

	EMC TEST REPORT	
FCC 47 CFR Part 15B, ISED ICES-003 Issue 6		
Report Reference No G0M-1909-8482-EF0115B-V01		
Testing Laboratory	Eurofins Product Service GmbH	
Address	Storkower Str. 38c 15526 Reichenwalde Germany	
Accreditation	DAKKS - Registration number: D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAKKS - Registration number: D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, RegNo.: 96970	
Applicant	ACL GmbH	
Address	Apelsteinallee 5 04416 Markkleeberg GERMANY	
Test Specification		
Standard	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014	
Non-Standard Test Method	None	
Equipment under Test (EUT):	•	
Product Description	display to be used in the medical/hospital environment	
Model(s)	OR-MD® 15	
Additional Model(s)	None	
Brand Name(s)	OR-MD (Trademark registration No.: 014037527)	
Hardware Version(s)	no hardware versions established for this product, hardware configuration #1516419004708	
Software Version(s)	device without software, software on accessories shall not be part of this test	
FCC-ID	2AUWB1	
IC	-/-	
Test Result	PASSED	

Test Report No.: G0M-1909-8482-EF0115B-V01



Possible test case verdicts:		***************************************			
required by standard but not tested		N/T			
not required by standard		N/R	N/R		
required by standard but not appl. to te	st object	N/A			
test object does meet the requirement		P(PASS)			
test object does not meet the requirement	ent	F(FAIL)			
Testing:					
Date of receipt of test item	- M.S LOCAL - G S S S S S S S.	2019-09-26			
Report:					
Compiled by	Stephan Liebich	h			
Tested by (+ signature) (Responsible for Test)	Stephan Liebich		Her les / Had		
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	t	7-1-1		
Date of Issue	2019-10-25				
Total number of pages	36		-		
General Remarks:					
The test results presented in this re The results contained in this report the responsibility of the manufactur requirements detailed within this re This report shall not be reproduced, ex	reflect the results f er to ensure that al port.	or this particu I production m	lar model and serial number. It is nodels meet the intent of the		
Additional Comments:					



# **ABBREVIATIONS AND ACRONYMS**

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



# **VERSION HISTORY**

		Version History	
Version	Issue Date	Remarks	Revised By
01	2019-10-25	Initial Release	



# **REPORT INDEX**

1	Equipment (Test Item) Under Test	6
1.1	Equipment Ports	
1.2	Equipment Photos - Internal	8
1.3	Equipment Photos - External	
1.4	Support Equipment	16
1.5	Operational Modes	16
1.6	EUT Configuration	16
1.7	Sample emission level calculation	
2	Result Summary	18
2.1	Test Conditions and Results - Radiated emissions acc. to ANSI C63.4	19
22	Test Conditions and Results - Conducted emissions acc. to ANSI C63.4	32



# 1 Equipment (Test Item) Under Test

Description	display to be used in the medical/hospital environment		
Model	OR-MD® 15		
Additional Model(s)	None		
Brand Name(s)	OR-MD (Trademark re	egistration No.: 014037527)	
Serial Number(s)	1516419004708		
Hardware Version(s)	no hardware versions configuration #15164	established for this product, hardware 19004708	
Software Version(s)	device without softwar of this test	re, software on accessories shall not be part	
FCC-ID	2AUWB1		
IC	-/-		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	5400		
Radio Module	None		
Supply Voltage	V <sub>NOM</sub> 1	120 V / 60 Hz	
AC/DC-Adaptor	None		
Manufacturer	ACL GmbH Apelsteinallee 5 04416 Markkleeberg GERMANY		

