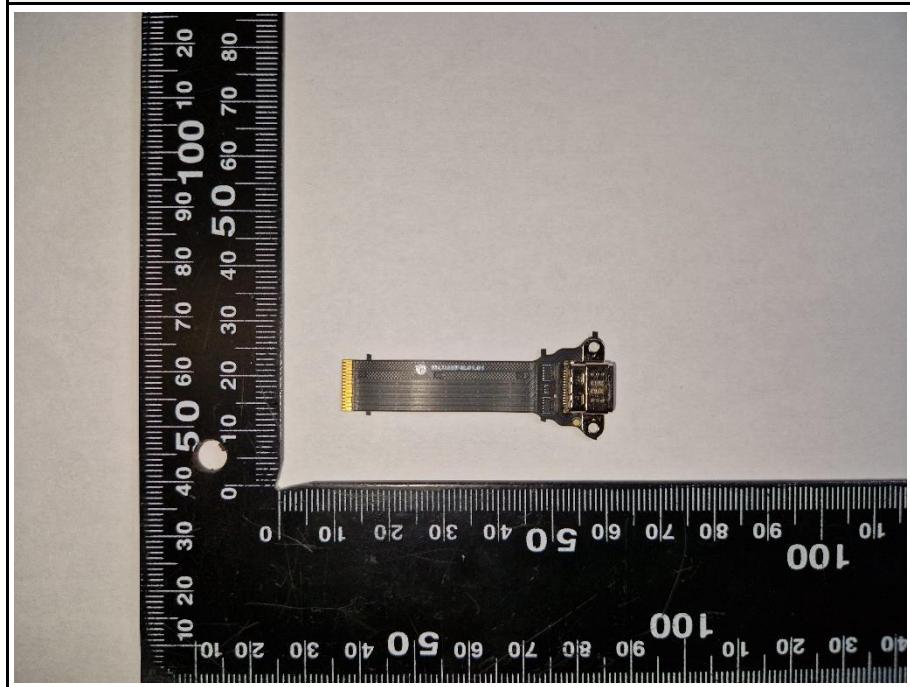
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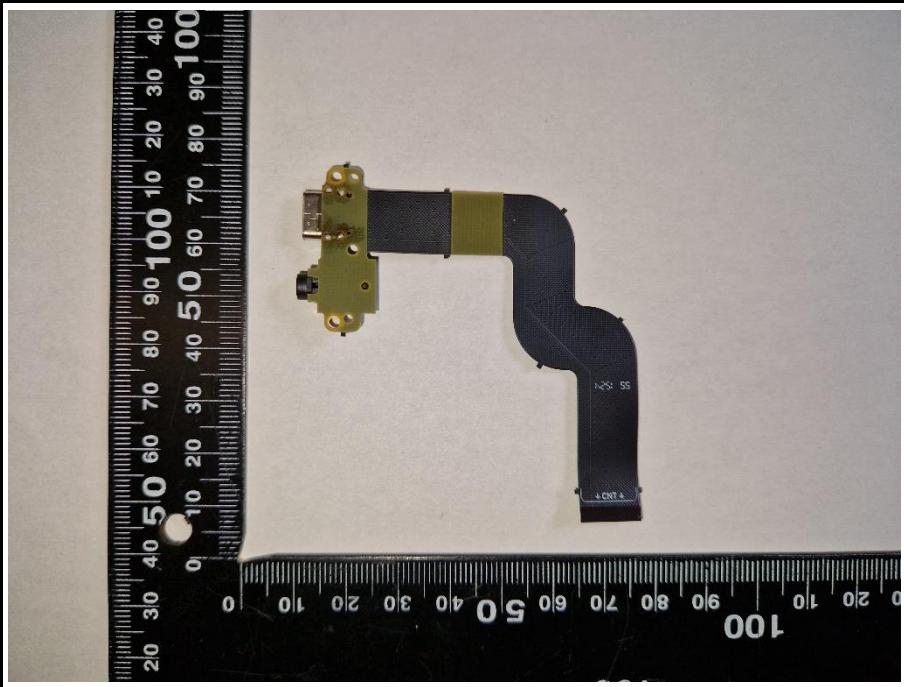
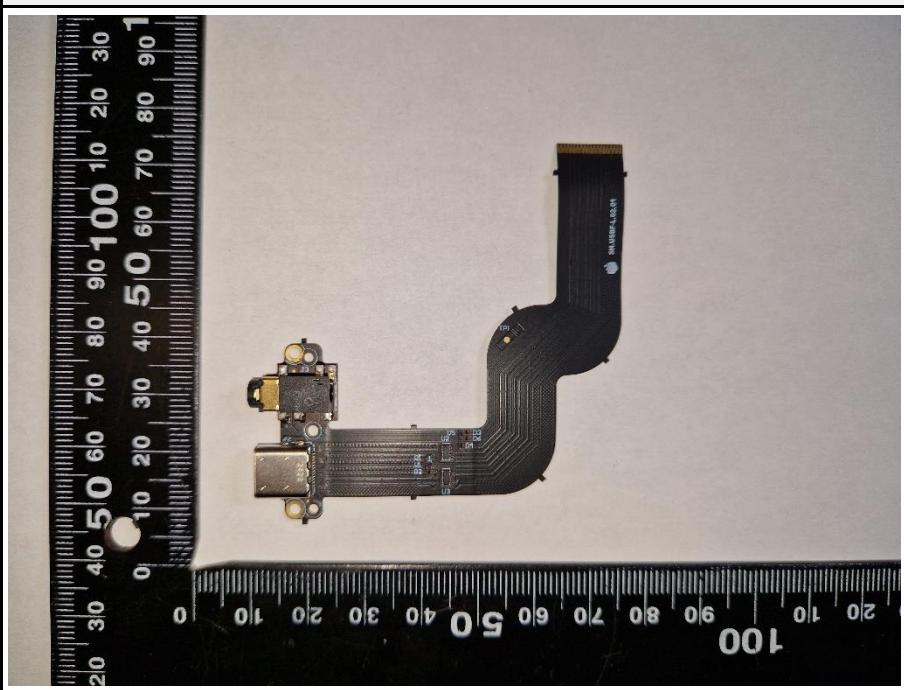
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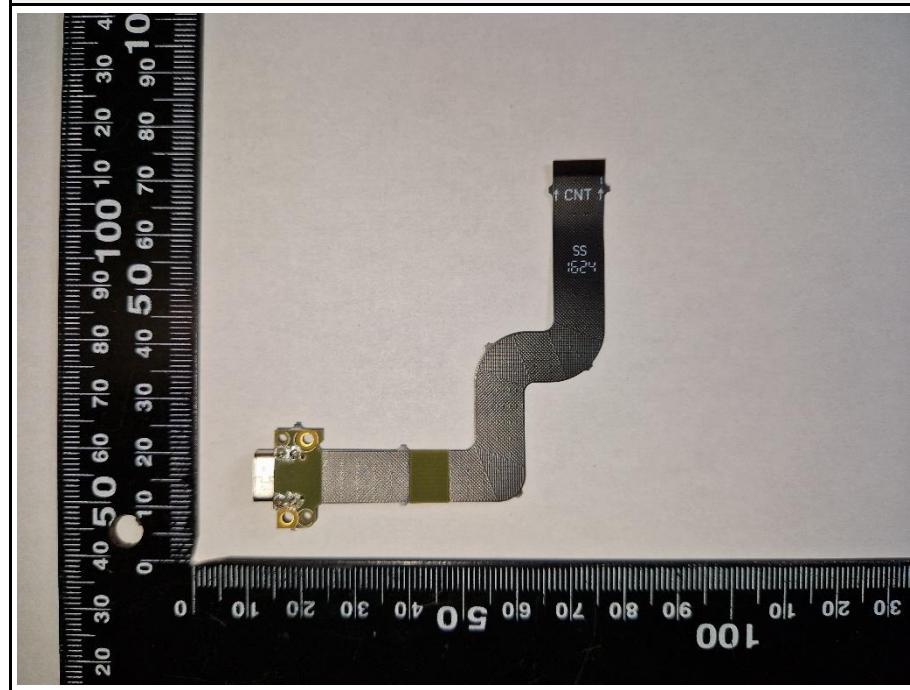
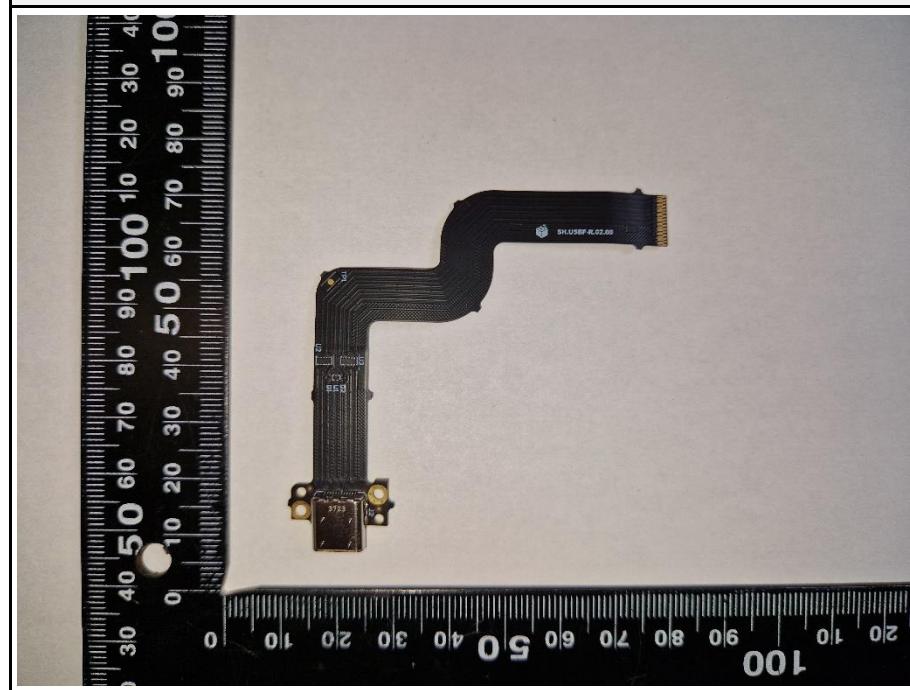


