

EMC TEST REPORT

FCC 47 CFR Part 15B Industry Canada ICES-003

Electromagnetic compatibility - Unintentional radiators

Testing Laboratory: Eurofins Product Service GmbH

Address: Storkower Str. 38c

15526 Reichenwalde

Germany

Accreditation:





A2LA Accredited Testing Laboratory, Certificate No.: 1983.01

FCC Filed Test Laboratory, Reg.-No.: 96970 IC OATS Filing assigned code: 3470A

Applicant's name: Liftup A/S

Address: Hagensvej 21

DK-9530 Støvring

DENMARK

Test specification:

Standard.....: 47 CFR Part 15 Subpart B

ICES-003, Issue 6:2016

ANSI C63.4:2014

Equipment under test (EUT):

Product description Mobile lifting chair

Model No. 103950

Additional Models None

Hardware version B

Firmware / Software version 1.4

FCC-ID: 2AK8H-RAIZER1 IC: 22516-RAIZER1

Test result Passed



-					
Poss	ible	test	case	verd	icts:

- not applicable 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 2017-03-27

Compiled by: Matthias Handrik

Tested by (+ signature).....: Matthias Handrik

Approved by (+ signature):

Jens Marquardt

Deputy Head of Lab

Date of issue 2017-04-07

Total number of pages: 33

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:



Version History

Version	Issue Date	Remarks	Revised by
V01	2017-04-07	Initial Release	



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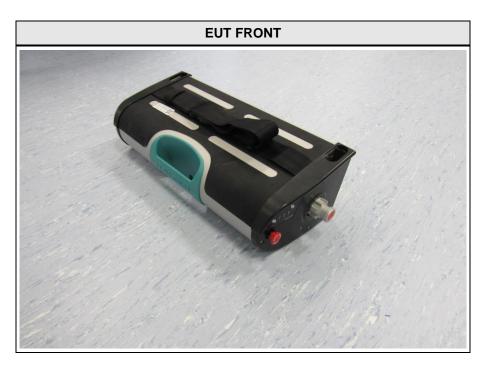


1 Equipment (Test item) Description

Description	Mobile lifting chair
Model	103950
Additional Models	None
Serial number	None
Hardware version	В
Software / Firmware version	1.4
Contains FCC-ID	N/A
Contains IC	N/A
Power supply	13.3 VDC / 120V AC
AC/DC-Adaptor	Model: 102921 Manufacturer: liftup Input: 100-240VAC / 50-60Hz Output: 14.6VDC / 0.9A
Manufacturer	Liftup A/S Hagensvej 21 DK- 9530 Støvring DENMARK
Highest emission frequency	> 1000 MHz (up to 5th Harm)
Device classification	Class B
Equipment type	Tabletop
Number of tested samples	1