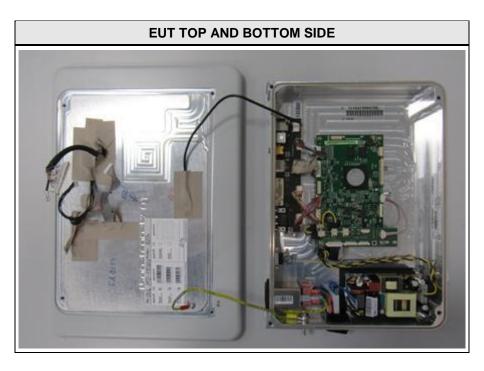


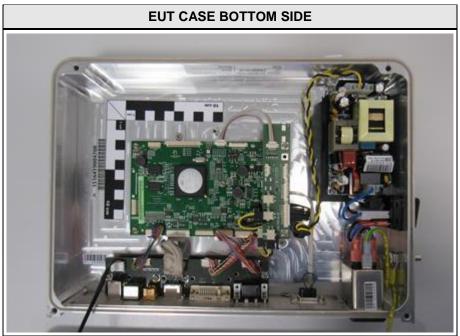
# 1.1 Equipment Ports

Name	Туре	Attributes		Comment
POWER	AC	Count: Direction: Service only:	1 In No	-
Composite	Ю	Count: Direction: Service only:	1 In No	-
S-Video	Ю	Count: Direction: Service only:	1 In No	-
DVI	Ю	Count: Direction: Service only:	1 In/Out No	-
VGA	Ю	Count: Direction: Service only:	1 In No	-
DP	Ю	Count: Direction: Service only:	1 In/Out No	-
USB	Ю	Count: Direction: Service only:	1 Out No	-
RS232	Ю	Count: Direction: Service only:	1 In/Out Yes	-
Description:				
AC	AC mains power input/output port			
DC	DC power input/output port			
BAT	DC power input port connected to external battery			
Ю	Input/Output port			
TP	Telecommunication port			
NE	Non-electrical port			