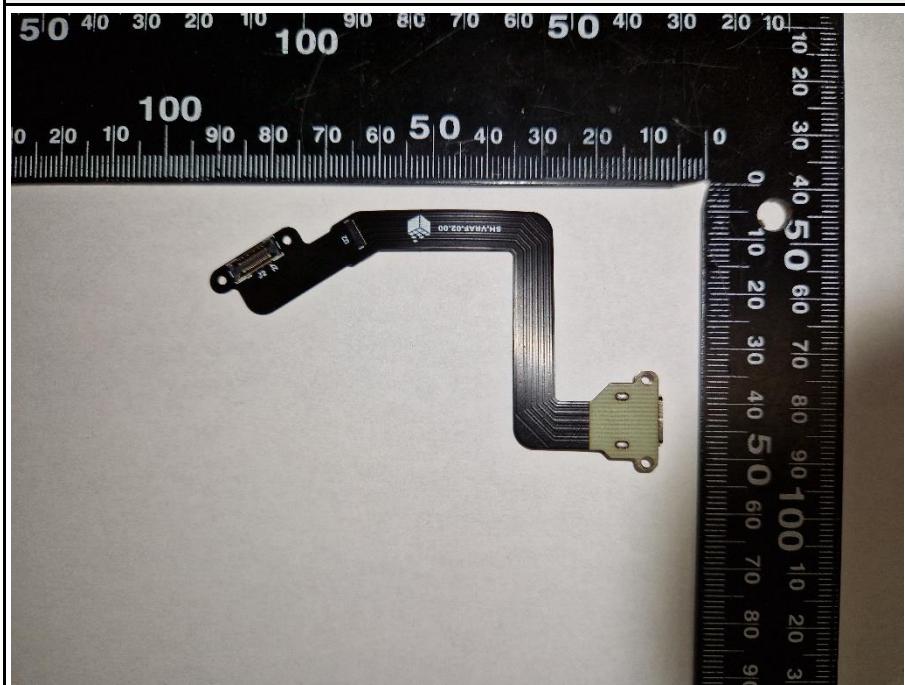
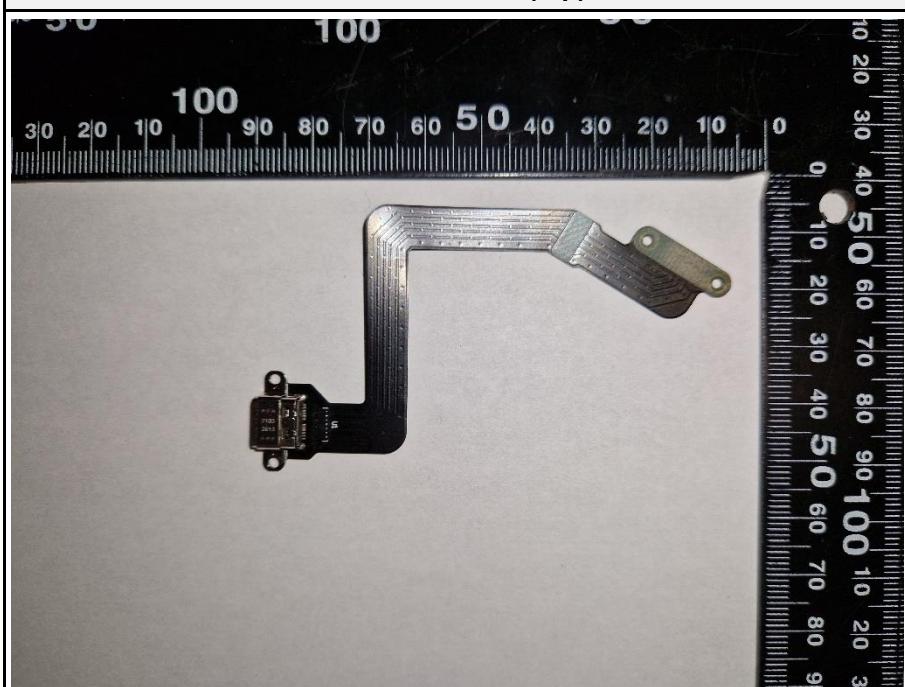


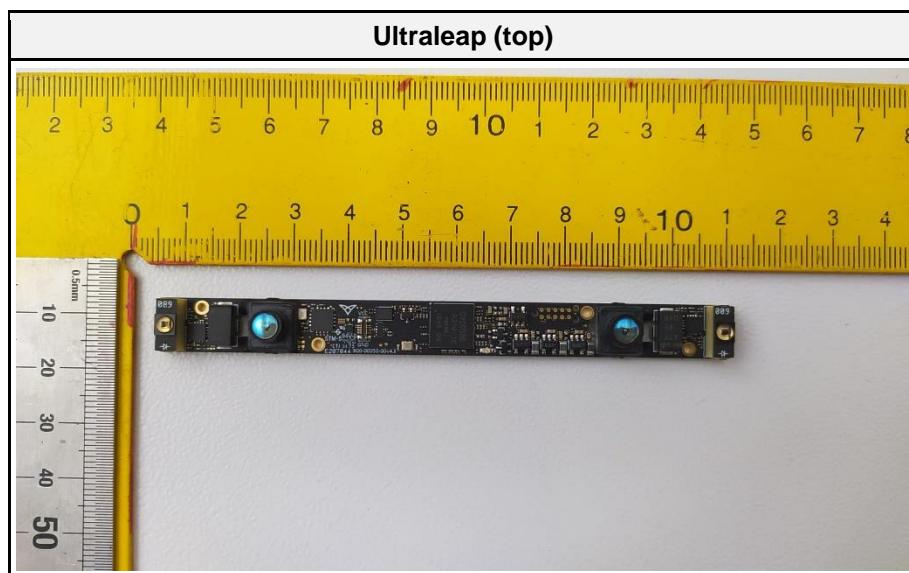
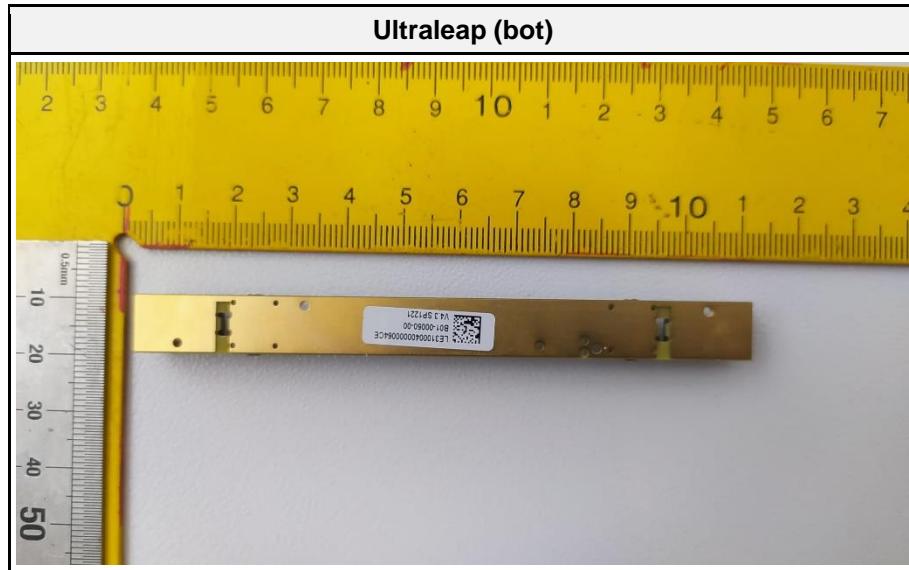


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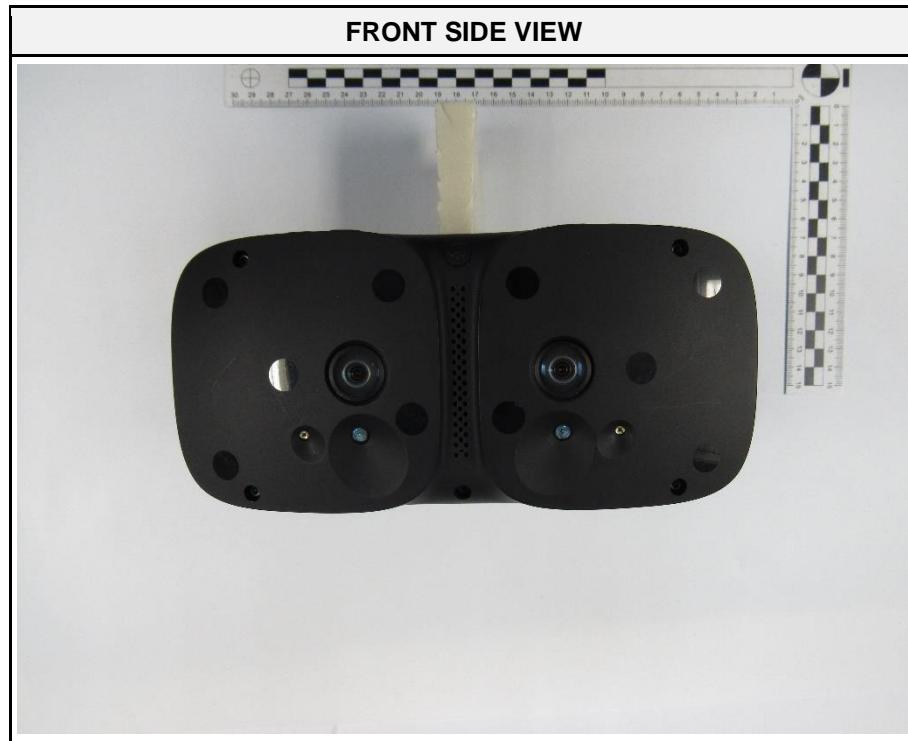
Test Report No.: G0M-2406-2604-EF0115B-V02

Eurofins Product Service GmbH
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1.3 Equipment Photos - External





