

Straubing, September 4, 2008

## TEST-REPORT

No. 52305-080803 (Edition 2)

for

## Wheelchair Wheel M15

## Remote Controlled Wheelchair Wheel

Applicant: Ulrich Alber GmbH

Test Specifications: FCC Code of Federal Regulations,

CFR 47, Part 15,

Sections 15.107, 15.109, 15.205, 15.207,

15.215 and 15.249

Industry Canada Radio Standards

**Specifications** 

RSS-Gen Issue 2, Sections 7.2.2, 7.2.3 and

RSS-210 Issue 7, Sections 2.2, A2.9

(Category I Equipment)

### Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.



# **Table of Contents**

1	Description of the Equipment Under Test (EUT)3			
2	A	Administrative Data		
3	ld	Identification of the Test Laboratory		
4	Sı	ummary	6	
5	0	peration Mode and Configuration of EUT	7	
6		easurement Procedures		
	6.1	Bandwidth Measurements		
	6.2	Pulse Train Measurement	9	
	6.3	Conducted AC Powerline Emission	10	
	6.4	Radiated Emission Measurement 9 kHz to 30 MHz	12	
	6.5	Radiated Emission in Fully or Semi Anechoic Room	14	
	6.6	Radiated Emission at Open Field Test Site	16	
7	Pl	hotographs Taken During Testing	17	
8	Te	est Results for Transmitter	24	
	8.1	Occupied Bandwidth	26	
	8.2	Bandwidth of the Emission	34	
	8.3	Designation of Emissions	38	
	8.4	Pulse Train Measurement	39	
	8.5	Restricted Bands of Operation	46	
	8.6	Conducted Powerline Emission Measurement 150 kHz to 30 MHz	50	
	8.7	Radiated Emission Measurement 9 kHz to 30 MHz	53	
	8.8	Radiated Emission Measurement 30 MHz to 25 GHz	54	
	8.9	Exposure of Humans to RF Fields	58	
9	Te	est Results for Receiver	60	
	9.1	Radiated Emission Measurement 30 MHz to 12.5 GHz	61	
1(	) R	eferenced Regulations	62	
1	1 R	evision History	63	
12	2 C	harts taken during testing	64	



## 1 Description of the Equipment Under Test (EUT)

Type designation<sup>1</sup>:

Parts<sup>2</sup>:

Serial number(s):

Manufacturer:

Type of equipment:

Version:

FCC ID:

Additional parts/accessories:

Wheelchair Wheel M15

Wheelchair Wheel M15

Ulrich Alber GmbH

Remote Controlled Wheelchair Wheel

As received

Technical data of EUT Application frequency range: 2400.0 - 2483.5 MHz Frequency range: 2405 - 2465 MHz 2405 MHz, 2425 MHz, 2445 MHz, 2465 MHz Operating frequency: **FSK** Type of modulation: Pulse train: 100 ms Pulse width: 23.5 ms Number of RF-channels: 4 Channel spacing: 20 MHz Designation of emissions<sup>3</sup>: 880kF1D Type of antenna: Integrated Size/length of antenna: ☐ detachable □ not detachable Connection of antenna: Type of power supply: Battery supply 25.2 V Specifications for power supply: nominal voltage:

\_\_\_

<sup>&</sup>lt;sup>1</sup> Type designation of the system if EUT consists of more than one part.

<sup>&</sup>lt;sup>2</sup> Type designations of the parts of the system, if applicable.

<sup>&</sup>lt;sup>3</sup> Also known as "Class of Emission".

**Application details** 



## 2 Administrative Data

Applicant (full address): Ulrich Alber GmbH

Vor dem Weißen Stein 21

D-72461 Albstadt-Tailfingen

Contact person: Mr. Jürgen Schneider

Contract identification: Order 2808395-1

Receipt of EUT: July 2, 2008

Date(s) of test: July 2008 / September 2008

Note(s):

Report details

Report number: 52305-080803

Edition: 2

Issue date: September 4, 2008



# 3 Identification of the Test Laboratory

**Details of the Test Laboratory** 

Company name: Senton GmbH EMI/EMC Test Center

Address: Aeussere Fruehlingstrasse 45

D-94315 Straubing

Germany

Laboratory accreditation: DAR-Registration No. DAT-P-171/94-02

FCC test site registration number 90926 Industry Canada test site registration: 3050A-1

Contact person: Mr. Johann Roidt

Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99



## 4 Summary

## Summary of test results

The tested sample complies with the requirements set forth in the

Code of Federal Regulations CFR 47, Part 15, Sections 15.109, 15.205, 15.207, 15.215 and 15.249 of the Federal Communication Commission (FCC) and the

Radio Standards Specifications RSS-Gen Issue 2, Section 7.2.2, 7.2.3 and RSS-210 Issue 7, Sections 2.2, 2.6, A2.9 (Category I Equipment)

of Industry Canada (IC).

Personnel involved in this report		
Laboratory Manager:		
	He Col	
	Mr. Johann Roidt	
Responsible for testing:		
	Skinell Martin	
	Mr. Martin Steindl	
Responsible for test report:	Mr. Martin Steindl	



# 5 Operation Mode and Configuration of EUT

## **Operation Mode**

The EUT was configured with a test software to transmit continuously on the lowest (2405 MHz), a middle (2445 MHz) and the highest (2465 MHz) channel and to work in receiving / standby mode.

## **Configuration of EUT**

The EUT was configured as wheel of a wheelchair. The second wheel was deactivated during testings.

List	of ports and cables			
Port	Description	Classification <sup>4</sup>	Cable type	Cable length

List	List of devices connected to EUT			
Item	Description	Type Designation	Serial no. or ID	Manufacturer

List	List of support devices			
Item	Description	Type Designation	Serial no. or ID	Manufacturer
1	Remote Control	M15 Remote Control		Ulrich Alber GmbH

\_

<sup>&</sup>lt;sup>4</sup> Ports shall be classified as ac power, dc power or signal/control port



### 6 Measurement Procedures

## 6.1 Bandwidth Measurements

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 15, section 15.215(c) IC RSS-Gen Issue 2, sections 4.6.1 and 4.6.2 IC RSS-210 Issue 7, section A1.1.3 ANSI C63.4, annex H.6	
Guide:	ANSI C63.4 / IC RSS-Gen Issue 2, sections 4.6.1 and 4.6.2	
Measurement setup:	☐ Conducted: See below ☐ Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.5)	

If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range.

The analyzer settings are specified by the test description of the appropriate test record(s).



## 6.2 Pulse Train Measurement

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 2, section 4.5	
Guide:	ANSI C63.4	
Measurement setup:	☐ Conducted: See below (direct connection or via test fixture) ☐ Radiated: Radiated Emission in Fully or Semi Anechoic Room (6.5)	

If antenna is detachable pulse train measurements shall be performed at the antenna connector (conducted measurement). The RF output terminals are connected to a spectrum analyzer or to a diode detector in combination with an oscilloscope. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable.

If antenna is not detachable a test fixture may be used instead of direct connection to RF output terminals. If radiated measurements are performed similar test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. However, the spectrum analyzer may be replaced by a diode detector connected to an oscilloscope.



## 6.3 Conducted AC Powerline Emission

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 15, sections 15.107 and 15.207 IC RSS-Gen Issue 2, section 7.2.2	
Guide:	ANSI C63.4 (CISPR 22)	

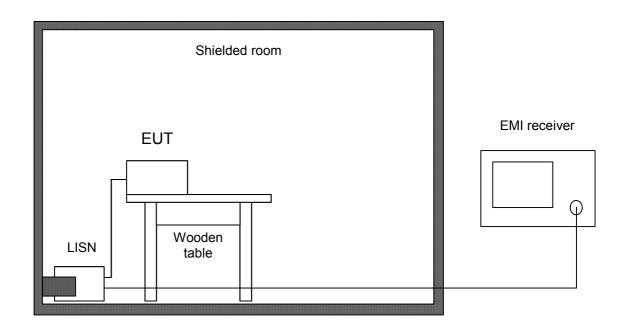
Conducted emission tests in the frequency range 150 kHz to 30 MHz are performed using Line Impedance Stabilization Networks (LISNs). To simplify testing with quasi-peak and average detector the following procedure is used:

First the whole spectrum of emission caused by the equipment under test (EUT) is recorded with detector set to peak using CISPR bandwidth of 10 kHz. After that all emission levels having less margin than 10 dB to or exceeding the average limit are retested with detector set to quasi-peak.