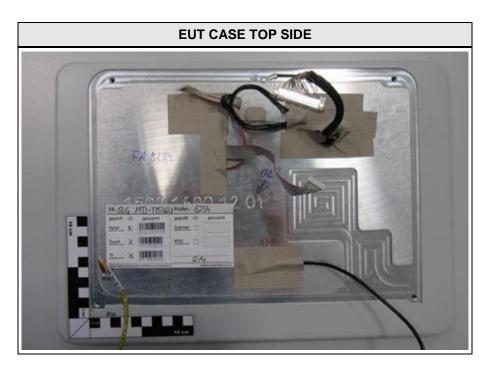


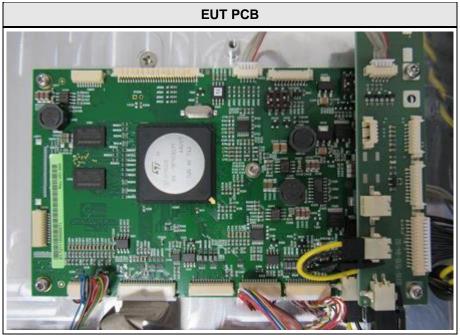
# 1.2 Equipment Photos - Internal



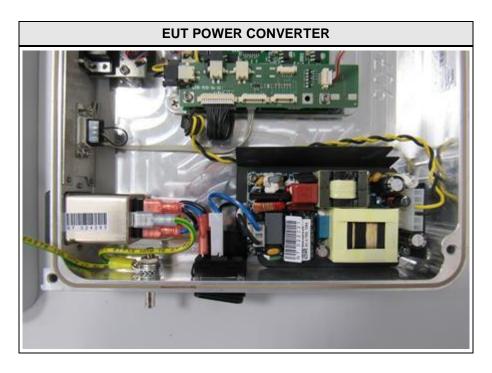


















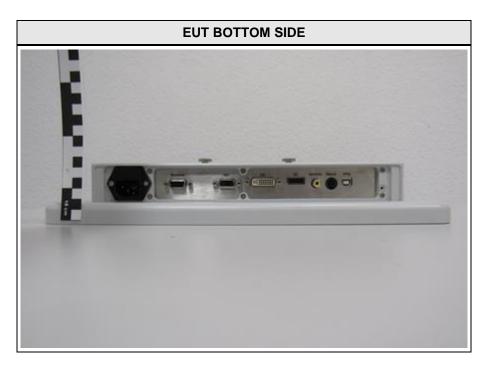


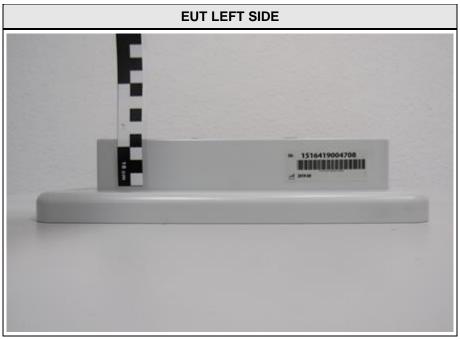
# 1.3 Equipment Photos - External





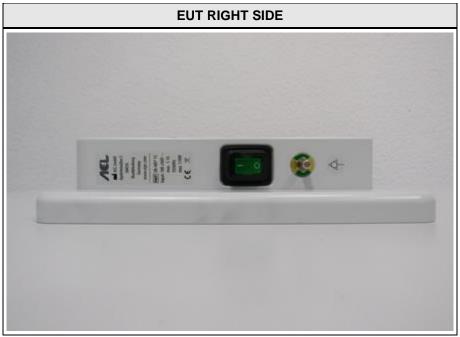




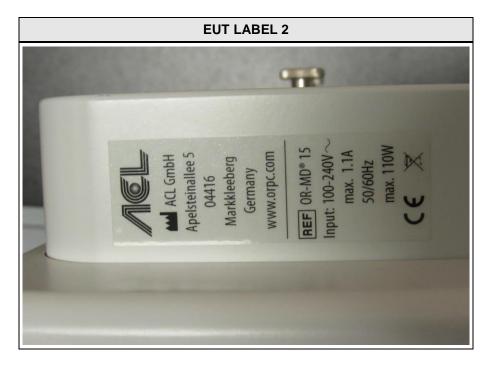


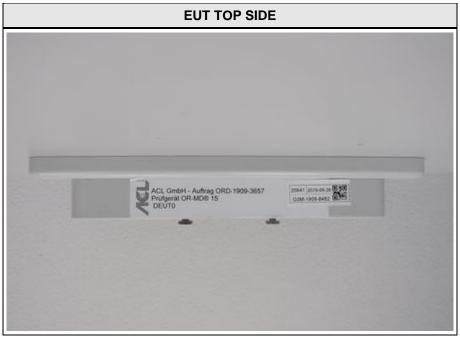














# 1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
SIM	Software	tsato	v0.1	ITU-R BT.1729 Colour Bar with Moving Element
CBL	power cable US	Micro Accessories Germany GmbH	CB-N-USHG	NEMA 5-15P to C13, 2m
CBL	signal cable composite	INTOS ELECTRONIC AG	89802P	Cinch to Cinch, 2m
CBL	signal cable S- Video	INTOS ELECTRONIC AG	89950P	S-Video to S- Video,2m
CBL	signal cable DVI	StarTech.com Ltd.	DVIDDMM6	DVI-D to DVI-D, 1.8m
CBL	signal cable VGA	StarTech.com Ltd.	MXTMMHQ2M	VGA to VGA, 2m
CBL	USB cable	StarTech.com Ltd.	USBHAB6	USB A to USB B, 1.8m
CBL	DP cable	StarTech.com Ltd.	DISPL2M	DP to DP, 2m
SIM	OR-PC	ACL GmbH	OR-PC® OD	signal source
AE	ground connector interface	ACL GmbH	-	-
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:			_	

# 1.5 Operational Modes

Mode #	Description
1	A motion picture (ITU-R BT.1729 Colour Bar with Moving Element) program is carried out via OR-PC and Displayed via EUT with maximum hardware acceleration and 1920x1080 screen resolution.
Comment:	

# 1.6 EUT Configuration

Configuration #	Description
1	EUT is powered up and powered with 120 V / 60 Hz.  EUT is connected with ground connector interface via signal cable composite, signal cable S-Video, signal cable DVI and signal cable VGA.  EUT is connected with OR-PC via DP and USB cable.  EUT, ground connector interface and OR-PC are grounded.  OR-PC are powered with 120 V / 60 Hz.
Comment:	
Horizontel position of the	EUT is the worst case



### 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  $dB\mu V/m$ ). 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  $dB\mu V/m$ :

Limit (dB $\mu$ V/m) = 20\*log ( $\mu$ 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 $\mu$ V + 26 dB/m = 47.5 dB $\mu$ V/m : 47.5 dB $\mu$ V/m - 57.0 dB $\mu$ V/m = -9.5 dB



# 2 Result Summary

	FCC 47 CFR Part 15B, ISE	D ICES-003 Issue 6		
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 8, 6.1	Radiated emissions	ANSI C63.4:2014	PASS	1
FCC 15.107 ICES-003, 8, 6.2 AC power line conducted emissions ANSI C63.4:2014 PASS -				
Comment:  1 → The test data of the worst-case conditions were recorded and shown on the next pages.				