1.1 Photos – Equipment external

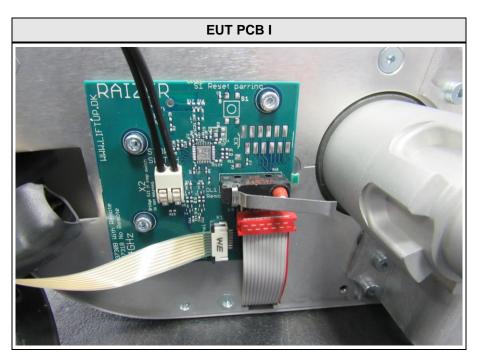


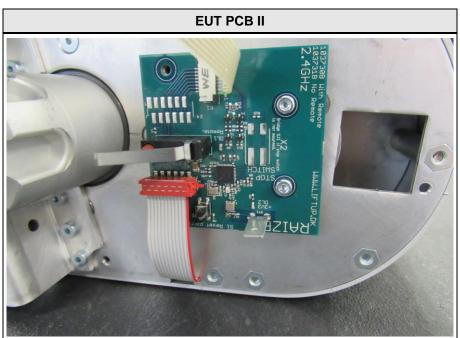






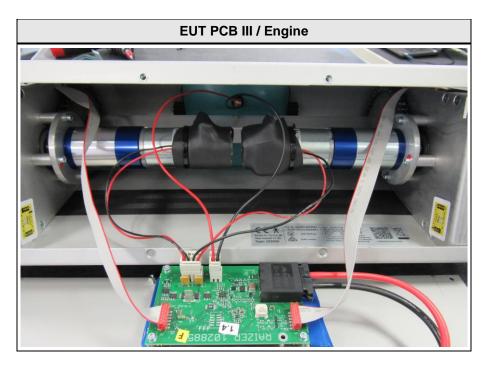
1.2 Photos – Equipment internal

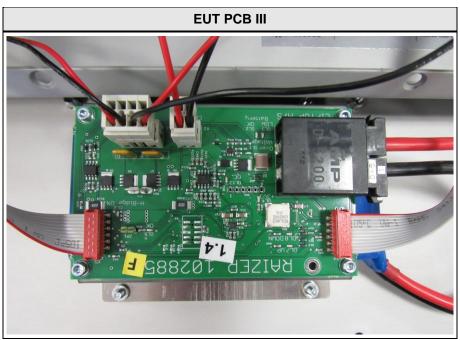






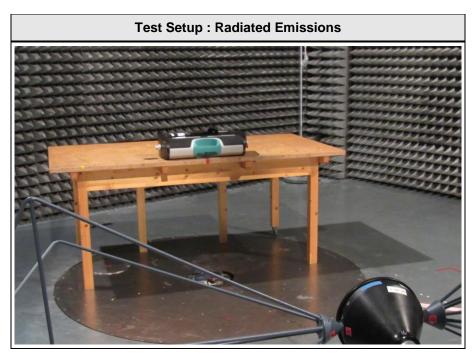
Product Service

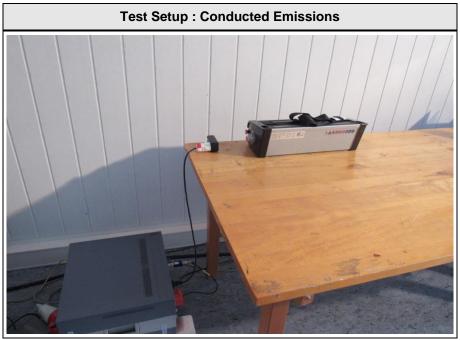






1.3 Photos - Test setup







1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments (e.g. serial no.)
AE	Remote control	liftup	104016	

*Note: Use the following abbreviations:

AE: Auxiliary/Associated Equipment, or SIM: Simulator (Not Subjected to Test)

CABL: Connecting cables

1.5 Input / Output Ports

Port #	Name	Type*	Max. Cable Length	Cable Shielded	Comments (e.g. Cat. of Cable)
1	power	AC	unspecified	unspecified	

*Note: Use the following abbreviations:

AC : AC power port
DC : DC power port
N/E : Non electrical

I/O : Signal input or output port
TP : Telecommunication port



1.6 Operating Modes and Configurations

Mode #	Description
1	EUT lift up/down via remote control
2	charging

Configuration #	EUT Configuration
1	EUT placed in measurement chamber powered up, remote control is placed in the corner of the measurement chamber by pressing permanently button.
2	EUT placed in measurement chamber and direct connected to AC/DC adaptor



1.7 Test Equipment Used During Testing

	Measurement	Software	
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2016.1.10

		Conducted emis	ssions SR1		
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	R&S	ESH2-Z5	EF00182	2017-01	2019-01
AMN	R&S	ESH3-Z5	EF00036	2017-01	2019-01
EMI Test Receiver	R&S	ESR7	EF00943	2016-10	2017-10
Cable	-	RG223/U	-	System Cal.	System Cal.