RIGHT SIDE VIEW**LEFT SIDE VIEW**



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Lenovo	Legion 5 15IAH7H	Customer Support Equipment
AE	USB flash drive (3 pieces)	SanDisk	BM2305006322Z SDDC3	Customer Support Equipment
AE	USB conversions	AlzaPower	-	USB conversion A to C (2pcs) and DisplayPort to USB-C (1pcs), Customer Support Equipment
AE	SteamVR Tracker	Tundra Labs	-	Tundra Tracker (2pcs), Customer Support Equipment
CBL	custom VR cable	BKSTEC	Sumnium VR1 VR cable	Main HMD (EUT) cable, Customer Support Equipment
CBL	custom MR cable	BKSTEC	Sumnium VR1 MR cable	MR cable, Customer Support Equipment
AE	AC/DC adaptor, 12V, 3A (2pcs)	Sunny	SYS1546-3612-T2	Customer Support Equipment
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Displays permanently running (display saver is turned off), using direct mode and testing application that changes background color in gradient between black and white in infinite loop. MR cameras, IPD cameras and Ultraleap cameras are running and transmitting image. Two instances of video are played in loop from external flash drives plugged in left and right USB sockets on the EUT.
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT positioned on the table and connected by two custom hybrid cables (VR and MR cable) to the laptop. - VR cable: USB and Display Port - MR cable: two USBs Junction boxes of the cables are placed on the table. CUI power adaptor (12V 3A) is connected to the junction box of VR cable and wall socket. Laptop is positioned on the table with the screen opened. Laptop's power adaptor is connected to both laptop and wall socket. If possible, laptop is connected by ethernet cable to the network with internet.
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 dB μ 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 μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ 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	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dB μ V + 26 dB/m	= 47.5 dB μ V/m	:	47.5 dB μ V/m - 57.0 dB μ V/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:				

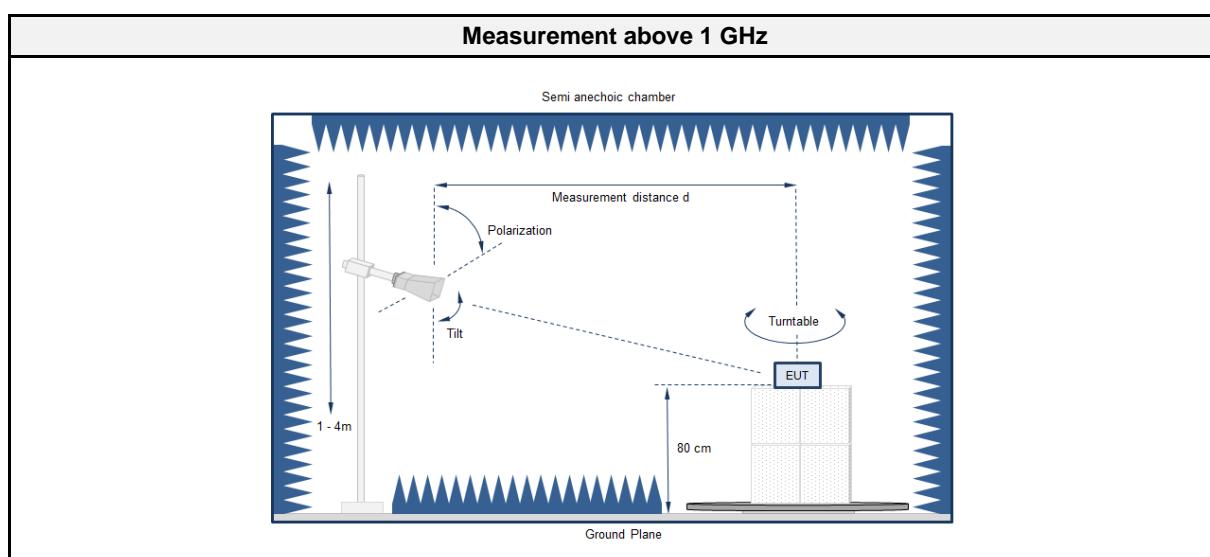
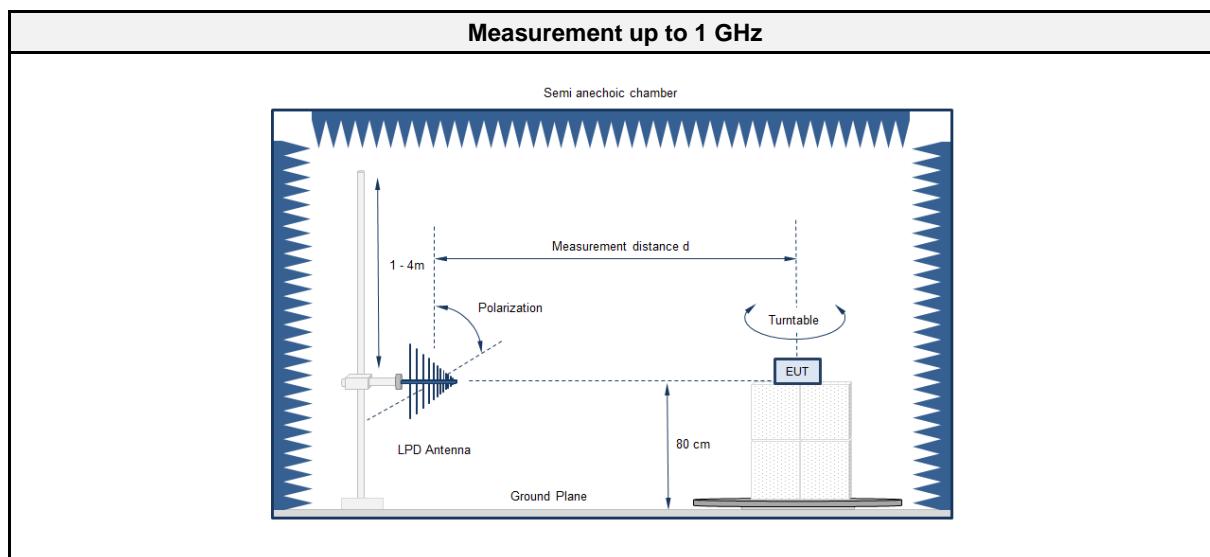
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

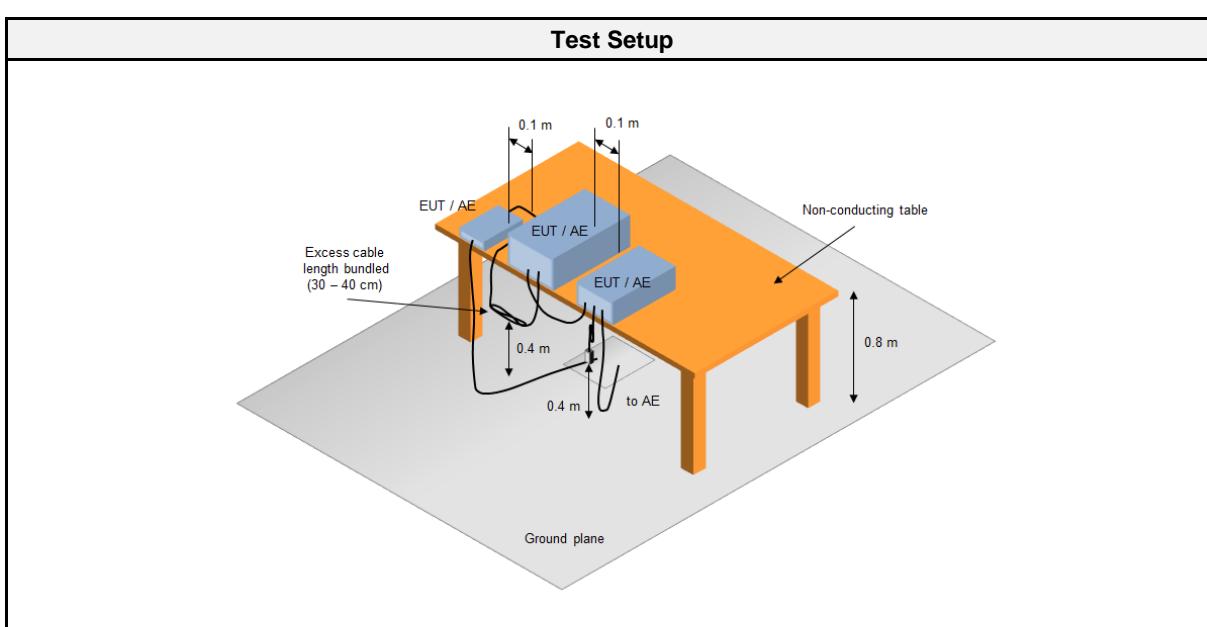
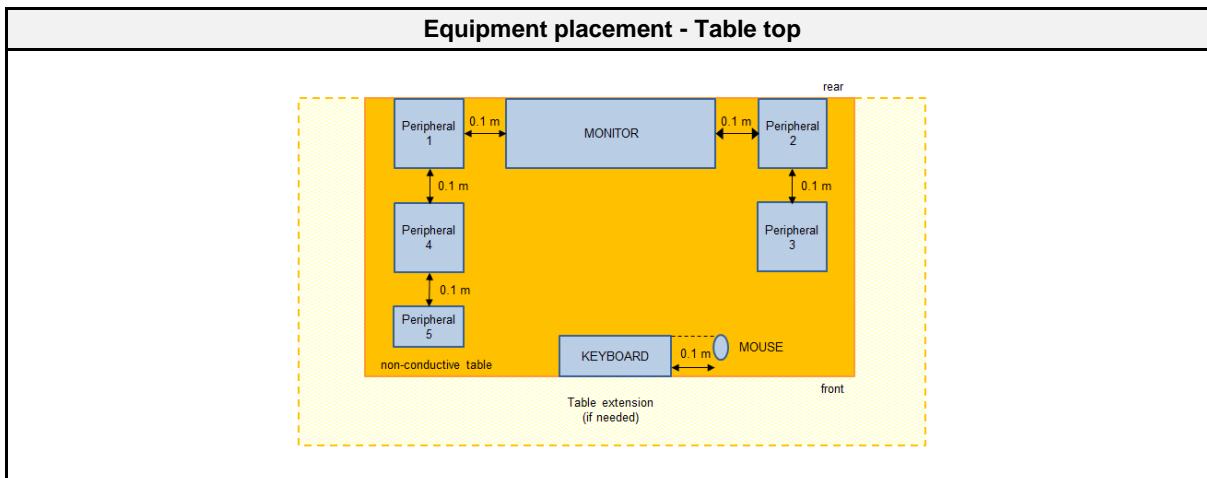
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