	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

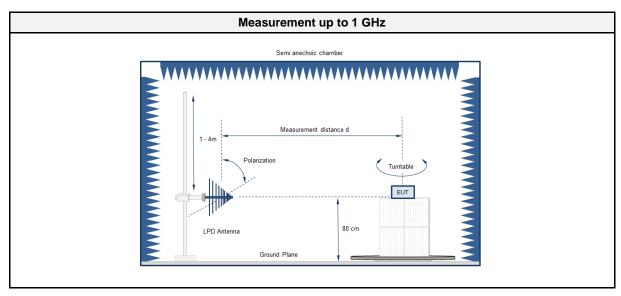


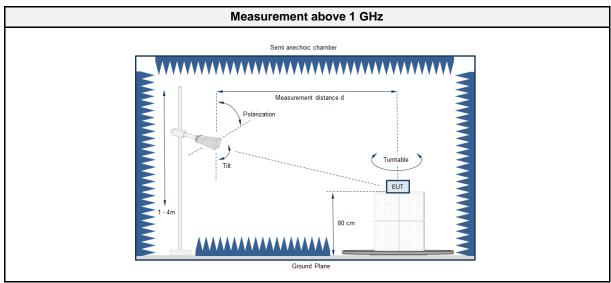
## 2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

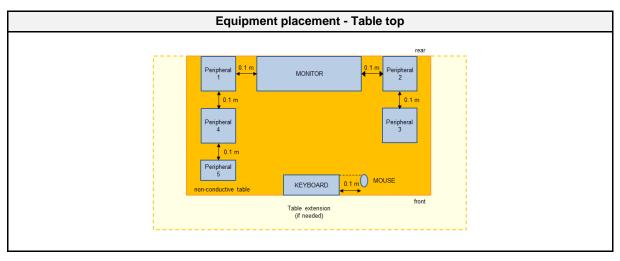
## 2.1.1 Information

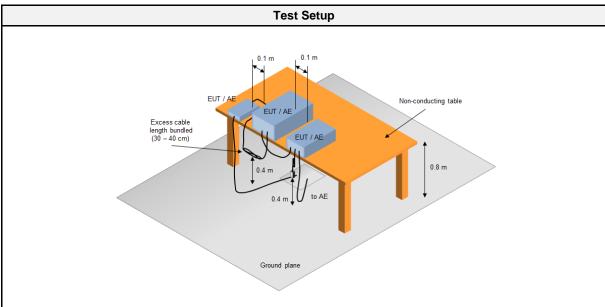
Test Information			
Reference	FCC 15.109, ICES-003, 8, 6.1		
Reference method	ANSI C63.4:2014 Section 8		
Equipment class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	5400		
Measurement range	30 MHz to 27000 MHz		
Temperature [°C]	23		
Humidity [%]	50		
Operator	Stephan Liebich		
Date	2019-10-01		

# 2.1.2 Setup









# 2.1.3 Equipment

Test Software					
Description Manufacturer Name Version					
EMC Software DARE Instruments Radimation 2016.1.10					

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	R&S	ESU8	EF00379	2019-07	2020-07
40GHz Standard Gain Horn with Amplifier	Flann Microwave Ltd	22240-25 Amp. CBL26402075	EF00301	2016-11	2019-11
Spectrum analyzer	Rohde & Schwarz Vertriebs GmbH	FSW43	EF00896	2019-07	2020-07
40GHz High Gain Antenna	Amplifier Research	AT4560	EF00302	2019-05	2020-05
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Horn antenna	Schwarzbeck	BBHA 9120D (1-18GHz)	EF00018	2019-10	2021-10

Test Report No.: G0M-1909-8482-EF0115B-V01



Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2019-05	2020-05
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### 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 1.3

### **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			

	Class A @ 10 m				
Frequency [MHz]	Detector	Limit [dBµV/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