If average limit is kept with quasi-peak levels no additional scan with average detector is necessary. In cases of emission levels between quasi-peak and average limit an additional scan with detector set to average is performed.

According to ANSI C63.4, section 13.1.3.1, testing of intentional radiators with detachable antenna shall be performed using a suitable dummy load connected to the antenna output terminals. Otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended.

Testing with dummy load may be necessary to distinguish (unintentional) conducted emissions on the supply lines from (intentional) emissions radiated by the antenna and coupling directly to supply lines and/or LISN. Usage of dummy load has to be stated in the appropriate test record(s) and notes should be added to clarify the test setup.





Used	Туре	Model	Serial No. or ID	Manufacturer
$\boxtimes$	EMI receiver	ESHS 10	860043/016	Rohde & Schwarz
$\boxtimes$	LISN	ESH3-Z5	862770/021	Rohde & Schwarz
	LISN	ESH3-Z5	830952/025	Rohde & Schwarz
	Artificial mains network	ESH 2-Z5	842966/004	Rohde & Schwarz
	Shielded room	No. 1	1451	Albatross Projects
$\boxtimes$	Shielded room	No. 4	3FD-100 544	Euroshield



### 6.4 Radiated Emission Measurement 9 kHz to 30 MHz

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.231(b)(3) IC RSS-210 Issue 7, section A1.1.2(b)	
Guide:	ANSI C63.4	

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

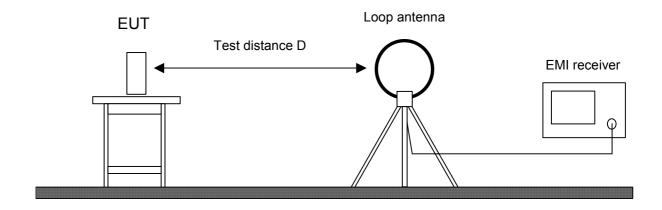
Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.





## Test instruments used:

Used	Туре	Model	Serial No. or ID	Manufacturer
$\boxtimes$	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
$\boxtimes$	Test receiver	ESHS 10	860043/016	Rohde & Schwarz
	Preamplifier	CPA9231A	3393	Schaffner
	Loop antenna	HFH2-Z2	882964/1	Rohde & Schwarz
$\boxtimes$	Fully anechoic room	No. 2	1452	Albatross Projects
	Semi-anechoic room	No. 3	1453	Siemens
$\boxtimes$	Open field test site	EG 1	1450	Senton



## 6.5 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:		
Rules and specifications:	CFR 47 Part 15, sections 15.109, 15.215(b) and 15.249 IC RSS-Gen Issue 2, sections 6(a), 7.2.3.2 IC RSS-210 Issue 7, section A2.9	
Guide:	ANSI C63.4	

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

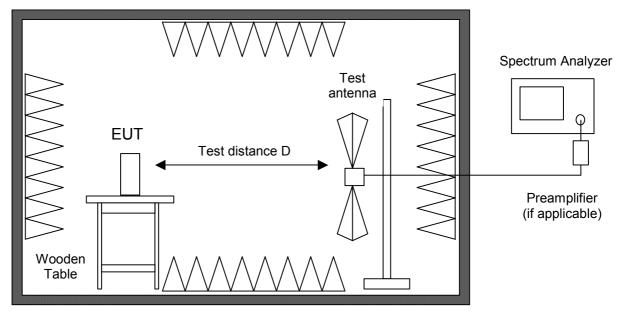
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as prescans.





Fully or semi anechoic room

## Test instruments used:

Used	Туре	Model	Serial No. or ID	Manufacturer
	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
	EMI test receiver	ESPI7	101018	Rohde & Schwarz
	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
$\boxtimes$	Preamplifier	CPA9231A	3393	Schaffner
	Preamplifier	R14601		Advantest
$\boxtimes$	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
$\boxtimes$	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
	External Mixer	WM782A	845881/005	Tektronix
	Harmonic Mixer	FS-Z30	843389/007	Rohde & Schwarz
	Accessories			
	Trilog broadband antenna	VULB 9163	9163-188	Schwarzbeck
	Horn antenna	3115	9508-4553	EMCO
	Horn antenna	3160-03	9112-1003	EMCO
	Horn antenna	3160-04	9112-1001	EMCO
$\boxtimes$	Horn antenna	3160-05	9112-1001	EMCO
$\boxtimes$	Horn antenna	3160-06	9112-1001	EMCO
$\boxtimes$	Horn antenna	3160-07	9112-1008	EMCO
$\boxtimes$	Horn antenna	3160-08	9112-1002	EMCO
$\boxtimes$	Horn antenna	3160-09	9403-1025	EMCO
	Horn antenna	3160-10	399185	EMCO
$\boxtimes$	Fully anechoic room	No. 2	1452	Albatross Projects
	Semi-anechoic room	No. 3	1453	Siemens



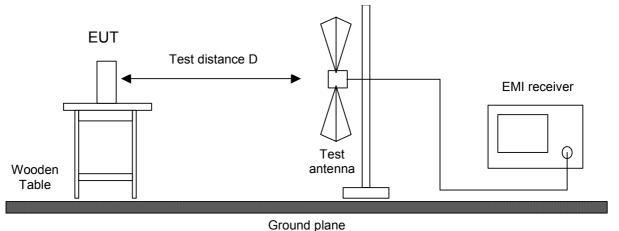
#### 6.6 Radiated Emission at Open Field Test Site

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.109, 15.215(b) and 15.249 IC RSS-Gen Issue 2, sections 6(a), 7.2.3.2 IC RSS-210 Issue 7, section A2.9
Guide:	ANSI C63.4

Radiated emission at open field test site is measured in the frequency range 30 MHz to 1 GHz using a biconical antenna up to 300 MHz and a logarithmic periodic antenna above. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train. including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value. Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in the fully anechoic room. EUT is rotated all around and receiving antenna is raised and lowered within 1 meter to 4 meters to find the maximum levels of emission. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.



### Test instruments used:

Used	Туре		Model	Serial No. or ID	Manufacturer
$\boxtimes$	EMI receiver		ESVP	881120/024	Rohde & Schwarz
$\boxtimes$	Biconical antenna	EG 1	HK 116	842204/001	Rohde & Schwarz
$\boxtimes$	Log. per. antenna	EG 1	HL 223	841516/023	Rohde & Schwarz
$\boxtimes$	Open field test site		EG 1	1450	Senton



# 7 Photographs Taken During Testing



# Test setup for conducted AC powerline emission measurement







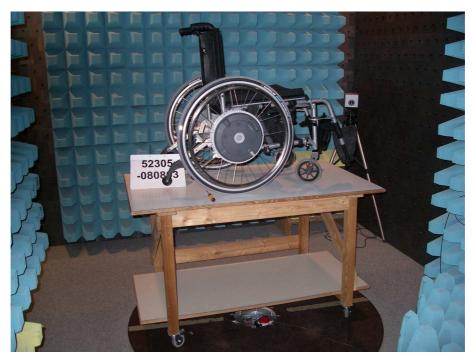
# Test setup for radiated emission measurement 9 kHz - 30 MHz