		Radiated emiss	sions AC1		
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Biconical Antenna	R&S	HK 116	EF00030	2016-04	2019-04
LPD Antenna	R&S	HL 223	EF00187	2016-05	2019-05
Horn antenna	Schwarzbeck	BBHA 9120D	EF00018	2016-09	2019-09
MXE EMI Receiver	Keysight Technologies	N9038A- 526/WXP	EF01070	2016-08	2017-08
RF Cable			-	System Cal.	System Cal
RF Cable			-	System Cal.	System Cal



1.8 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 analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer 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 analyzer. 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 Analyzer ($dB\mu V$) + A.F. (dB) = Net field strength ($dB\mu V/m$)

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 $dB\mu V/m$:

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 μ V + 26 dB = 47.5 dB μ V/m : 47.5 dB μ V/m - 57.0 dB μ V/m = -9.5 dB



2 Result Summary

Requirement – Test	Reference Method	Result	Remarks
Radiated emissions	ANSI C 63.4	PASS	
AC power line conducted emissions	ANSI C63.4	PASS	
	Radiated emissions	Radiated emissions ANSI C 63.4	Radiated emissions ANSI C 63.4 PASS



3 Test Conditions and Results

3.1 Test Conditions and Results - Radiated emissions

Radiated emission	ons acc. FCC 47 C	/ ICES-003		Verdict:	PASS			
Laboratory	Parameters:	Requir	ed prior to the test	During the test				
Ambient T	emperature	15 to 35 °C 26°C			26°C			
Relative	Humidity		30 to 60 %		25%			
Test accordi	ng referenced		Reference	e Metho	d			
stan	dards		ANSI	C63.4				
Sample is tested	with respect to the		Equipmo	ent class				
requirements of the	ne equipment class		Cla	ss B				
Test frequency ran	ge determined from		Highest emiss	sion freq	uency			
highest emiss	sion frequency	> 1000 MHz (up to 5th Harm)						
Fully configured sample scanned over		Frequency range						
the following frequency range		30 MHz to 13 GHz						
Operati	ng mode	1/2						
Config	juration	1/2						
	L	imits and	results Class B					
Frequency [MHz]	Quasi-Peak [dBµV/r	m] Result	Average [dBµV/m]	Result	Peak [dBµV/m]	Result		
30 – 88	40	PASS	-		-	-		
88 – 216	43.5	PASS	-		-	-		
216 – 960	46	PASS	-		-	-		
960 – 1000	54	PASS	-		-	-		
> 1000	-	-	54	PASS	74	PASS		
Comments:		<u> </u>		•		•		



Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC. The measurement procedure is as follows:

Exploratory measurement:

- The EUT was placed on a non-conductive table at a height of 0.8m.
- The EUT and support equipment, if needed, were set up to simulate typical usage.
- 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.
- The antenna was placed at a distance of 3 or 10 m.
- The received signal was monitored at the measurement receiver.
 - Cables not bundled were manipulated within the range of likely arrangements to produce the highest emission amplitude
 - To maximize the suspected emissions the EUT is rotated 360 degrees. If the signal exceeds the previous amplitude, go back to the corresponding azimuth and manipulate the cables again for maximizing the emissions if possible.
 - Move the antenna from 1 to 4m to maximize the suspected highest amplitude signal.
- This procedure has to be performed in both antenna polarizations, horizontal and vertical.
- The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3.

Final measurement:

- 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
- 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
- The EUT and cable arrangement were based on the exploratory measurement results
- Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
- The test data of the worst-case conditions were recorded and shown on the next pages.



Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

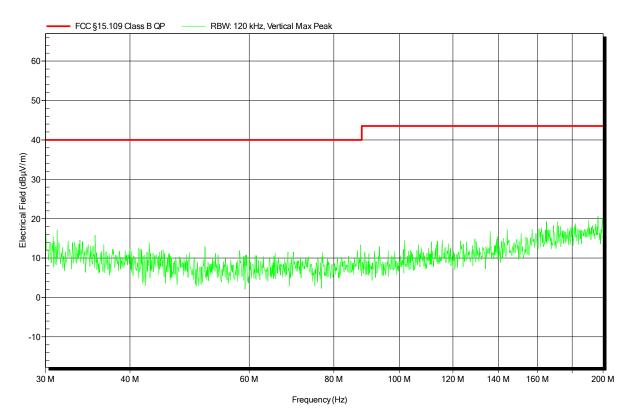
Test Site: Eurofins Product Service GmbH

Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery Antenna: Rohde & Schwarz HK 116, Vertical