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]	5000
Measurement range	30 MHz to 26500 MHz
Temperature [°C]	22 – 26
Humidity [%]	51 – 56
Operator	Mahmood Nasor
Date	2024-09-09

2.1.2 Setup Table top:





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2023.2.6

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC1	EF00062	2024-07	2027-07
Anechoic chamber (SVSWR)	Frankonia	AC 1	EF01011	2024-07	2027-07
Test Receiver	Rohde & Schwarz GmbH & Co. KG - Vertrieb Berlin	ESW44	EF01856	2024-04	2025-04
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU26	EF00887	2024-01	2025-01
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	EF01824	2022-10	2025-10
40GHz High Gain Antenna	Amplifier Research	AT4560	EF00302	2023-09	2025-09
Programmable AC Source	Chroma ATE Inc.	61604	EF01068	2023-08	2025-08
Horn Antenna	Schwarzbeck	BBHA9120D	EF00018	2022-12	2025-12
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2023-07	2027-07

2.1.4 Procedure

Exploratory measurement Table top
<ol style="list-style-type: none">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 3m/10 Table top
<ol style="list-style-type: none">1. The EUT was placed on a 0.8 m non-conductive table at a 3 or 10 m distance from the receive antenna. The antenna output was connected to the measurement receiver.2. A broadband hybrid antenna was used for the frequency range 30 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast. If required, in the range 1- 18 GHz a Double Ridged Broadband Horn antenna, in the range 18 – 40 GHz a High Gain / Standard Gain Horn 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

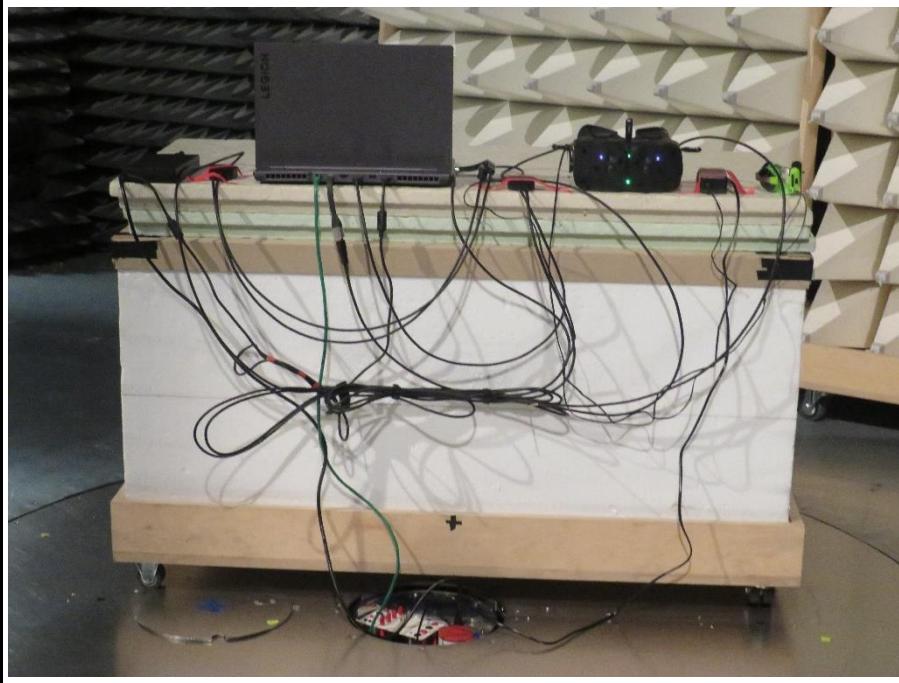
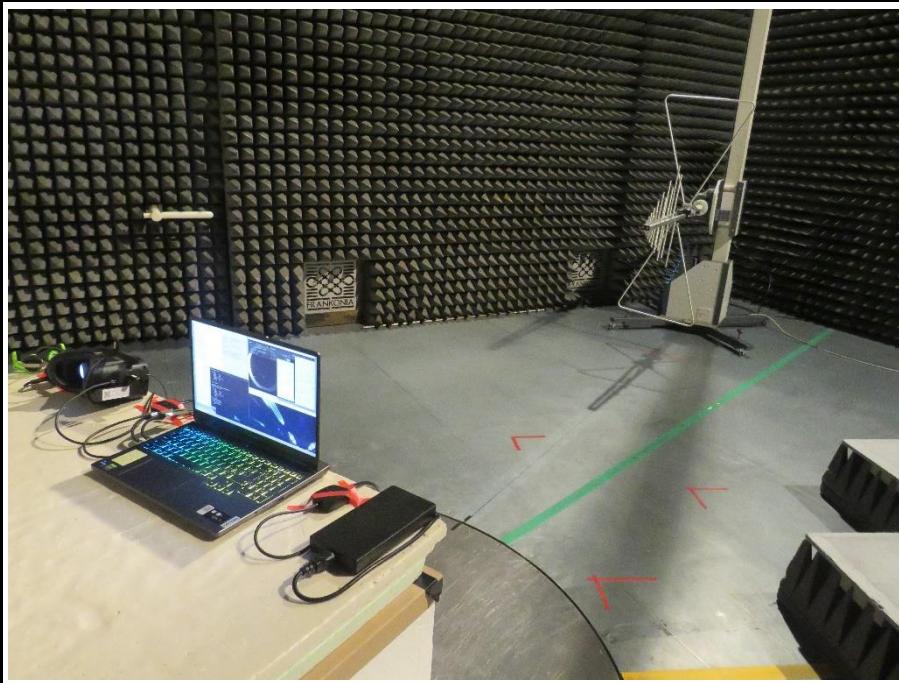
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak Average	74 54

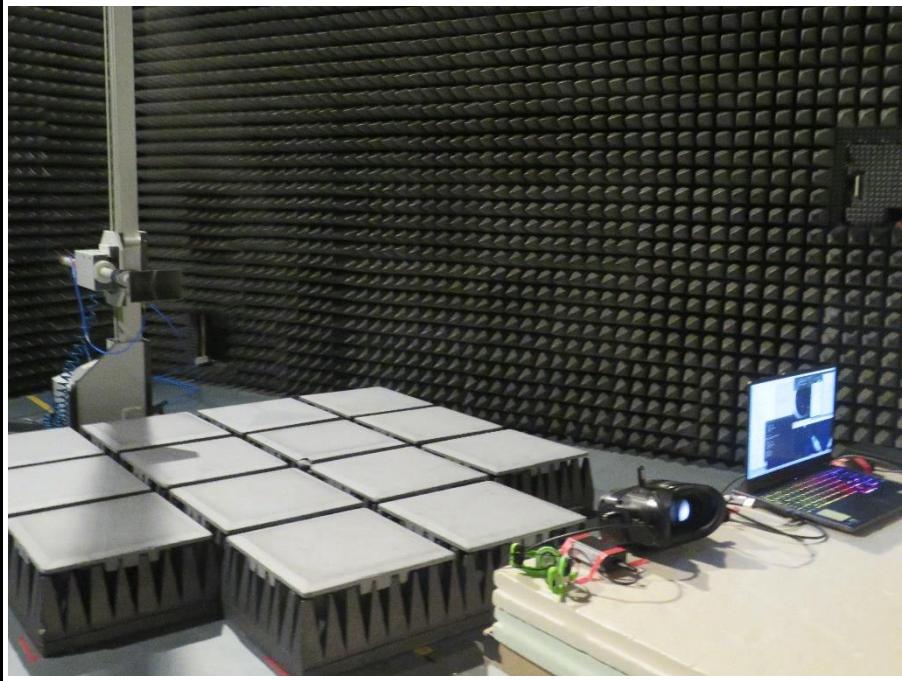
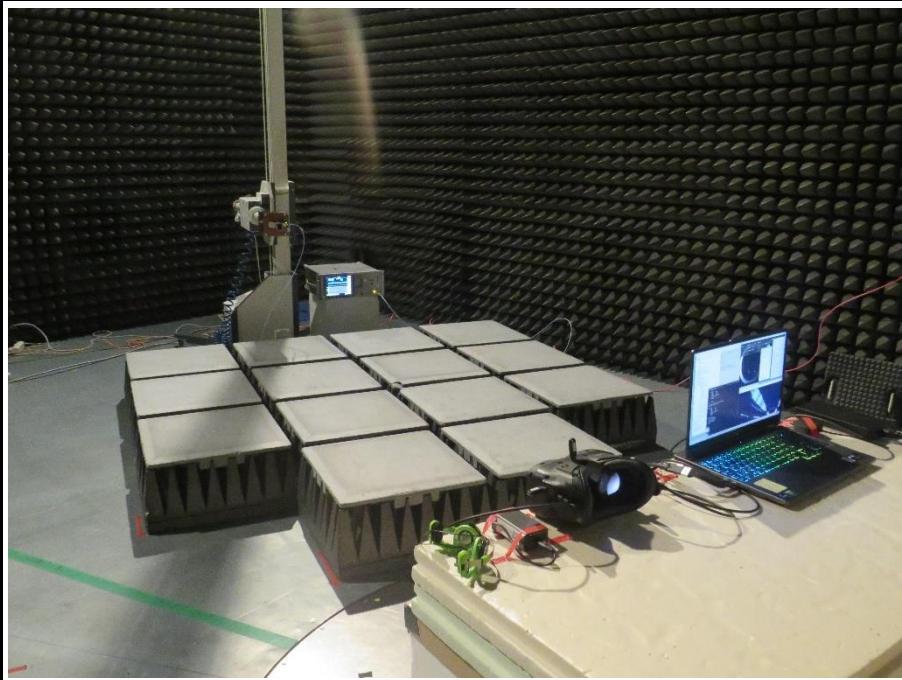
Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak Average	69.5 49.5