# Test setup for radiated emission measurement (fully anechoic room)







# Test setup for radiated emission measurement (open field test site)





# Test setup for radiated emission measurement (open field test site) - continued -







# Test setup for radiated emission measurement (open field test site) - continued -





# 8 Test Results for Transmitter

FCC CFR 47 Parts 2 and 15				
Section(s)	Test	Page	Result	
2.1046(a)	Conducted output power		Not applicable	
2.202(a)	Occupied bandwidth	26	Recorded	
15.215(c)	Bandwidth of the emission	34	Test passed	
2.201, 2.202	Class of emission	38	Calculated	
15.35(c)	Pulse train measurement for pulsed operation	39	Recorded	
15.205(a)	Restricted bands of operation	46	Test passed	
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	50	Test passed	
15.205(b) 15.249	Radiated emission 9 kHz to 30 MHz	53	Test passed	
15.205(b) 15.215(b) 15.249	Radiated emission 30 MHz to 25 GHz	54	Test passed	



IC RSS-Gen Issue 2			
Section(s)	Test	Page	Result
4.8	Transmitter output power (conducted)		Not applicable
4.6.1	Occupied Bandwidth	26	Recorded
3.2(h), 8	Designation of emissions	38	Calculated
4.5	Pulsed operation	39	Recorded
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	50	Test passed
5.5	Exposure of Humans to RF Fields	58	Exempted from SAR and RF evaluation

IC RSS-210 Issue 7			
Section(s)	Test	Page	Result
2.2(a)	Restricted bands and unwanted emission frequencies	46	Test passed
2.2(b)(c), 2.6 A2.9	Unwanted emissions 9 kHz to 30 MHz	53	Test passed
2.2(b)(c), 2.6 A2.9	Unwanted emissions 30 MHz to 25 GHz	54	Test passed

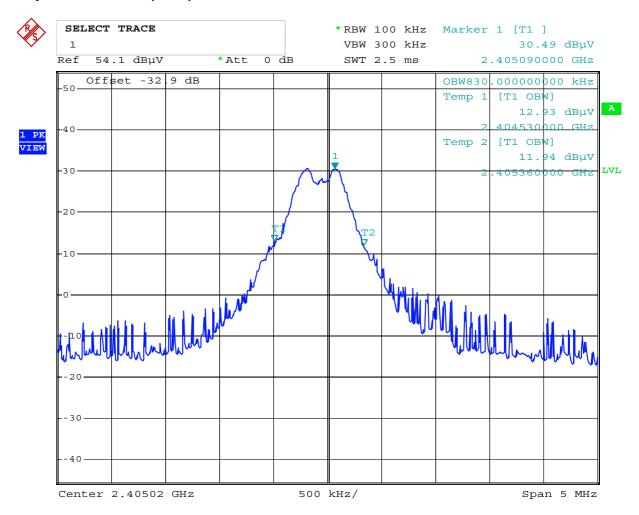


# 8.1 Occupied Bandwidth

Rules and specifications:	CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6		
Guide:	ANSI C63.4		
Description:	The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.		
	The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier.		
	The resolution bandwidth of the spect greater than 5.0% of the allowed band are given, the following guidelines are	lwidth. If no bandwidth specifications	
	Fundamental frequency	Minimum resolution bandwidth	
	9 kHz to 30 MHz	1 kHz	
	30 MHz to 1000 MHz	10 kHz	
	1000 MHz to 40 GHz 100 kHz		
	The video bandwidth shall be at least three times greater than the resolution bandwidth.		
Measurement procedure:	Bandwidth Measurements (6.1)		

Comment:	
Date of test:	July 3, 2008
Test site:	Fully anechoic room, cabin no. 2

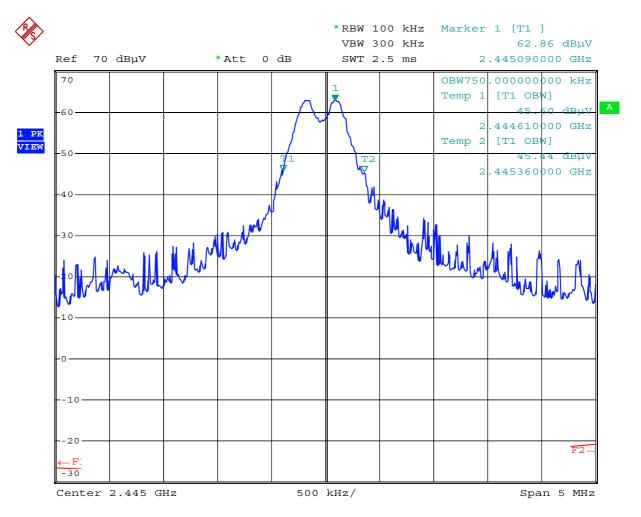




Date: 3.JUL.2008 09:48:23

Occupied Bandwidth (99 %): 830 kHz

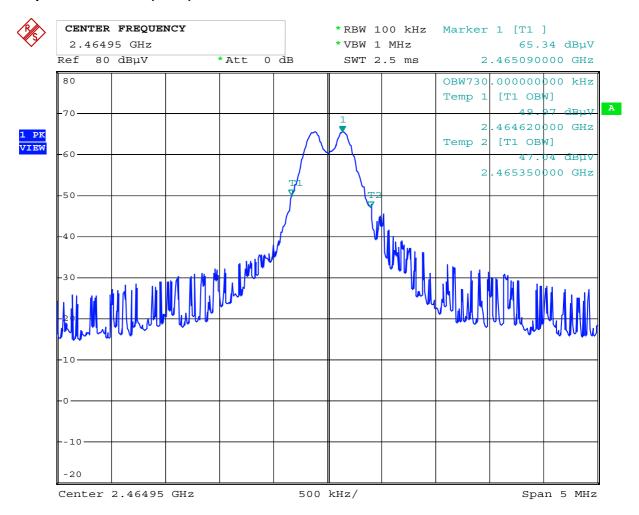




Date: 3.JUL.2008 09:58:48

Occupied Bandwidth (99 %): 750 kHz





Date: 3.JUL.2008 10:21:53

Occupied Bandwidth (99 %): 730 kHz

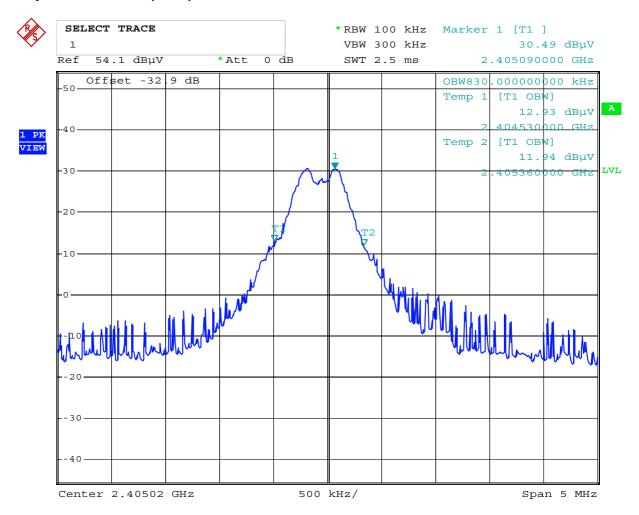


# **Occupied Bandwidth (continued)**

Rules and specifications:	IC RSS-Gen Issue 2, section 4.6.1
Guide:	IC RSS-Gen Issue 2, section 4.6.1
Description:	If not specified in the applicable RSS the occupied bandwidth is measuredas the 99% emission bandwidth.  The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.  The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.
Measurement procedure:	Bandwidth Measurements (6.1)