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:





Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

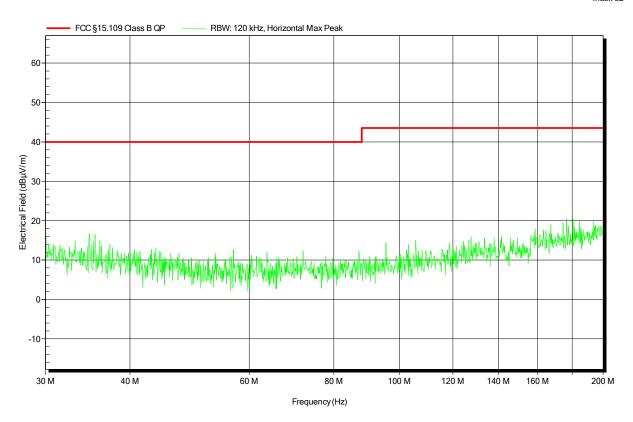
Test Site: Eurofins Product Service GmbH

Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery Antenna: Rohde & Schwarz HK 116, Horizontal

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:





Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

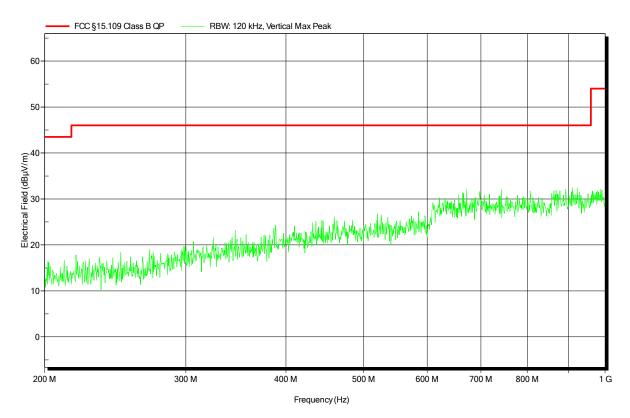
Test Site: Eurofins Product Service GmbH

Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery Antenna: Rohde & Schwarz HL 223, Vertical

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:





Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

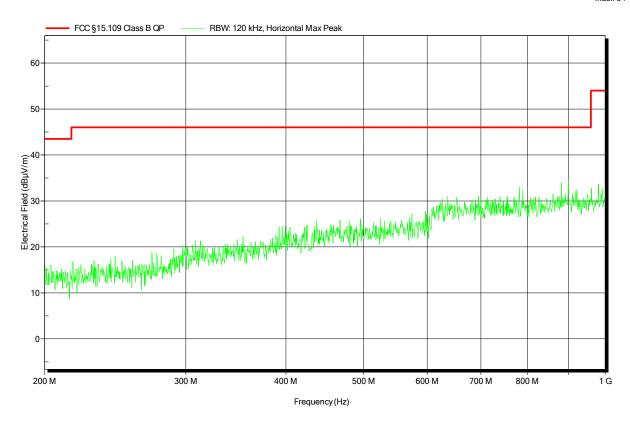
Test Site: Eurofins Product Service GmbH

Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery
Antenna: Rohde & Schwarz HL 223, Horizontal

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:





Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

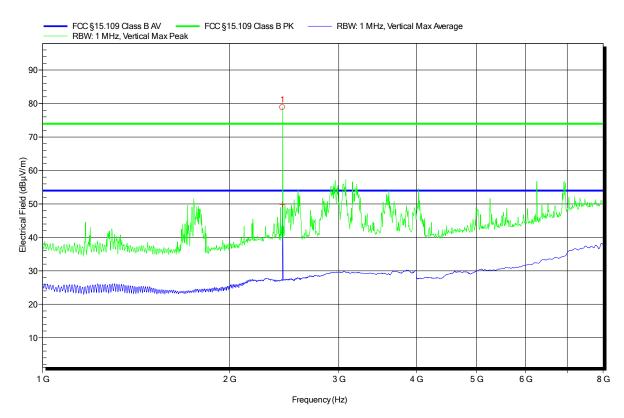
Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery
Antenna: Schwarzbeck BBHA 9120D, Vertical