2.1.6 Results

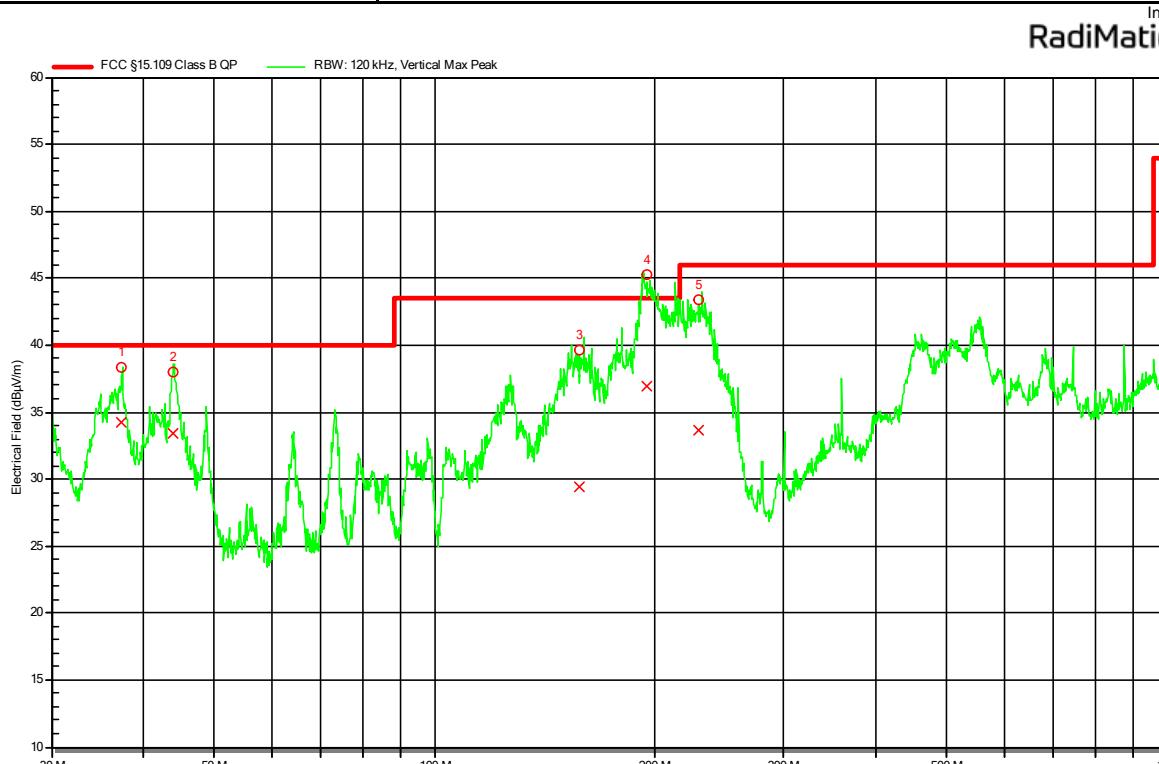
Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

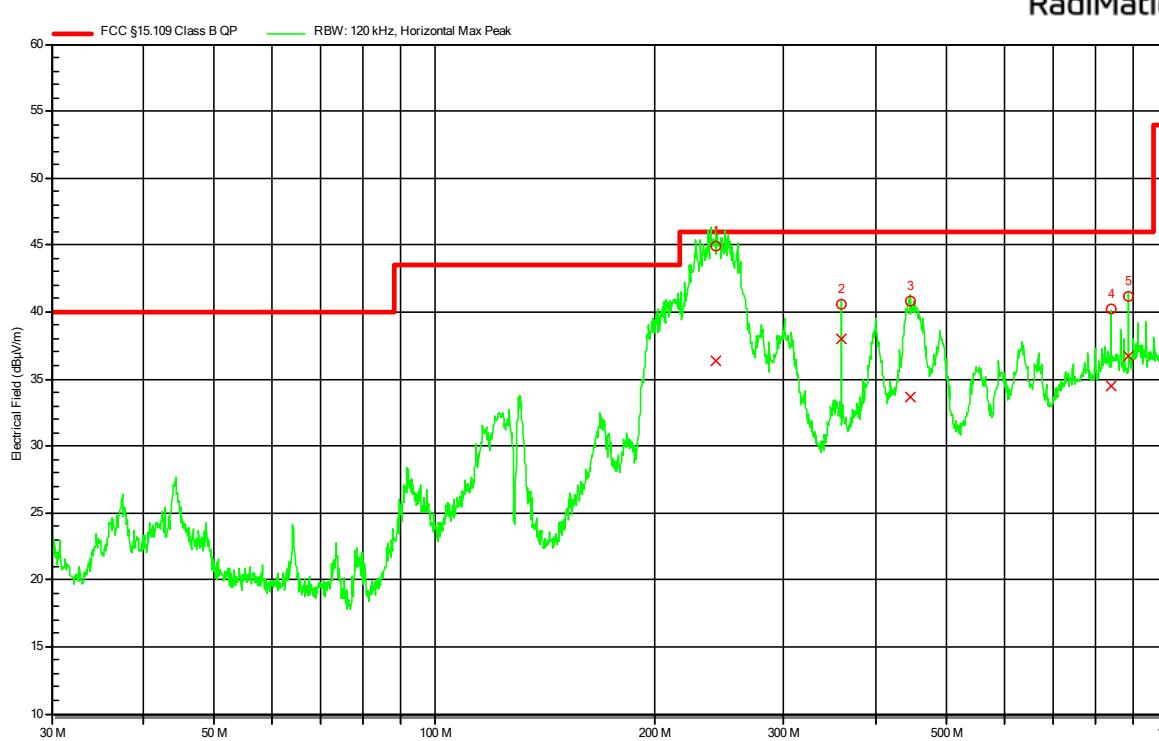
2.1.7 Setup Photos

TEST SETUP - FOCUS**TEST SETUP - 30 MHz to 1 GHz**

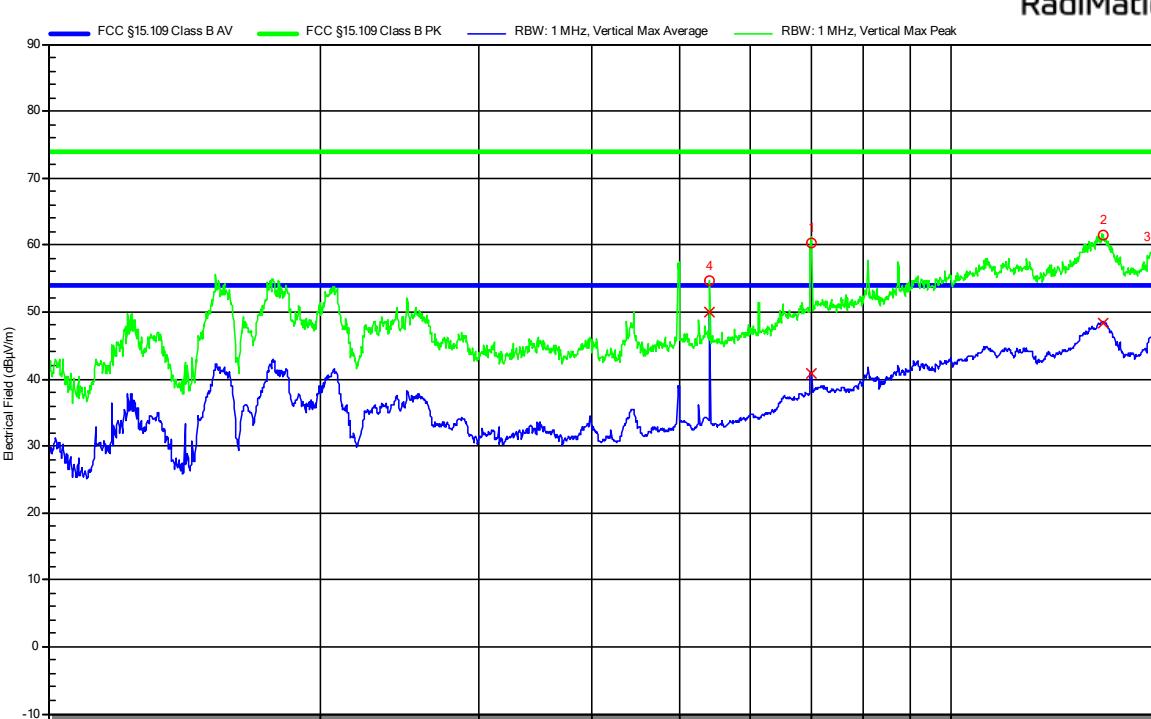
TEST SETUP - 1 GHz - 17 GHz**TEST SETUP - 17 GHz - 26.5 GHz**

2.1.8 Records

Radiated emissions according to FCC part 15B							
Project Number:	G0M-2406-2604						
Applicant:	Somnium Space LTD.						
Model Description:	Head-Mounted Display / VR headset						
Model:	VR1						
Test Sample ID:	49301						
Test Site:	Eurofins Product Service GmbH						
Operator:	Mr. Nasor						
Test Date & Time:	2024-09-09						
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V /60 Hz						
Antenna:	Schwarzbeck VULB 9168, Vertical						
Measurement Distance:	3m						
Operational Mode:	1						
DUT Configuration:	1						
Note 1:	-						
							
Start Frequency 30 MHz	Stop Frequency 1 GHz	Frequency Step Linear: 60 kHz steps	Measure Time 1 s	RBW 120 kHz			
Peak Number	Frequency (MHz)	Quasi-Peak (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	Angle (degrees)	Height (m)
1	37.44	34.19	40	-5.81	Pass	180	1
2	43.98	33.42	40	-6.58	Pass	180	1
3	157.92	29.48	43.52	-14.04	Pass	180	1
4	194.94	36.98	43.52	-6.54	Pass	180	1
5	229.62	33.68	46.02	-12.34	Pass	180	1