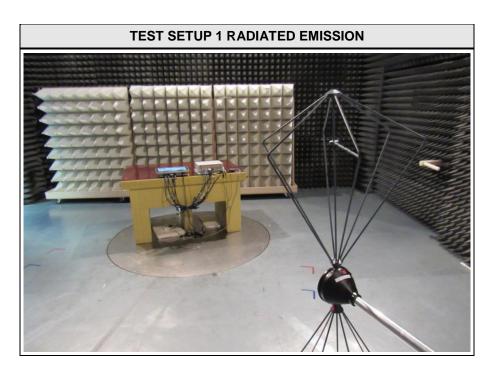
Test Results					
Operational mode EUT Configuration Verdict Remark					
1	1	PASS	1		

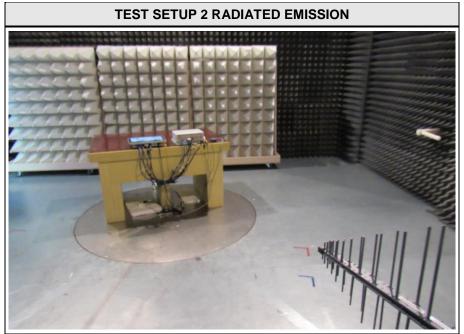
#### Comment

<sup>1 →</sup> The test data of the worst-case conditions from 30 MHz to 8 GHz were recorded and shown on the next pages. Above 8 GHz were no relevant peaks detected with Spectrum analyzer.

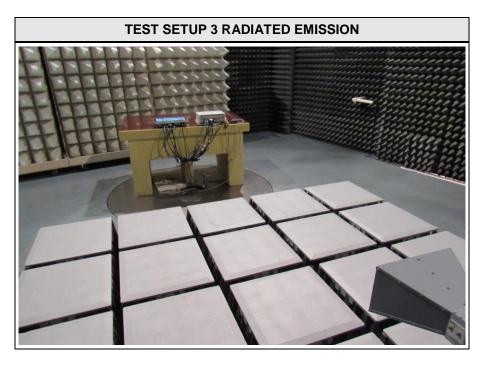


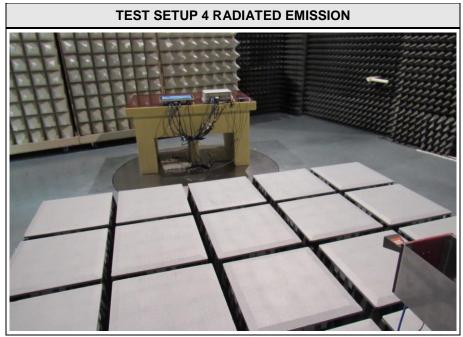
# 2.1.7 Setup Photos



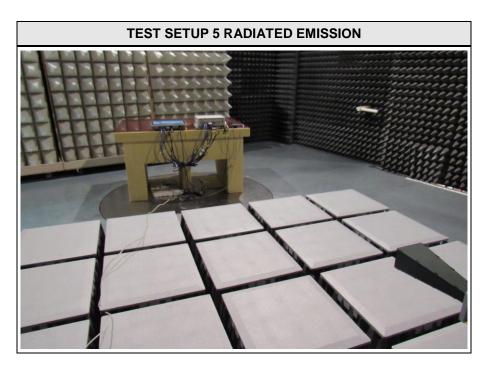


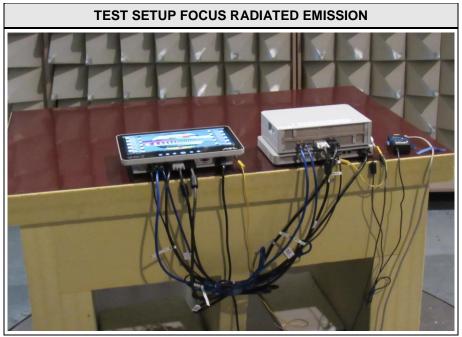














### 2.1.8 Records

## Radiated emissions according to FCC part 15B

Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

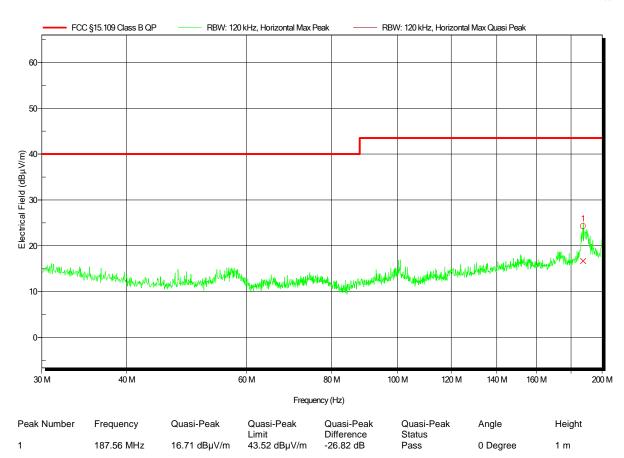
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HK 116, Horizontal