Comment:	
Date of test:	July 2, 2008
Test site:	Fully anechoic room, cabin no. 2

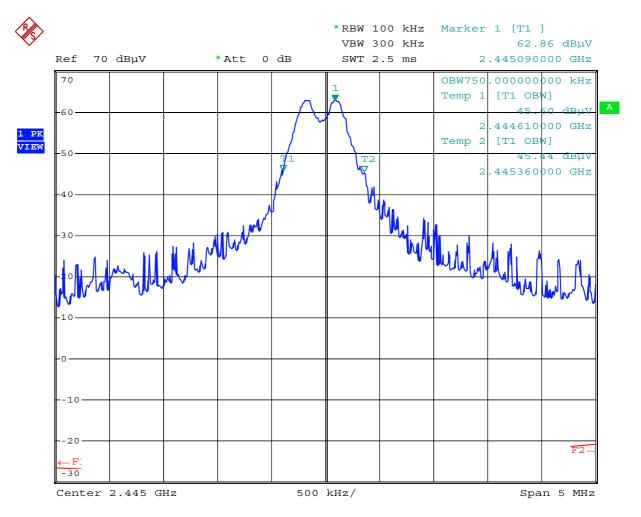




Date: 3.JUL.2008 09:48:23

Occupied Bandwidth (99 %): 830 kHz

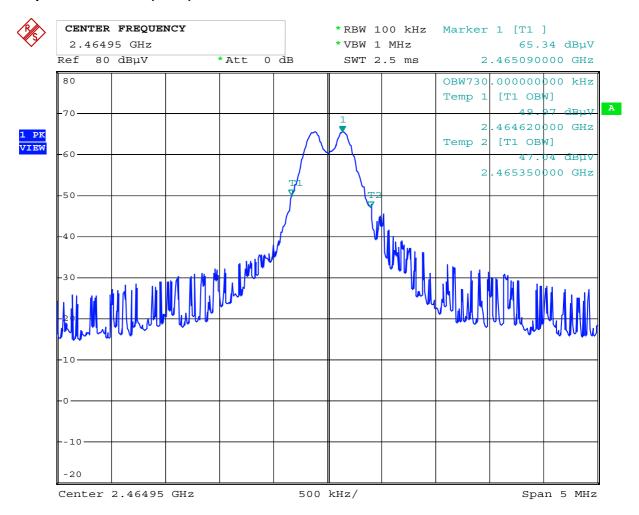




Date: 3.JUL.2008 09:58:48

Occupied Bandwidth (99 %): **750 kHz** 





Date: 3.JUL.2008 10:21:53

Occupied Bandwidth (99 %): 730 kHz



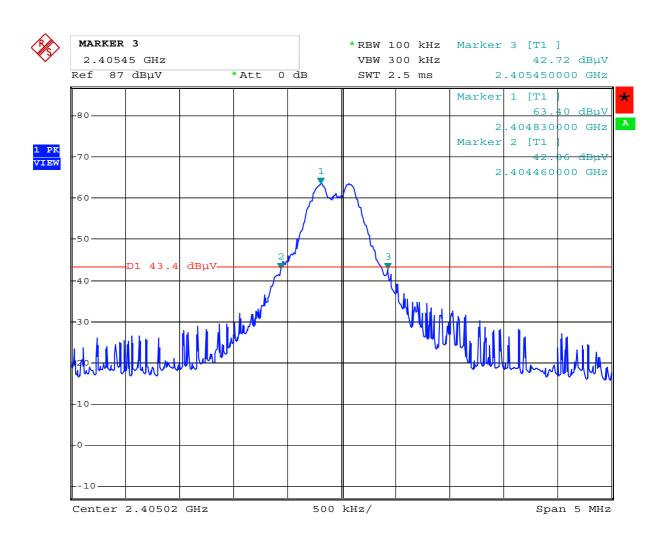
## 8.2 Bandwidth of the Emission

Rules and specifications:	CFR 47 Part 15, section 15.215(c)		
Guide:	ANSI C63.4		
Description:	The 20 dB bandwidth of the emission is measured as the frequency range defined by the points that are 20 dB down relative to the maximum level of the modulated carrier.  For intentional radiators operating under the alternative provisions t general emission limits the requirement to contain the 20 dB bandw of the emission within the specified frequency band includes the eff from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least central 80% of the permitted band in order to minimize the possibility out-of-band operation.		
	The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:		
	Fundamental frequency	Minimum resolution bandwidth	
	9 kHz to 30 MHz	1 kHz	
	30 MHz to 1000 MHz	10 kHz	
	1000 MHz to 40 GHz 100 kH:		
	The video bandwidth shall be at leas resolution bandwidth.	t three times greater than the	
Measurement procedure:	Bandwidth Measurements (6.1)		

Test Result: Test passed	
--------------------------	--



Comment:	
Date of test:	July 3, 2008
Test site:	Fully anechoic room, cabin no. 2



Date: 3.JUL.2008 09:49:43

Permitted frequency band:	2400.0 - 2483.5 MHz	
20 dB bandwidth:	990 kHz	
Carrier frequency stability: Maximum frequency tolerances:	specified	□ not specified
Bandwidth of the emission:	990 kHz	within permitted frequency band <sup>5</sup> :  ☑ yes ☐ no

Test Report No. 52305-080803 (Edition 2)

<sup>&</sup>lt;sup>5</sup> If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



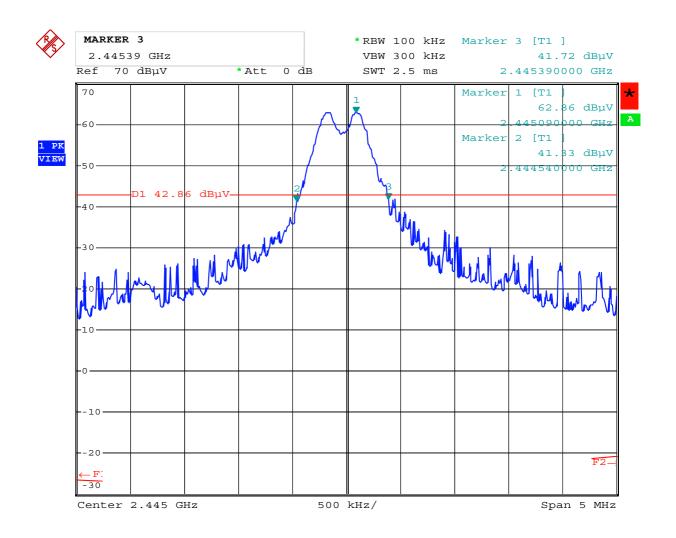
Comment:

Date of test:

Test site:

July 3, 2008

Fully anechoic room, cabin no. 2



Date: 3.JUL.2008 09:59:20

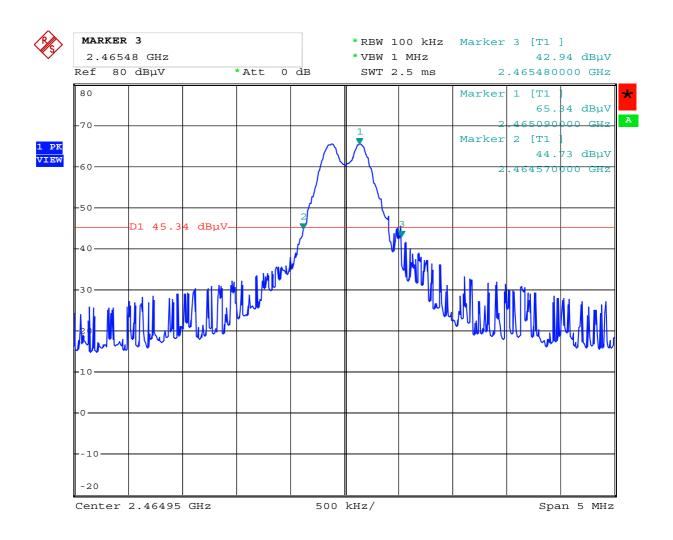
Permitted frequency band:	2400.0 - 2483.5 MHz	
20 dB bandwidth:	850 kHz	
Carrier frequency stability: Maximum frequency tolerances:	specified	□ not specified
Bandwidth of the emission:	850 kHz	within permitted frequency band <sup>6</sup> :  ☑ yes ☐ no