Radiated emissions according to FCC part 15B				
Project Number:	G0M-2406-2604			
Applicant:	Somnium Space LTD.			
Model Description:	Head-Mounted Display / VR headset			
Model:	VR1			
Test Sample ID:	49301			
Test Site:	Eurofins Product Service GmbH			
Operator:	Mr. Nasor			
Test Date & Time:	2024-09-09			
Operating Conditions:	ambient temperature: 24 °C power input: 120 V / 60 Hz			
Antenna:	Schwarzbeck VULB 9168, Horizontal			
Measurement Distance:	3m			
Operational Mode:	1			
DUT Configuration:	1			
Note 1:	-			
Index 6				
RadiMation				
				
Start Frequency 30 MHz	Stop Frequency 1 GHz	Frequency Step Linear: 60 kHz steps	Measure Time 1 s	RBW 120 kHz

Peak Number	Frequency (MHz)	Quasi-Peak (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)	Quasi-Peak Difference (dB)	Quasi-Peak Status	Angle (degrees)	Height (m)
1	242.46	36.4	46.02	-9.62	Pass	180	1
2	360	38.04	46.02	-7.98	Pass	180	1
3	446.1	33.7	46.02	-12.33	Pass	180	1
4	840	34.44	46.02	-11.58	Pass	180	1
5	888	36.67	46.02	-9.35	Pass	180	1

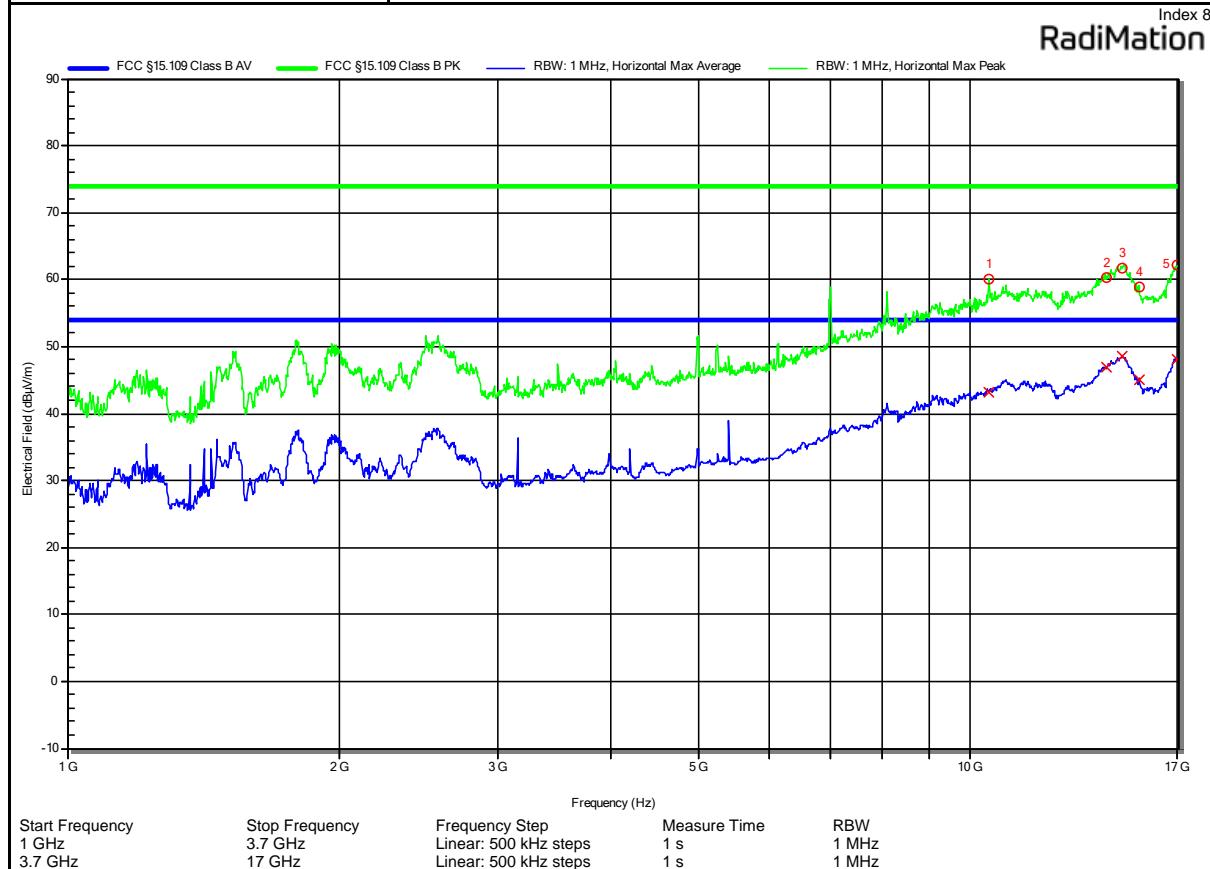
Radiated emissions according to FCC part 15B				
Project Number:	G0M-2406-2604			
Applicant:	Somnium Space LTD.			
Model Description:	Head-Mounted Display / VR headset			
Model:	VR1			
Test Sample ID:	49301			
Test Site:	Eurofins Product Service GmbH			
Operator:	Mr. Nasor			
Test Date & Time:	2024-09-09			
Operating Conditions:	ambient temperature: 24 °C power input: 120 V /60 Hz			
Antenna:	Schwarzbeck BBHA 9120D, Vertical			
Measurement Distance:	3m			
Operational Mode:	1			
DUT Configuration:	1			
Note 1:	-			
Index 7 RadiMation				
				
Start Frequency 1 GHz 3.7 GHz	Stop Frequency 3.7 GHz 17 GHz	Frequency Step Linear: 500 kHz steps	Measure Time 20 ms 20 ms	RBW 1 MHz 1 MHz

Peak Number	Frequency (MHz)	Peak (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	6999.5	60.34	73.98	-13.64	Pass	-10	3
2	14742.5	61.46	73.98	-12.52	Pass	-10	3
3	16986.5	61.01	73.98	-12.97	Pass	-10	3
4	5400	54.77	73.98	-19.21	Pass	-10	3
Peak Number	Frequency (MHz)	Average (dB μ V/m)	Average Limit (dB μ V/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	6999.5	40.88	53.98	-13.1	Pass	-10	3
2	14742.5	48.44	53.98	-5.54	Pass	-10	3
3	16986.5	48.06	53.98	-5.92	Pass	-10	3
4	5400	49.94	53.98	-4.04	Pass	-10	3

Test Report No.: G0M-2406-2604-EF0115B-V02

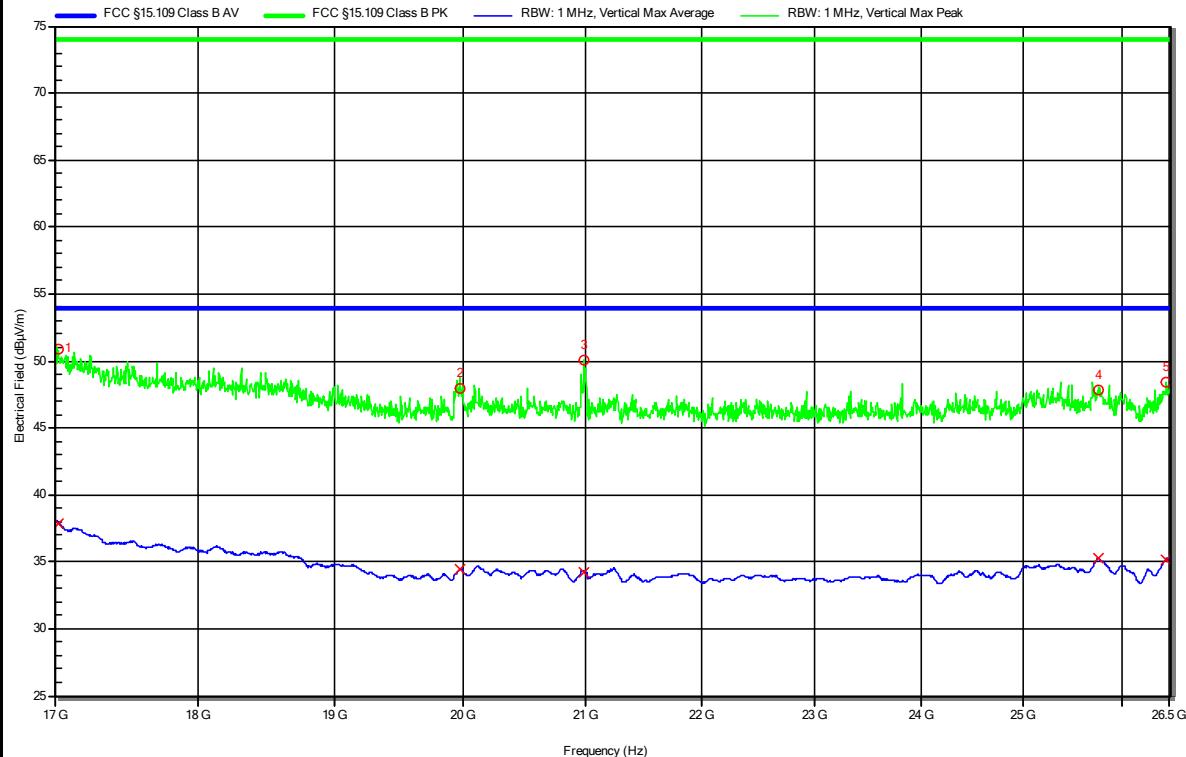
 Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated emissions according to FCC part 15B	
Project Number:	G0M-2406-2604
Applicant:	Somnium Space LTD.
Model Description:	Head-Mounted Display / VR headset
Model:	VR1
Test Sample ID:	49301
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Nasor
Test Date & Time:	2024-09-09
Operating Conditions:	ambient temperature: 24 °C power input: 120 V /60 Hz
Antenna:	Schwarzbeck BBHA 9120D, Horizontal
Measurement Distance:	3m
Operational Mode:	1
DUT Configuration:	1
Note 1:	-