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:





Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

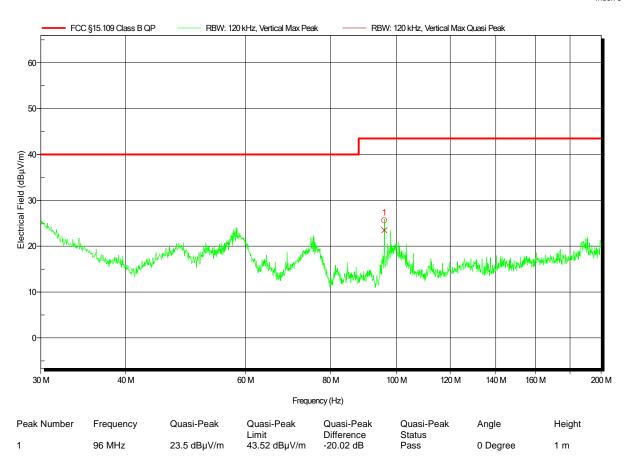
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz Antenna: Rohde & Schwarz HK 116, Vertical

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:





Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

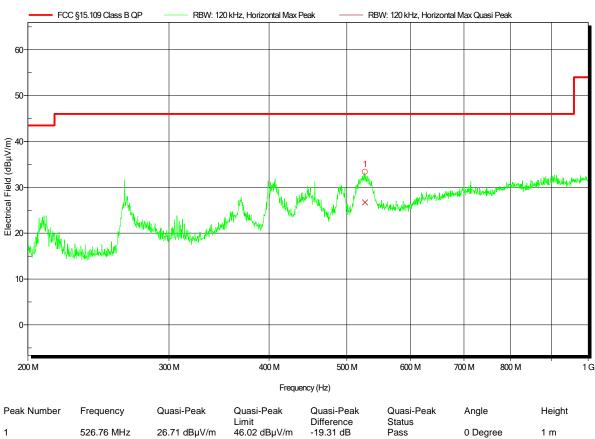
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HL 223, Horizontal

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:





Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

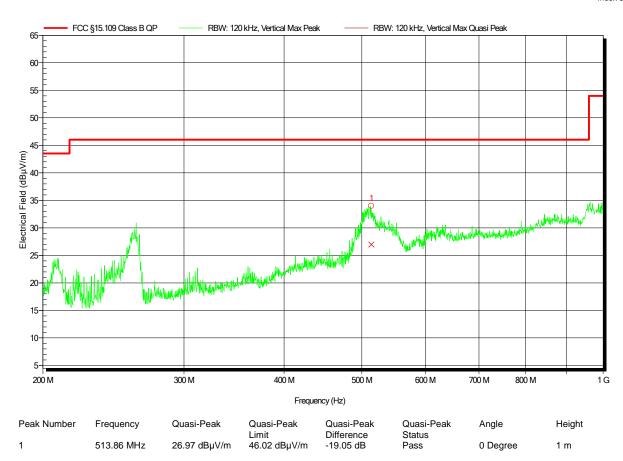
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
Antenna: Rohde & Schwarz HL 223, Vertical

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:





Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

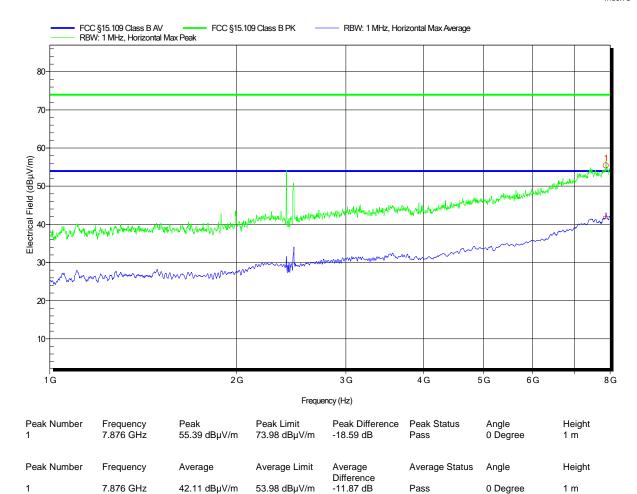
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz
Antenna: Schwarzbeck BBHA 9120D, Horizontal