Test Report No. 52305-080803 (Edition 2)

<sup>&</sup>lt;sup>6</sup> If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



Comment:	
Date of test:	July 3, 2008
Test site:	Fully anechoic room, cabin no. 2



Date: 3.JUL.2008 10:22:55

Permitted frequency band:	2400.0 - 2483.5 MHz	
20 dB bandwidth:	910 kHz	
Carrier frequency stability: Maximum frequency tolerances:	specified	□ not specified
Bandwidth of the emission:	910 kHz	within permitted frequency band <sup>7</sup> :  ☑ yes ☐ no

Test Report No. 52305-080803 (Edition 2)

<sup>&</sup>lt;sup>7</sup> If a frequency stability is not specified, it is recommended that the fundamental emission is kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



### 8.3 Designation of Emissions

Rules and specifications:	CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 2, sections 3.2(h) and 8	
Guide:	ANSI C63.4 / TRC-43	

Type of modulation:	Frequency Shift Keying (FSK)

B <sub>n</sub> = Necessary Bandwidth	$B_n = 2DK + B$
D = Peak deviation	D = 210 kHz
K = Overall numerical factor	K = 1
B = Modulation rate	B = 230 kHz
Calculation:	B <sub>n</sub> = 2 · (230 kHz) · 1 + 2 · (210 kHz) = 880 kHz

Designation of Emissions:	880kF1D
---------------------------	---------



#### 8.4 Pulse Train Measurement

Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 2, section 4.5			
Guide:	ANSI C63.4			
Measurement procedure:	Pulse Train Measurement (6.2)			



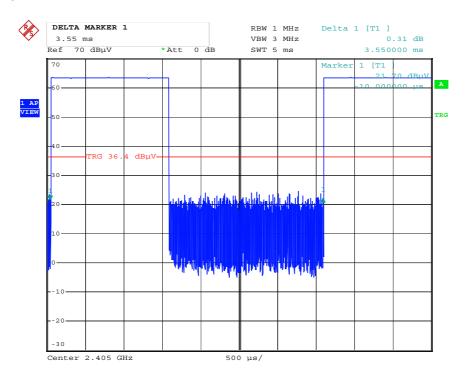
Comment:		
Date of test:	July 3, 2008	
Test site:	Fully anechoic room, cabin no. 2	

#### Calculation of pulse train correction:

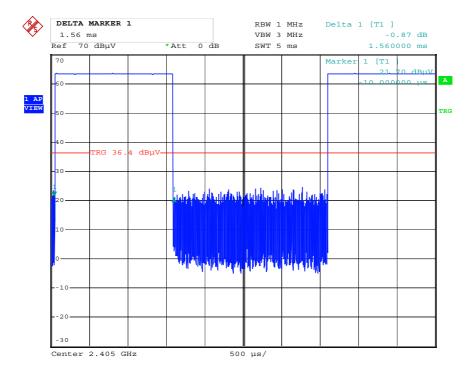
TX-On-Time (worst case):	T <sub>on</sub>	=	1.56 ms
Pulse Train Time:	$T_{pt}$	=	3.55 ms
Period Time:	Tperiod	=	3.55 ms
Pulse Train Correction:	C <sub>pt</sub>	=	20 · Log(T <sub>on</sub> / T <sub>period</sub> ) dB
_	-	=	-7.14 dB



#### **Total Pulse Train:**







Date: 3.JUL.2008 09:54:21



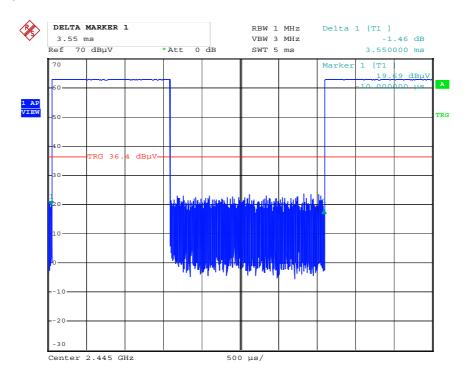
Comment:	
Date of test:	July 3, 2008
Test site:	Fully anechoic room, cabin no. 2

#### Calculation of pulse train correction:

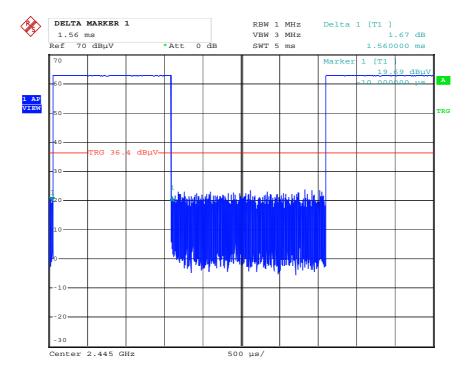
TX-On-Time (worst case):	T <sub>on</sub>	=	1.67 ms
Pulse Train Time:	$T_{pt}$	=	3.55 ms
Period Time:	T <sub>period</sub>	=	3.55 ms
Pulse Train Correction:	C <sub>pt</sub>	=	20 · Log(T <sub>on</sub> / T <sub>period</sub> ) dB
_		=	-6.55 dB



#### **Total Pulse Train:**







Date: 3.JUL.2008 09:56:31



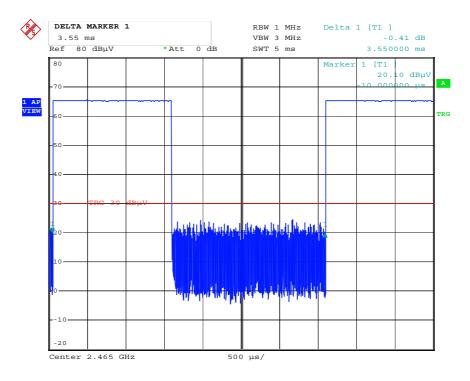
Comment:		
Date of test:	July 3, 2008	
Test site:	Fully anechoic room, cabin no. 2	

#### Calculation of pulse train correction:

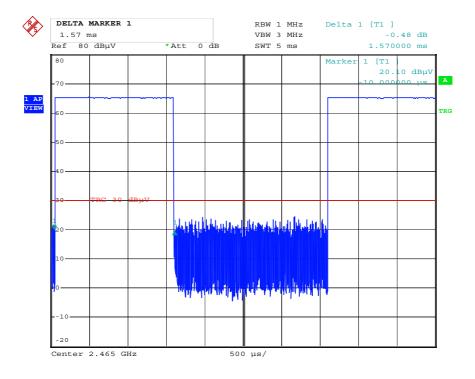
TX-On-Time (worst case):	T <sub>on</sub>	=	1.57 ms
Pulse Train Time:	$T_{pt}$	=	3.55 ms
Period Time:	T <sub>period</sub>	=	3.55 ms
Pulse Train Correction:	C <sub>pt</sub>	=	20 · Log(T <sub>on</sub> / T <sub>period</sub> ) dB
_		=	-7.09 dB



#### **Total Pulse Train:**



Date: 3.JUL.2008 10:27:31



Date: 3.JUL.2008 10:27:17



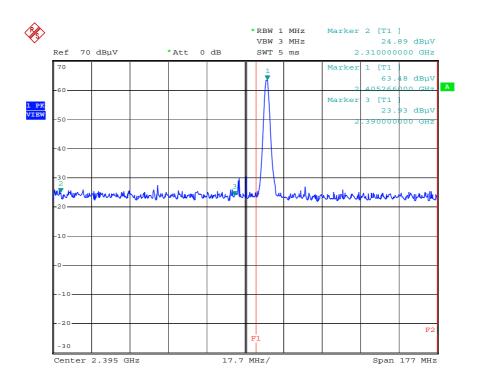
### 8.5 Restricted Bands of Operation

Rules and specifications:	CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 7, section 2.2(a)
Guide:	ANSI C63.4
Limit:	Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 7, section 2.2(a).
Measurement procedure:	Radiated Emission in Fully or Semi Anechoic Room (6.5)