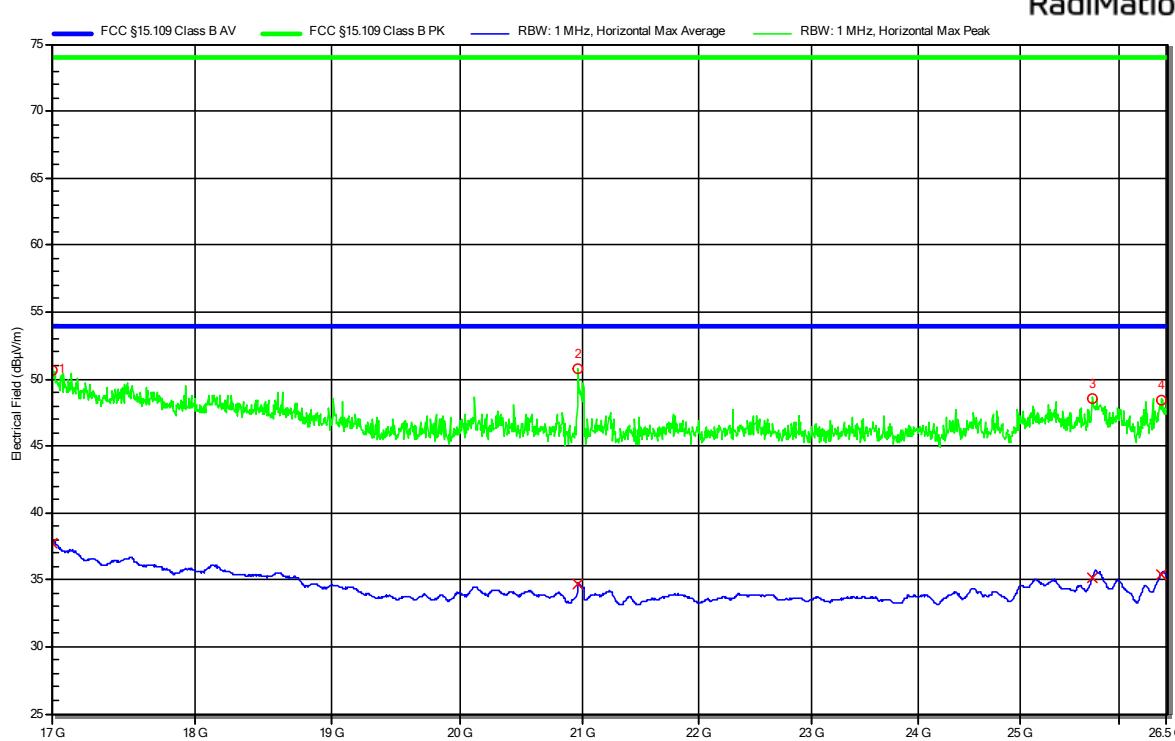
Peak Number	Frequency (MHz)	Peak (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	10500	60.03	73.98	-13.95	Pass	-10	3
2	14143	60.19	73.98	-13.79	Pass	-10	3
3	14746	61.74	73.98	-12.24	Pass	-10	3
4	15384	58.88	73.98	-15.1	Pass	-10	3
5	16983	62.23	73.98	-11.75	Pass	-10	3

Peak Number	Frequency (MHz)	Average (dB μ V/m)	Average Limit (dB μ V/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	10500	43.08	53.98	-10.9	Pass	-10	3
2	14143	46.86	53.98	-7.12	Pass	-10	3
3	14746	48.55	53.98	-5.43	Pass	-10	3
4	15384	45.06	53.98	-8.92	Pass	-10	3
5	16983	48.07	53.98	-5.91	Pass	-10	3

Radiated emissions according to FCC part 15B				
Project Number:	G0M-2406-2604			
Applicant:	Somnium Space LTD.			
Model Description:	Head-Mounted Display / VR headset			
Model:	VR1			
Test Sample ID:	49301			
Test Site:	Eurofins Product Service GmbH			
Operator:	Mr. Nasor			
Test Date & Time:	2024-09-09			
Operating Conditions:	ambient temperature: 24 °C power input: 120 V /60 Hz			
Antenna:	Amplifier Research Configurable Antenna, Vertical			
Measurement Distance:	3m			
Operational Mode:	1			
DUT Configuration:	1			
Note 1:	--			
Index 9				
RadiMation				
 <p>The graph shows the measured radiated emissions spectrum in dB_{μV/m} versus Frequency in Hz. The x-axis ranges from 17 GHz to 26.5 GHz, and the y-axis ranges from 25 to 75 dB_{μV/m}. A blue line represents the RBW: 1 MHz, Vertical Max Average, and a green line represents the RBW: 1 MHz, Vertical Max Peak. A horizontal blue line at approximately 54 dB_{μV/m} represents the FCC §15.109 Class B Average limit. A horizontal green line at approximately 73 dB_{μV/m} represents the FCC §15.109 Class B Peak limit. Several red markers with numbers (1, 2, 3, 4, 5, 6, 7, 8, 9) are placed on the green line to indicate specific measurement points or peaks. The plot shows a general downward trend of the signal power as frequency increases, with several distinct peaks and noise floor variations.</p>				
Start Frequency 17 GHz	Stop Frequency 26.5 GHz	Frequency Step Linear: 500 kHz steps	Measure Time 20 ms	RBW 1 MHz

Peak Number	Frequency (MHz)	Peak (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	17024	50.84	73.98	-23.14	Pass	0	1
2	19976.5	47.97	73.98	-26.01	Pass	0	1
3	20986.5	50.03	73.98	-23.95	Pass	0	1
4	25750.5	47.84	73.98	-26.14	Pass	0	1
5	26461.5	48.39	74.98	-26.59	Pass	0	1

Peak Number	Frequency (MHz)	Average (dB μ V/m)	Average Limit (dB μ V/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	17024	37.82	53.98	-16.16	Pass	0	1
2	19976.5	34.41	53.98	-19.57	Pass	0	1
3	20986.5	34.2	53.98	-19.78	Pass	0	1
4	25750.5	35.22	53.98	-18.76	Pass	0	1
5	26461.5	35.15	53.98	-18.83	Pass	0	1

Radiated emissions according to FCC part 15B				
Project Number:	G0M-2406-2604			
Applicant:	Somnium Space LTD.			
Model Description:	Head-Mounted Display / VR headset			
Model:	VR1			
Test Sample ID:	49301			
Test Site:	Eurofins Product Service GmbH			
Operator:	Mr. Nasor			
Test Date & Time:	2024-09-09			
Operating Conditions:	ambient temperature: 24 °C power input: 120 V /60 Hz			
Antenna:	Amplifier Research Configurable Antenna, Horizontal			
Measurement Distance:	3m			
Operational Mode:	1			
DUT Configuration:	1			
Note 1:	--			
Index 10				
RadiMation				
				
Start Frequency 17 GHz	Stop Frequency 26.5 GHz	Frequency Step Linear: 500 kHz steps	Measure Time 20 ms	RBW 1 MHz

Peak Number	Frequency (MHz)	Peak (dB μ V/m)	Peak Limit (dB μ V/m)	Peak Difference (dB)	Peak Status	Angle (degrees)	Height (m)
1	17004.5	50.7	73.98	-23.28	Pass	0	1
2	20961.5	50.77	73.98	-23.21	Pass	0	1
3	25732.5	48.59	73.98	-25.39	Pass	0	1
4	26449	48.4	73.98	-25.58	Pass	0	1

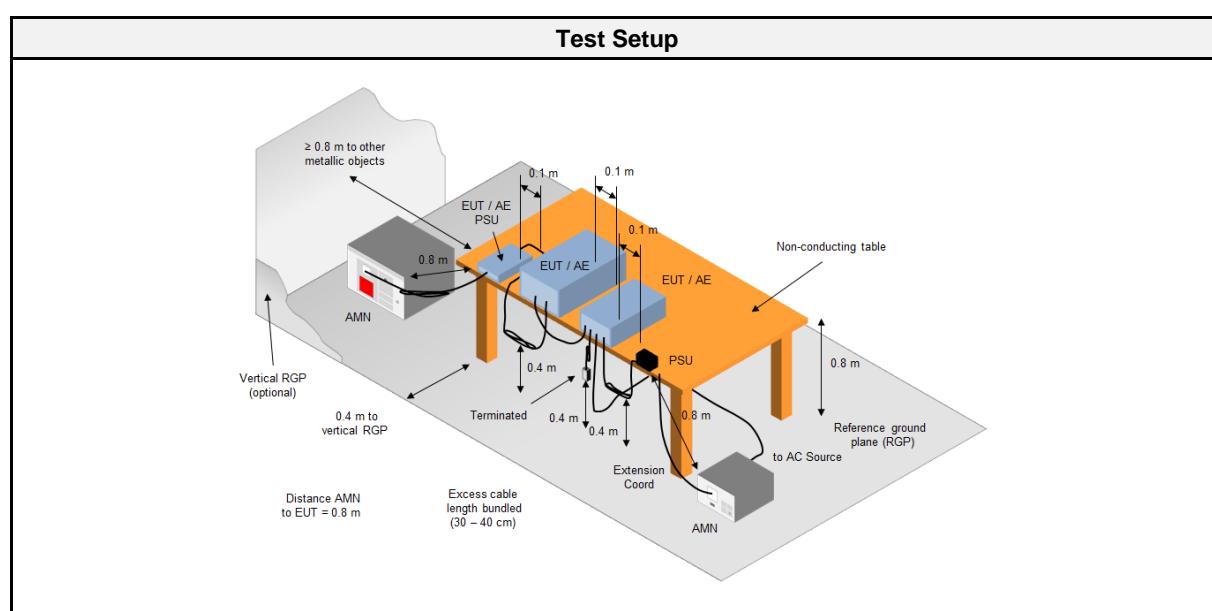
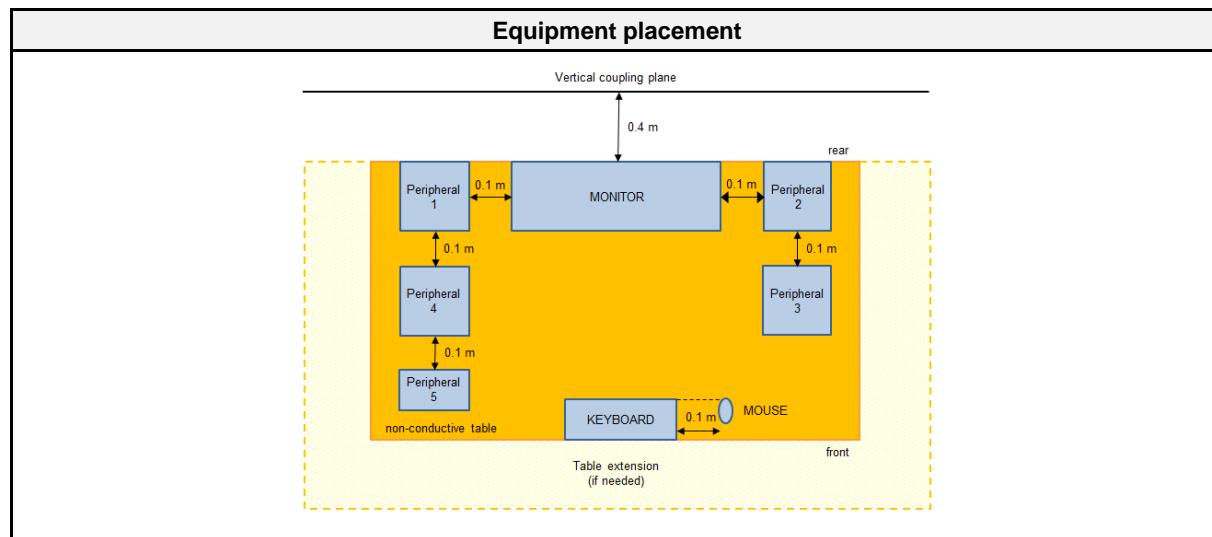
Peak Number	Frequency (MHz)	Average (dB μ V/m)	Average Limit (dB μ V/m)	Average Difference (dB)	Average Status	Angle (degrees)	Height (m)
1	17004.5	37.68	53.98	-16.3	Pass	0	1
2	20961.5	34.65	53.98	-19.33	Pass	0	1
3	25732.5	35.18	53.98	-18.8	Pass	0	1
4	26449	35.43	53.98	-18.55	Pass	0	1