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:





Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

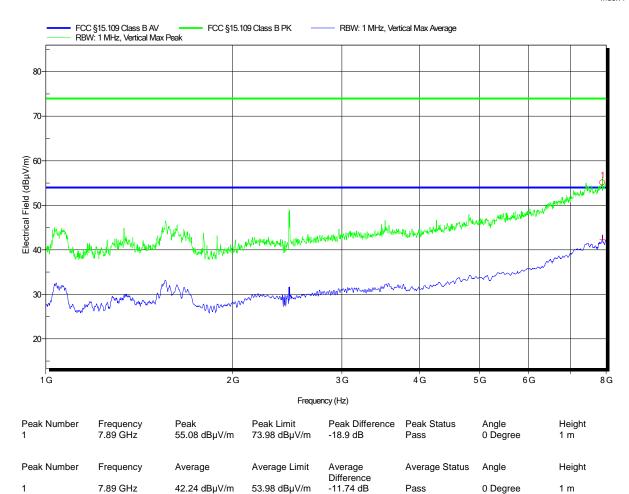
Operator: Mr. Liebich

Test Conditions: Tnom: 23°C, Unom: 120 V / 60 Hz Antenna: Schwarzbeck BBHA 9120D, Vertical

Measurement distance: 3m Mode: 1

Test Date: 2019-10-01

Note:



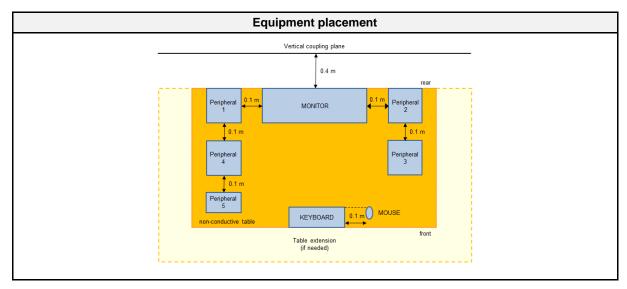


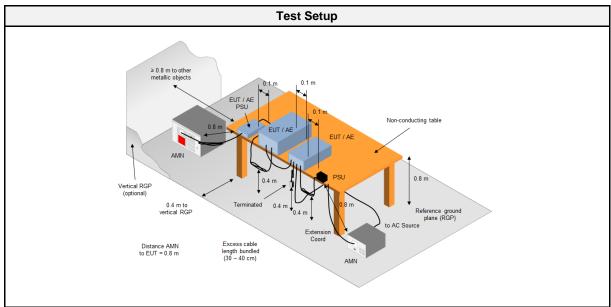
## 2.2 Test Conditions and Results - Conducted emissions acc. to ANSI C63.4

## 2.2.1 Information

Test Information			
Reference	FCC 15.107, ICES-003, 8, 6.2		
Reference method ANSI C63.4:2014 Section 12			
Measurement range	150 kHz to 30 MHz		
Equipment class	Class B		
Equipment type	pment type Table top		
Temperature [°C]	22		
Humidity [%]	48		
Operator	Stephan Liebich		
Date	2019-10-01		

## 2.2.2 Setup







### 2.2.3 Equipment

Test Software						
Description Manufacturer Name Version						
EMC Software	EMC Software DARE Instruments Radimation 2016.1.10					

Test Equipment						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
AMN	R&S	ESH2-Z5	EF00182	2019-02	2021-02	
AMN	R&S	ESH3-Z5	EF00036	2019-07	2021-07	
Pulse Limiter	R&S	ESH3-Z2	EF01063	2019-07	2020-07	
CDN	MEB Messelektronik Berlin GmbH	M1-801/6	EF01207	2019-07	2020-07	
EMI Test Receiver	R&S	ESR 7	EF00943	2019-07	2020-07	
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2019-05	2020-05	

#### 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 1.3

### **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 [dΒμV]	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						



## 2.2.6 Results

AC power line conducted emissions						
Port Coupling Operational EUT Verdict Remark						
POWER	AMN	1	1	PASS	-	