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:

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 Peak Number
 Frequency
 Average
 Average Limit
 Average Difference
 Average Status
 Angle
 Height

 1
 2.435 GHz
 carrier



Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

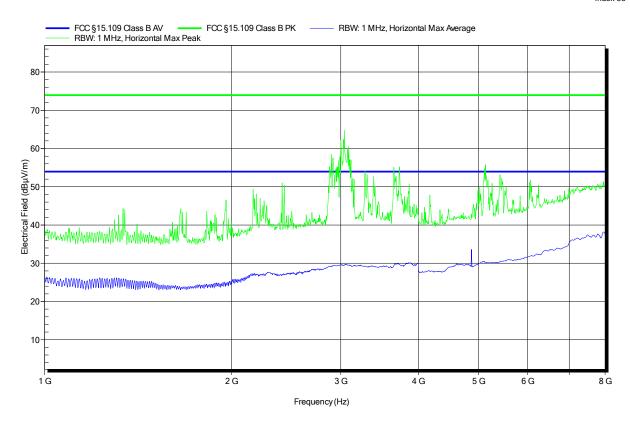
Test Site: Eurofins Product Service GmbH

Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 12.0 V battery Antenna: Schwarzbeck BBHA 9120D, Horizontal

Measurement distance: 3m Mode: Mode# 1 Test Date: 2017-04-06

Note:





Spurious emissions according to FCC Part 15b

Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

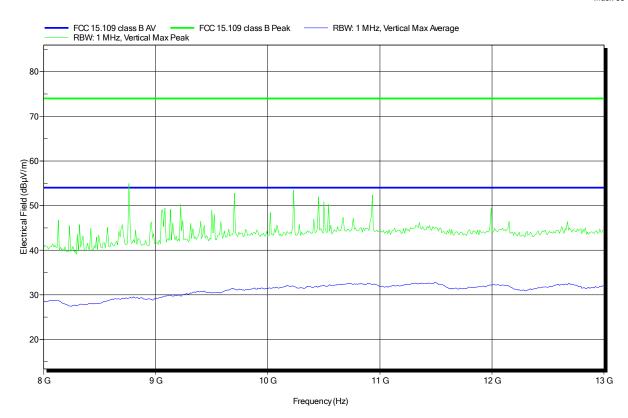
Operator: Mr. Handrik

Test Conditions: Tnom: 25°C, Vnom: 12.0 V battery Antenna: Schwarzbeck BBHA 9120D, Vertical

Measurement distance: 1 m corrected to 3 m

Mode: Mode# 1
Test Date: 2017-04-06

Note:





Spurious emissions according to FCC Part 15b

Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

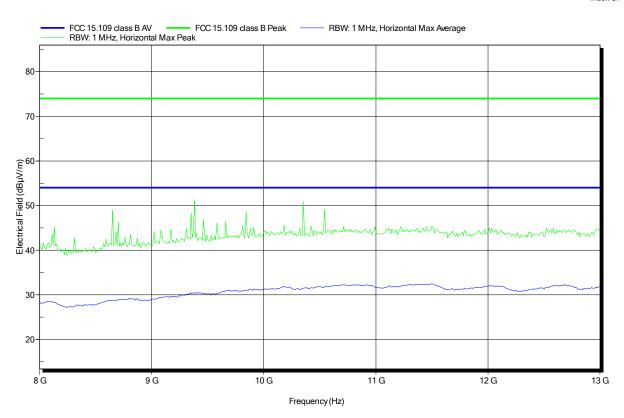
Operator: Mr. Handrik

Test Conditions: Tnom: 25°C, Vnom: 12.0 V battery Antenna: Schwarzbeck BBHA 9120D, Horizontal

Measurement distance: 1 m corrected to 3m

Mode: Mode# 1
Test Date: 2017-04-06

Note:





Project number: G0M-1703-6390

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

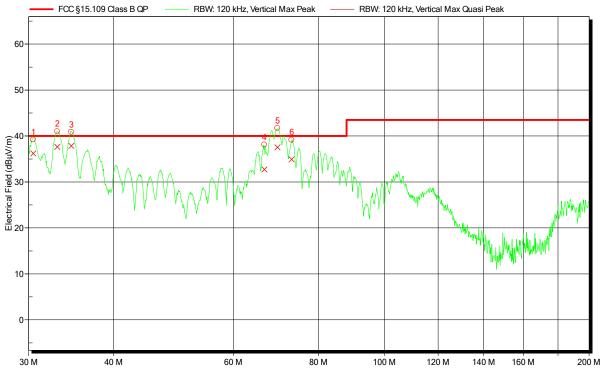
Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 120V AC (AC/DC adaptor)

Antenna: Rohde & Schwarz HK 116, Vertical

Measurement distance: 3m Mode: Mode# 2 Test Date: 2017-04-06

Note:



Eroc	uency	/Hz
1100	ucncy	(112

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	30.48 MHz	36.2 dBµV/m	40 dBµV/m	-3.8 dB	Pass	180 Degree	1 m
2	33.063 MHz	37.64 dBµV/m	40 dBµV/m	-2.36 dB	Pass	180 Degree	1 m
3	34.684 MHz	37.87 dBµV/m	40 dBµV/m	-2.13 dB	Pass	180 Degree	1 m
4	66.63 MHz	32.72 dBµV/m	40 dBµV/m	-7.28 dB	Pass	180 Degree	1 m
5	69.633 MHz	37.54 dBµV/m	40 dBµV/m	-2.46 dB	Pass	180 Degree	1 m
6	73.061 MHz	34.92 dBµV/m	40 dBµV/m	-5.08 dB	Pass	180 Degree	1 m



Project number: G0M-1703-6390

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

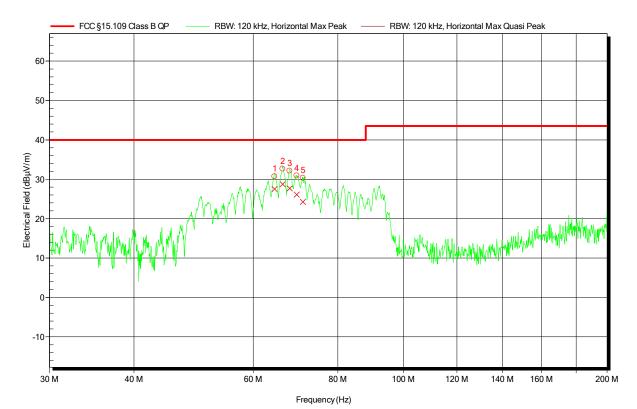
Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 120V AC (AC/DC adaptor)

Antenna: Rohde & Schwarz HK 116, Horizontal

Measurement distance: 3m Mode: Mode# 2 Test Date: 2017-04-06

Note:



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	64.528 MHz	27.54 dBµV/m	40 dBµV/m	-12.46 dB	Pass	256 Degree	1.71 m
2	66.33 MHz	28.75 dBµV/m	40 dBµV/m	-11.25 dB	Pass	256 Degree	1.71 m
3	67.951 MHz	27.7 dBµV/m	40 dBµV/m	-12.3 dB	Pass	256 Degree	1.71 m
4	69.572 MHz	26.09 dBµV/m	40 dBµV/m	-13.91 dB	Pass	256 Degree	1.71 m
5	71 062 MHz	24 24 dBuV/m	40 dBuV/m	-15 76 dB	Pass	256 Degree	1 71 m



Project number: G0M-1703-6390

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

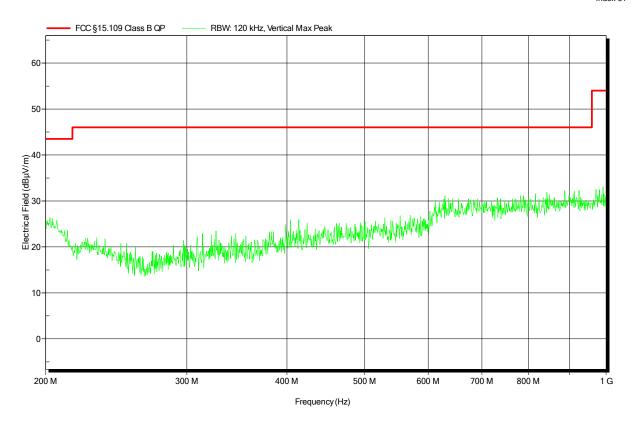
Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 120V AC (AC/DC adaptor)