Comment:	
Date of test:	July 3, 2008
Test site:	Fully anechoic room, cabin no. 2
Test distance:	3 meters

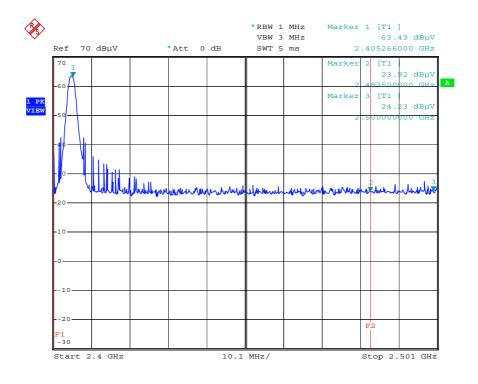
Test Result:	Test passed
--------------	-------------



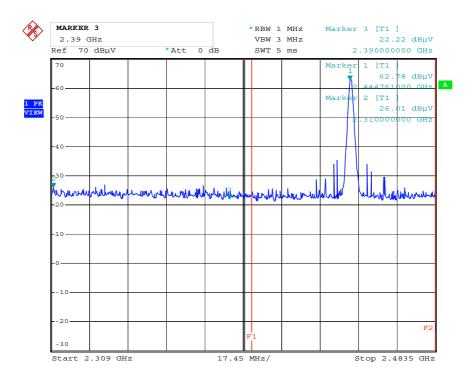


Date: 3.JUL.2008 09:52:07

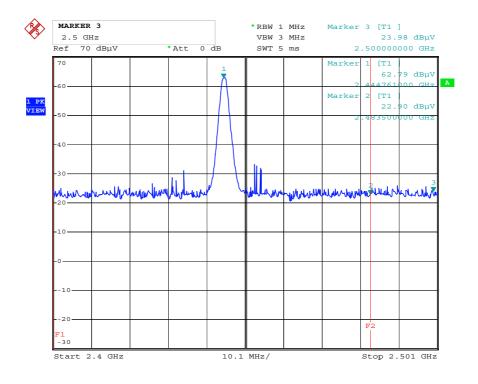
3.JUL.2008 09:52:59





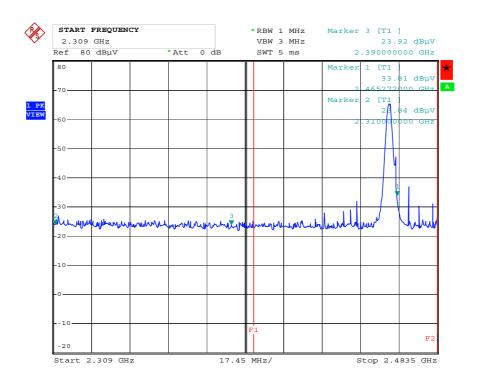


Date: 3.JUL.2008 09:57:27

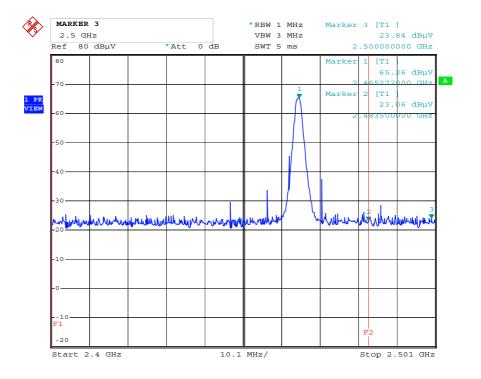


Date: 3.JUL.2008 09:57:56





Date: 3.JUL.2008 10:25:29



Date: 3.JUL.2008 10:25:57



#### 8.6 Conducted Powerline Emission Measurement 150 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, section 15.207 IC RSS-Gen Issue 2, section 7.2.2			
Guide:	ANSI C63.4 / CISPR 22			
Limit:	Frequency of Emission	Conducted Limit (dBµV)		
	(MHz)	Quasi-peak	Average	
	0.15 - 0.5	66 to 56	56 to 46	
	0.5 - 5	56	46	
	5 - 30 60 50			
Measurement procedure:	Conducted AC Powerline Emission (6.3)			

Comment:	
Date of test:	September 4, 2008
Test site:	Shielded room, cabin no. 4

Test Result:	Test passed



Tested on: Linecord Live Wire

Frequency	Detector	Reading	Correction	Final	Limit	Margin
		Value	Factor	Value		
(MHz)		(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)
0.170	Quasi-Peak	49.5	0.0	49.5	65.0	15.5
0.225	Quasi-Peak	41.5	0.0	41.5	62.6	21.1
0.340	Quasi-Peak	42.4	0.0	42.4	59.2	16.8
0.400	Quasi-Peak	38.2	0.0	38.2	57.9	19.7
0.455	Quasi-Peak	42.9	0.0	42.9	56.8	13.9
0.570	Quasi-Peak	43.4	0.0	43.4	56.0	12.6
0.685	Quasi-Peak	41.9	0.0	41.9	56.0	14.1
0.855	Quasi-Peak	39.0	0.0	39.0	56.0	17.0
1.140	Quasi-Peak	36.2	0.0	36.2	56.0	19.8
1.370	Quasi-Peak	38.0	0.0	38.0	56.0	18.0
1.655	Quasi-Peak	36.8	0.0	36.8	56.0	19.2
2.055	Quasi-Peak	37.6	0.0	37.6	56.0	18.4
2.735	Quasi-Peak	32.3	0.0	32.3	56.0	23.7
3.420	Quasi-Peak	32.0	0.0	32.0	56.0	24.0
4.450	Quasi-Peak	37.6	0.0	37.6	56.0	18.4
5.020	Quasi-Peak	38.9	0.0	38.9	60.0	21.1
5.700	Quasi-Peak	28.8	0.0	28.8	60.0	31.2
7.985	Quasi-Peak	33.4	0.0	33.4	60.0	26.6
9.355	Quasi-Peak	33.1	0.0	33.1	60.0	26.9
12.550	Quasi-Peak	32.1	0.0	32.1	60.0	27.9
15.860	Quasi-Peak	32.2	0.0	32.2	60.0	27.8
16.660	Quasi-Peak	35.6	0.0	35.6	60.0	24.4
24.025	Quasi-Peak	37.0	0.0	37.0	60.0	23.0
25.625	Quasi-Peak	48.8	0.0	48.8	60.0	11.2



Tested on: Linecord Neutral Wire	
----------------------------------	--

Frequency	Detector	Reading	Correction	Final	Limit	Margin
		Value	Factor	Value		-
(MHz)		(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)
0.170	Quasi-Peak	46.9	0.0	46.9	65.0	18.1
0.345	Quasi-Peak	42.4	0.0	42.4	59.1	16.7
0.455	Quasi-Peak	42.3	0.0	42.3	56.8	14.5
0.570	Quasi-Peak	41.3	0.0	41.3	56.0	14.7
0.685	Quasi-Peak	38.7	0.0	38.7	56.0	17.3
0.855	Quasi-Peak	36.9	0.0	36.9	56.0	19.1
1.485	Quasi-Peak	37.5	0.0	37.5	56.0	18.5
1.600	Quasi-Peak	36.3	0.0	36.3	56.0	19.7
2.285	Quasi-Peak	38.7	0.0	38.7	56.0	17.3
2.400	Quasi-Peak	38.5	0.0	38.5	56.0	17.5
2.970	Quasi-Peak	37.0	0.0	37.0	56.0	19.0
4.000	Quasi-Peak	40.3	0.0	40.3	56.0	15.7
5.485	Quasi-Peak	41.2	0.0	41.2	60.0	18.8
5.715	Quasi-Peak	43.4	0.0	43.4	60.0	16.6
8.400	Quasi-Peak	44.8	0.0	44.8	60.0	15.2
8.800	Quasi-Peak	45.1	0.0	45.1	60.0	14.9
12.285	Quasi-Peak	41.0	0.0	41.0	60.0	19.0
13.085	Quasi-Peak	40.2	0.0	40.2	60.0	19.8
17.830	Quasi-Peak	43.1	0.0	43.1	60.0	16.9
24.120	Quasi-Peak	47.3	0.0	47.3	60.0	12.7
26.405	Quasi-Peak	47.1	0.0	47.1	60.0	12.9