# 2.2.7 Setup Photos





### 2.2.8 Records

## EMI voltage test in the ac-mains according to FCC part 15B

Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

Operator: Mr. Liebich

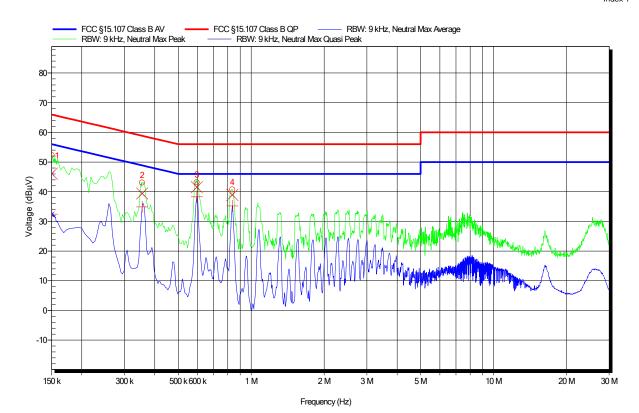
Test Conditions: Tnom: 22°C, Unom: 120 V / 60 Hz

LISN: ESH3-Z5 (N)

Mode: 1

Test Date: 2019-10-01

Note:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	150.45 kHz	46.1 dBμV	65.98 dBµV	-19.88 dB	Pass
2	354.75 kHz	39.4 dBμV	58.85 dBµV	-19.45 dB	Pass
3	596.4 kHz	41.53 dBμV	56 dBµV	-14.47 dB	Pass
4	836.25 kHz	38.9 dBμV	56 dBµV	-17.1 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status Pass Pass Pass Pass Pass
1	150.45 kHz	32.46 dBμV	55.98 dBµV	-23.52 dB	
2	354.75 kHz	34.87 dBμV	48.85 dBµV	-13.98 dB	
3	596.4 kHz	38.26 dBμV	46 dBµV	-7.74 dB	
4	836.25 kHz	35.17 dBμV	46 dBµV	-10.83 dB	



## EMI voltage test in the ac-mains according to FCC part 15B

Project number: G0M-1909-8482

Applicant: ACL GmbH

EUT Name: display to be used in the medical/hospital environment

Model: OR-MD® 15

Test Site: Eurofins Product Service GmbH

Operator: Mr. Liebich

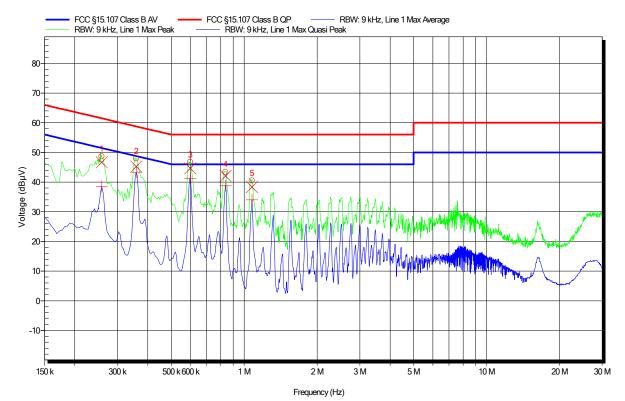
Test Conditions: Tnom: 22°C, Unom: 120 V / 60 Hz

LISN: ESH3-Z5 (L)

Mode: 1

Test Date: 2019-10-01

Note:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	258 kHz	46.71 dBµV	61.5 dBµV	-14.79 dB	Pass
2	358.35 kHz	45.24 dBµV	58.77 dΒμV	-13.53 dB	Pass
3	598.65 kHz	44.64 dBµV	56 dBµV	-11.36 dB	Pass
4	837.15 kHz	42.03 dBµV	56 dBµV	-13.97 dB	Pass
5	1.077 MHz	38.31 dBµV	56 dBµV	-17.69 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	258 kHz	38.55 dBµV	51.5 dBµV	-12.95 dB	Pass
2	358.35 kHz	43.32 dBµV	48.77 dΒμV	-5.45 dB	Pass
3	598.65 kHz	41.12 dBµV	46 dBµV	-4.88 dB	Pass
4	837.15 kHz	38.74 dBµV	46 dBµV	-7.26 dB	Pass
5	1.077 MHz	34.01 dBµV	46 dBµV	-11.99 dB	Pass