Antenna: Rohde & Schwarz HL 223, Vertical

Measurement distance: 3m Mode: Mode# 2 Test Date: 2017-04-06

Note:





Project number: G0M-1703-6390

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

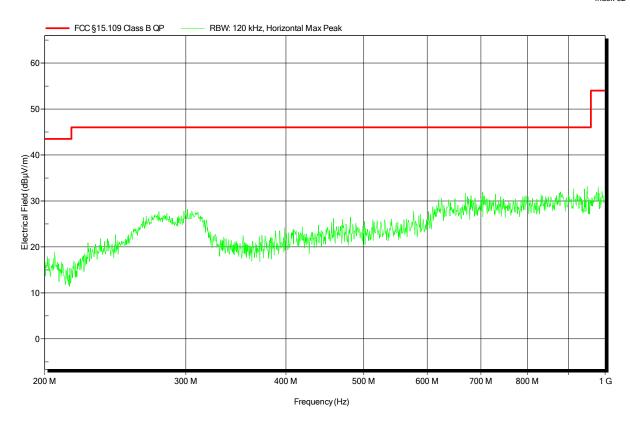
Operator: Mr. Handrik

Test Conditions: Tnom: 26°C, Unom: 120V AC (AC/DC adaptor)

Antenna: Rohde & Schwarz HL 223, Horizontal

Measurement distance: 3m Mode: Mode# 2 Test Date: 2017-04-06

Note:





3.2 Test Conditions and Results – AC power line conducted emissions

Conducted emissions acc. FCC 47 CFR 15.107 / ICES-003 Verdict: PAS							
Laboratory Para	Req	uired prior to the	test	Durin	g the test		
Ambient Temp	erature		15 to 35 °C		25°C		
Relative Hur	nidity	30 to 60 %		28%			
Test according re	eferenced		Re	eference	Method		
standard				ANSI C	63.4		
Fully configured sampl	e scanned over		F	requency	/ range		
the following frequ			0.15 MHz to 30 MHz				
Sample is tested with	respect to the	Equipment class					
requirements of the equipment class		Class B					
Points of Appl	Application Interface						
AC Main	S	LISN					
Operating n	node	2					
Configurat	ion	2					
	L	imits and	l results Class B	}			
Frequency [MHz]	Quasi-Peak [dBµV]	Result	Avera	age [dBµV]	Result	
0.15 to 5	66 to 56	*	PASS	56	6 to 46*	PASS	
0.5 to 5	56		PASS		46	PASS	
5 to 30	60		PASS		50	PASS	

^{*} Limit decreases linearly with the logarithm of the frequency.



Test Procedure:

The test site is in accordance with ANSI C63-4:2014 requirements and is listed by FCC. The measurement procedure is as follows:

Exploratory measurement:

- 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)
- The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
- 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).
- The LISN measurement port was connected to a measurement receiver
- I/O cables were bundled not longer than 0.4 m
- Measurement was performed in the frequency range 0.15 30MHz on each current-carrying conductor
- To maximize the emissions the cable positions were manipulated
- The worst configuration of EUT and cables is shown on a test setup picture at item 1.3

Test Procedure:

Final measurement:

- 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)
- The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
- 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).
- The LISN measurement port was connected to a measurement receiver
- The EUT and cable arrangement were based on the exploratory measurement results
- The test data of the worst-case conditions were recorded and shown on the next pages.