Final Value ( $dB\mu V$ ) = Reading Value ( $dB\mu V$ ) + Correction Factor (dB)



### 8.7 Radiated Emission Measurement 9 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, sections 15.215(b) and 15.231(b)(3) IC RSS-210 Issue 7, section A1.1.2(b)			
Guide:	ANSI C63.4			
Limit:	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			
	0.009 - 0.490 2400/F(kHz) 67.6 - 20 · log(F(kHz)) 300			
	0.490 - 1.705   24000/F(kHz)   87.6 - 20 · log(F(kHz))   30			
	1.705 - 30.000 30 29.5 30			
	Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			
Measurement procedure:	Radiated Emission Measurement 9 kHz to 30 MHz (6.4)			

Comment:	
Date of test:	July 3, 2008
Test site:	Open field test site

Test Result:	Test passed	
--------------	-------------	--

No emissions above noise level detected



#### 8.8 Radiated Emission Measurement 30 MHz to 25 GHz

Rules and specifications:	CFR 47 Part 15, sections IC RSS-210 Issue 7, sections						
Guide:	ANSI C63.4						
Limit:	Frequency of Emission (MHz) Field Strength (pV/m) Field Strength (dBµV/m)						
	30 - 88	40.0					
	88 - 216 150 43.5 216 - 960 200 46.0 Above 960 500 54.0  Additionally, the level of any unwanted emissions shall not exceed the le of the fundamental emission.						
Measurement procedures:		Radiated Emission in Fully or Semi Anechoic Room (6.5) Radiated Emission at Open Field Test Site (6.6)					

Test Result:	Test passed



Comment:	Transmitting on lowest channel			
Date of test:	uly 2, 2008, July 3, 2008 uly 4, 2008			
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2			
Test distance:	Frequencies ≤ 1 GHz: 3 meters  Frequencies > 1 GHz and ≤ 18 GHz: 1 meters 8  Frequencies > 18 GHz: 0.5 meters 8			

Test Result: Test passed
--------------------------

Frequency	Antenna	Detector	Receiver	Correction	Pulse Train	Final	Limit	Margin
	Polarization		Reading	Factor	Correction	Value		
(MHz)			(dBµV)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
2405.000	horizontal	Peak	64.4	33.4	-7.1	90.6	94.0	3.4
4808.800	horizontal	Peak	23.8	34.3	-7.1	50.9	54.0	3.1
7213.000	horizontal	Peak	10.2	39.0	-7.1	42.0	54.0	12.0
9619.600	vertical	Peak	13.6	44.1	-7.1	50.6	63.5	12.9

Final Value (dB $\mu$ V/m) = Reading Value (dB $\mu$ V) + Correction Factor (dB/m) + Pulse Train Correction (dB)

<sup>&</sup>lt;sup>8</sup> Limit corrected with 20 dB/decade.



Comment:	ransmitting on middle channel				
Date of test:	luly 2, 2008, July 3, 2008 luly 4, 2008				
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2				
Test distance:	Frequencies $\leq$ 1 GHz: 3 meters Frequencies > 1 GHz and $\leq$ 18 GHz: 1 meters $^9$ Frequencies > 18 GHz: 0.5 meters $^9$				

Test Result:	Test passed

Frequency	Antenna	Detector	Receiver	Correction	Pulse Train	Final	Limit	Margin
	Polarization		Reading	Factor	Correction	Value		
(MHz)			(dBµV)	(dB/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
2445.000	horizontal	Peak	65.4	33.5	-6.6	92.3	94.0	1.7
4888.600	horizontal	Peak	22.1	34.3	-6.6	49.9	54.0	4.1
7335.200	horizontal	Peak	10.5	39.1	-6.6	43.0	54.0	11.0
9779.200	horizontal	Peak	14.6	44.2	-6.6	52.3	63.5	11.2

Final Value (dB $\mu$ V/m) = Reading Value (dB $\mu$ V) + Correction Factor (dB/m) + Pulse Train Correction (dB)

<sup>&</sup>lt;sup>9</sup> Limit corrected with 20 dB/decade.



Comment:	Transmitting on highest channel			
Date of test:	July 2, 2008, July 3, 2008 July 4, 2008			
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2			
Test distance:	Frequencies $\leq$ 1 GHz: 3 meters Frequencies > 1 GHz and $\leq$ 18 GHz: 1 meters <sup>10</sup> Frequencies > 18 GHz: 0.5 meters <sup>10</sup>			

Frequency	Antenna	Detector	Receiver	Correction	Pulse Train	Final	Limit	Margin
	Polarization		Reading	Factor	Correction	Value		
(MHz)			(dBµV)	(dB/m)	(dB)	$(dB\mu V/m)$	(dBµV/m)	(dB)
2465.000	horizontal	Peak	66.0	33.5	-7.1	92.4	94.0	1.6
4930.400	horizontal	Peak	21.5	34.4	-7.1	48.8	54.0	5.2
7396.300	vertical	Peak	11.0	39.2	-7.1	43.0	54.0	11.0
9859.000	horizontal	Peak	14.5	44.3	-7.1	51.7	63.5	11.8

Final Value (dB $\mu$ V/m) = Reading Value (dB $\mu$ V) + Correction Factor (dB/m) + Pulse Train Correction (dB)

<sup>&</sup>lt;sup>10</sup> Limit corrected with 20 dB/decade.



#### 8.9 Exposure of Humans to RF Fields

Rules and specifications:	IC RSS-Gen Issue 2, section 5.5
Guide:	IC RSS-102 Issue 2, section 2.5

Exposure of Humans to RF Fields	Applicable	Declared by applicant	Measured	Exemption
The antenna is				
detachable				
The conducted output power (CP in watts) is measured at the antenna connector:				
CP =			Ш	
The effective isotropic radiated power (EIRP in watts) is calculated using				
the numerical antenna gain: $G$ $EIRP = G \cdot CP \Rightarrow EIRP$				
☐ the field strength <sup>11</sup> in V/m: FS				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$				
with:				
Distance between the antennas in m: D				
⊠ not detachable				
A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by <sup>11</sup> :				
$EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP = 521 \cdot 10^{-6} \text{ W}$				
with:				
Field strength in V/m: $FS = 92.4 \text{ dB}\mu\text{V/m}$ $= 41.7 \cdot 10^{-3} \text{ V/m}$			$\boxtimes$	
Distance between the two antennas in m: $D = 3 \text{ m}$			$\boxtimes$	
Selection of output power				
The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.):				
$TP =$ 521 $\cdot$ 10 <sup>-6</sup> W				

Test Report No. 52305-080803 (Edition 2)

<sup>&</sup>lt;sup>11</sup> The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses. If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.