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]	22 – 26
Humidity [%]	51 – 56
Operator	Mahmood Nasor
Date	2024-09-09

2.2.2 Setup Table top



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2023.2.6

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8127	EF01592	2024-07	2026-07
Pulse Limiter	Rohde & Schwarz Vertriebs GmbH	ESH3-Z2	EF01222	2023-08	2025-08
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESU26	EF00887	2024-01	2025-01
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2023-07	2027-07

2.2.4 Procedure

Exploratory measurement Table top
<ol style="list-style-type: none"> 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 Table Top
<ol style="list-style-type: none"> 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 A		
Frequency [MHz]	Quasi-peak Limit [dB μ V]	Average Limit [dB μ V]
0.15 - 0.5	79	66
0.5 - 30	73	60

Class B		
Frequency [MHz]	Quasi-peak Limit [dB μ V]	Average Limit [dB μ V]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

2.2.6 Results

AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
Power	AMN	1	1	PASS	-

2.2.7 Setup Photos

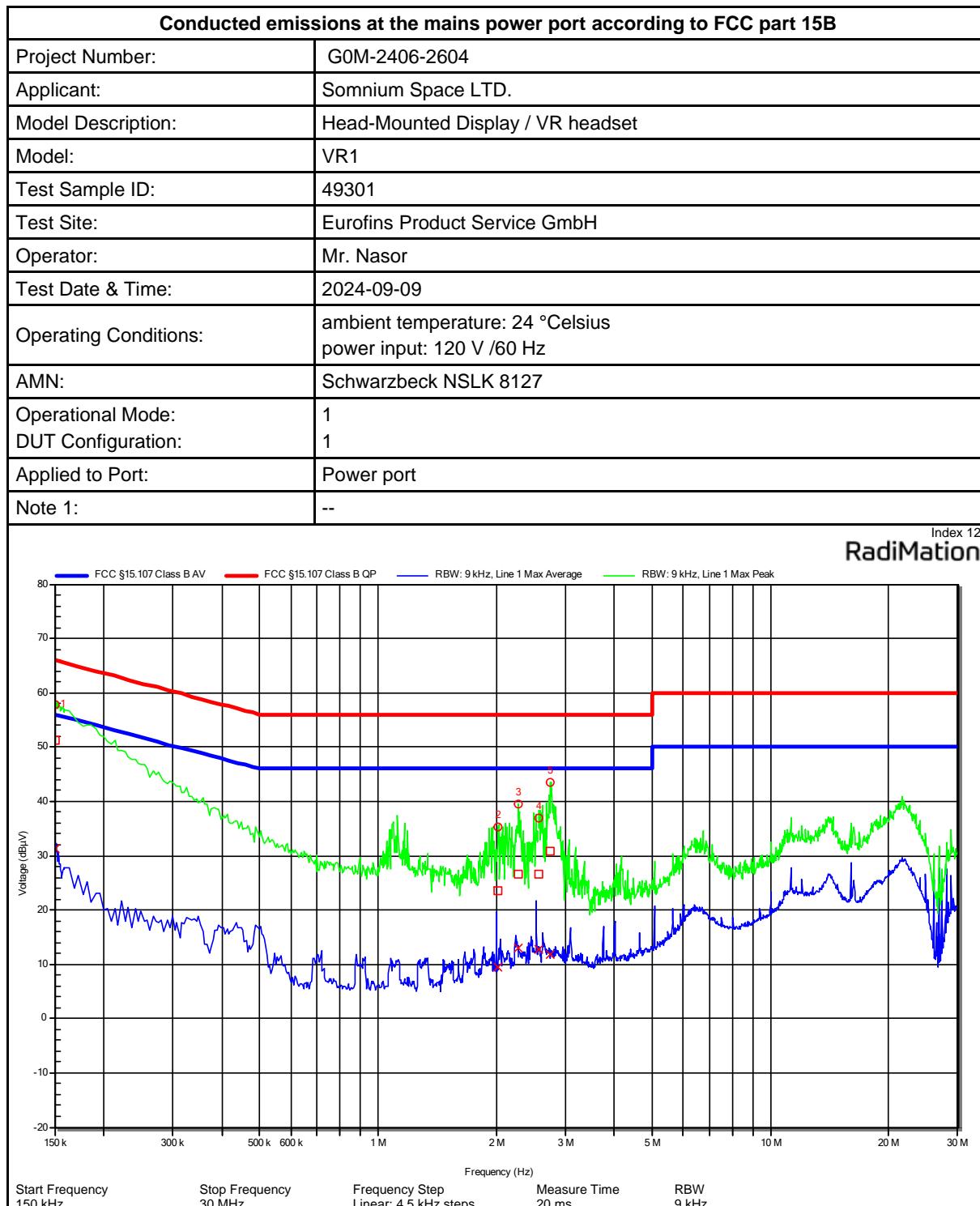


2.2.8 Records

Conducted emissions at the mains power port according to FCC part 15B	
Project Number:	G0M-2406-2604
Applicant:	Somnium Space LTD.
Model Description:	Head-Mounted Display / VR headset
Model:	VR1
Test Sample ID:	49301
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Nasor
Test Date & Time:	2024-09-09
Operating Conditions:	ambient temperature: 24 °Celsius power input: 120 V /60 Hz
AMN:	Schwarzbeck NSLK 8127
Operational Mode:	1
DUT Configuration:	1
Applied to Port:	Power port
Note 1:	--
<p>Index 11 RadiMation</p> <p>Legend: FCC §15.107 Class B AV (blue line), FCC §15.107 Class B QP (red line), RBW: 9 kHz, Neutral Max Average (blue line), RBW: 9 kHz, Neutral Max Peak (green line).</p> <p>Y-axis: Voltage (dBµV) from -20 to 80. X-axis: Frequency (Hz) from 150 kHz to 30 MHz.</p> <p>Start Frequency: 150 kHz, Stop Frequency: 30 MHz, Frequency Step: Linear: 4.5 kHz steps, Measure Time: 20 ms, RBW: 9 kHz.</p>	

Peak Number	Frequency (MHz)	Quasi-Peak (dB μ V)	Quasi-Peak Limit (dB μ V)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.15	51.33	66	-14.67	Pass	Neutral
2	1.104	26.63	56	-29.37	Pass	Neutral
3	2.599	28.91	56	-27.09	Pass	Neutral
4	2.695	29.18	56	-26.82	Pass	Neutral
5	21.894	34.75	60	-25.25	Pass	Neutral

Peak Number	Frequency (MHz)	Average (dB μ V)	Average Limit (dB μ V)	Average Difference (dB)	Average Status	LISN
1	0.15	32.09	56	-23.91	Pass	Neutral
2	1.104	9.98	46	-36.02	Pass	Neutral
3	2.599	12.08	46	-33.92	Pass	Neutral
4	2.695	12.3	46	-33.7	Pass	Neutral
5	21.894	28.89	50	-21.11	Pass	Neutral



Peak Number	Frequency (MHz)	Quasi-Peak (dB μ V)	Quasi-Peak Limit (dB μ V)	Quasi-Peak Difference (dB)	Quasi-Peak Status	LISN
1	0.15	51.18	66	-14.82	Pass	Line 1
2	2.022	23.55	56	-32.45	Pass	Line 1
3	2.27	26.66	56	-29.34	Pass	Line 1
4	2.567	26.7	56	-29.3	Pass	Line 1
5	2.75	30.83	56	-25.17	Pass	Line 1

Peak Number	Frequency (MHz)	Average (dB μ V)	Average Limit (dB μ V)	Average Difference (dB)	Average Status	LISN
1	0.15	31.28	56	-24.72	Pass	Line 1
2	2.022	9.45	46	-36.55	Pass	Line 1
3	2.27	12.89	46	-33.11	Pass	Line 1
4	2.567	12.84	46	-33.16	Pass	Line 1
5	2.75	11.77	46	-34.23	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	150 kHz to 30 MHz, 3.35 dB
Radiated Emission	30 MHz to 200 MHz @ 3 m, 5.1 dB 200 MHz to 1 GHz @ 3 m, 5.3 dB >1 GHz to 18 GHz @3 m, 5.95 dB