EMI voltage test in the ac-mains according to FCC Part 15b

Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

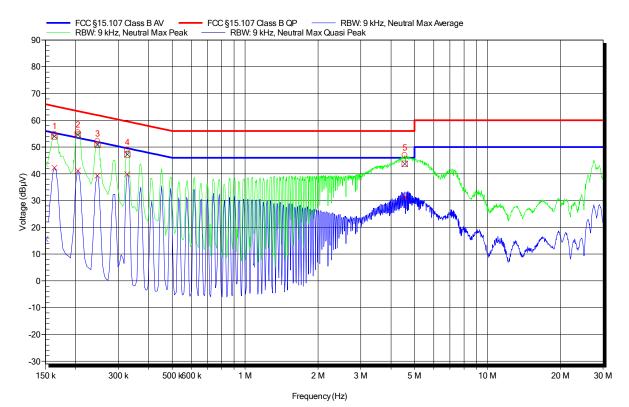
Operator: Mr. Handrik

Test Conditions: Tnom: 25°C, Unom: 120V AC (AC/DC adaptor)

LISN: ESH2-Z5 N Mode: Mode# 2 Test Date: 2017-04-06

Note:

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Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	163.5 kHz	54.01 dBµV	65.28 dBµV	-11.28 dB	Pass
2	204 kHz	54.59 dBµV	63.45 dBµV	-8.86 dB	Pass
3	245.85 kHz	50.84 dBµV	61.9 dBµV	-11.05 dB	Pass
4	326.4 kHz	47.25 dBµV	59.54 dBµV	-12.29 dB	Pass
5	4.56 MHz	43.68 dBµV	56 dBµV	-12.32 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	163.5 kHz	42.24 dBµV	55.28 dBµV	-13.05 dB	Pass
2	204 kHz	41.17 dBµV	53.45 dBµV	-12.28 dB	Pass
3	245.85 kHz	39.33 dBµV	51.9 dBµV	-12.57 dB	Pass
4	326.4 kHz	39.88 dBµV	49.54 dBµV	-9.66 dB	Pass
5	4.56 MHz	31.28 dBµV	46 dBµV	-14.72 dB	Pass



EMI voltage test in the ac-mains according to FCC Part 15b

Project number: G0M-1703-6391

Applicant: Liftup A/S

EUT Name: Mobile lifting chair

Model: 103950

Test Site: Eurofins Product Service GmbH

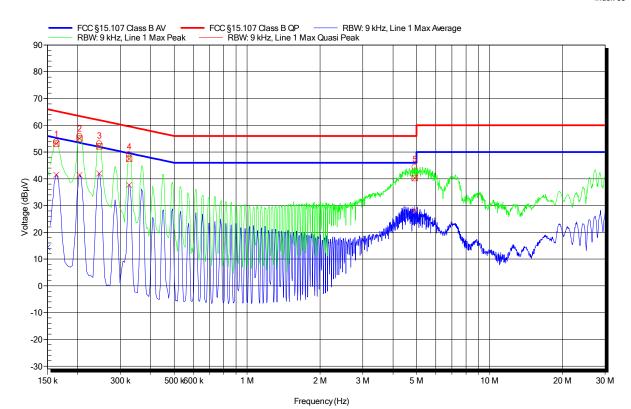
Operator: Mr. Handrik

Test Conditions: Tnom: 25°C, Unom: 120V AC (AC/DC adaptor)

LISN: ESH2-Z5 L Mode: Mode# 2 Test Date: 2017-04-06

Note:

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Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
1	163.05 kHz	53.12 dBµV	65.31 dBµV	-12.18 dB	Pass
2	203.55 kHz	55.02 dBµV	63.46 dBµV	-8.44 dB	Pass
3	245.4 kHz	52.13 dBµV	61.91 dBµV	-9.78 dB	Pass
4	325.95 kHz	47.49 dBµV	59.55 dBµV	-12.07 dB	Pass
5	4.919 MHz	40.28 dBµV	56 dBµV	-15.72 dB	Pass
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status
1	163.05 kHz	41.46 dBµV	55.31 dBµV	-13.85 dB	Pass
2	203.55 kHz	41.4 dBµV	53.46 dBµV	-12.07 dB	Pass
3	245.4 kHz	41.98 dBµV	51.91 dBµV	-9.93 dB	Pass
4	325.95 kHz	37.72 dBµV	49.55 dBµV	-11.83 dB	Pass
5	4.919 MHz	28.29 dBµV	46 dBµV	-17.71 dB	Pass