Exposure of Humans to RF Fields (continued)			Declared by applicant	Measured	Exemption
	Separation distance between the user and the transmitting device is				
			$\boxtimes$		
	Transmitting device is				
	☐ in the vicinity of the human head ☐ body-worn		$\boxtimes$		
	SAR evaluation				
	SAR evaluation is required if the separation distance between the user and the device is less than or equal to 20 cm.				
	The device operates from 3 kHz up to 1 GHz inclusively and its source-based time-averaged output power is less than, or equal to 200 mW for General Public Use and 1000 mW for Controlled Use.				
	☐ The device operates above 1 GHz up to 2.2 GHz inclusively and its source-based time-averaged output power is less than, or equal to 100 mW for General Public Use and 500 mW for Controlled Use.				
The device operates above 2.2 GHz up to 3 GHz inclusively and its source-based time-averaged output power is less than, or equal to 20 mW for General Public Use and 100 mW for Controlled Use.					
☐ The device operates above 3 GHz up to 6 GHz inclusively and its source-based time-averaged output power) is less than, or equal to 10 mW for General Public Use and 50 mW for Controlled Use.					
	☐ SAR evaluation is documented in test report no				
	RF exposure evaluation				
	RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm.				
	The device operates below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W.				
☐ The device operates at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.					
	RF exposure evaluation is documented in test report no				ĺ



#### 9 Test Results for Receiver

FCC CFR 47 Part 15			
Section(s)	Test	Page	Result
15.107	Conducted AC powerline emission 150 kHz to 30 MHz		Not applicable
15.109	Radiated emission 30 MHz to 12.5 GHz	61	Test passed
15.111(a)	Antenna power conduction emission of receivers 9 kHz to 12.5 GHz		Not applicable

IC RSS-Gen Issue 2				
Section(s)	Test	Page	Result	
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz		Not applicable	
6(a), 7.2.3.2	Receiver spurious emissions (radiated) 30 MHz to 12.5 GHz	61	Test passed	
6(b), 7.2.3.1	Receiver spurious emissions (antenna conducted) 9 kHz to 12.5 GHz		Not applicable	



#### 9.1 Radiated Emission Measurement 30 MHz to 12.5 GHz

Rules and specifications:	CFR 47 Part 15, section 15.109 (Class B) IC RSS-Gen Issue 2, sections 6(a) and 7.2.3.2			
Guide:	ANSI C63.4	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Field Strength (μV/m)	Field Strength (dBµV/m)	
	30 - 88	100	40.0	
-	88 - 216	150	43.5	
	216 - 960	200	46.0	
	Above 960 500		54.0	
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.5) Radiated Emission at Open Field Test Site (6.6)			

Comment:		
Date of test:	July 2, 2007, July 3, 2007,	
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2	
Test distance:	Frequencies ≤ 8.2 GHz: 3 meters Frequencies > 1 GHz: 1 meters <sup>12</sup>	

Test Result: Test passed
--------------------------

No emissions above noise level detected

<sup>&</sup>lt;sup>12</sup> Limit corrected with 20 dB/decade.



### 10 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

-		
CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 1, 2007
CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	September 20, 2007
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	December 11, 2003 (published on January 30, 2004)
RSS-Gen	Radio Standards Specification RSS-Gen Issue 2 containing General Requirements and Information for the Certification of Radiocommunication Equimpment, published by Industry Canada	June 2007
RSS-210	Radio Standards Specification RSS-210 Issue 7 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	June 2007
RSS-310	Radio Standards Specification RSS-310 Issue 1 for Low Power Licence-Ecempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	September 2005
RSS-102	Radio Standards Specification RSS-102 Issue 2: Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	November 2005
ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada	February 7, 2004
CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement"	1997
CAN/CSA- CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
TRC-43	Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October 9, 1982



### 11 Revision History

Revision History				
Edition	Date	Issued by	Modifications	
1	July 7, 2008	Martin Steindl (cj)	First Edition	
2	September 4, 2008	Johann Roidt (cj)	Edition 2 Required for FCC Certification: Conducted Emission Test attached	



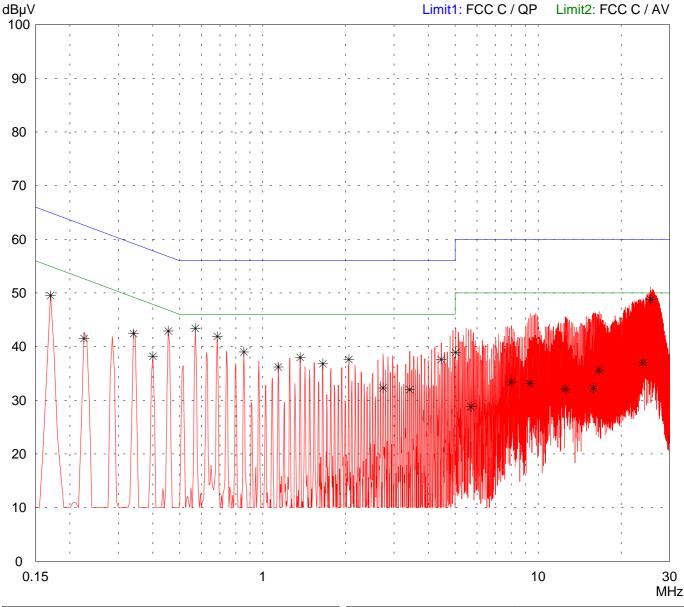
### 12 Charts taken during testing

# Conducted Emission Test 150 kHz - 30 MHz according to FCC Part 15 Subpart C

Model:		
M15 Remote Control for Wheel Chairs		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Shielded room, cabin no. 4		
Tested on:		
Linecord		
Live Wire		
Date of test:	Operator:	
09/04/2008	J. Roidt	
Test performed:	File name:	
automatically		

Mode:
Charging Mode
115 V AC

Detector:
Peak / Final Results: QP
Final results:
20 dB Margin
25 Subranges



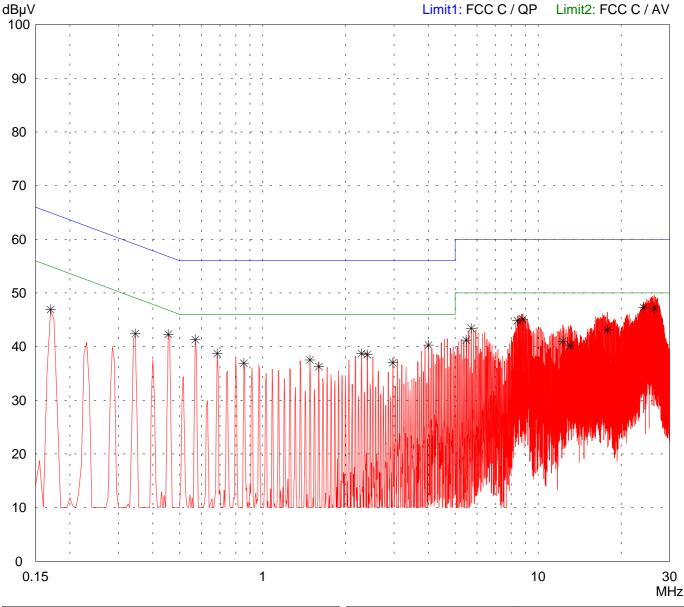
Result: Test Pass Project file: 52305-080803

# Conducted Emission Test 150 kHz - 30 MHz according to FCC Part 15 Subpart C

Model:		
M15 Remote Control for Wheel Chairs		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Shielded room, cabin no. 4		
Tested on:		
Linecord		
Neutral Wire		
Date of test:	Operator:	
09/04/2008	J. Roidt	
Test performed:	File name:	
automatically		

Mode:
Charging Mode
115 V AC

Detector:
Peak / Final Results: QP
Final results:
20 dB Margin
25 Subranges



Result: Test Pass Project file: 52305-080803

# Radiated Emission Test 9 kHz - 30 MHz acc. to FCC Part 15 Subpart C (FAR)

Model: Wheelchair M15		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres		
Date of test:	Operator:	
07/01/2008	M. Steindl	
Test performed:	File name:	
by hand	default.emi	

Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

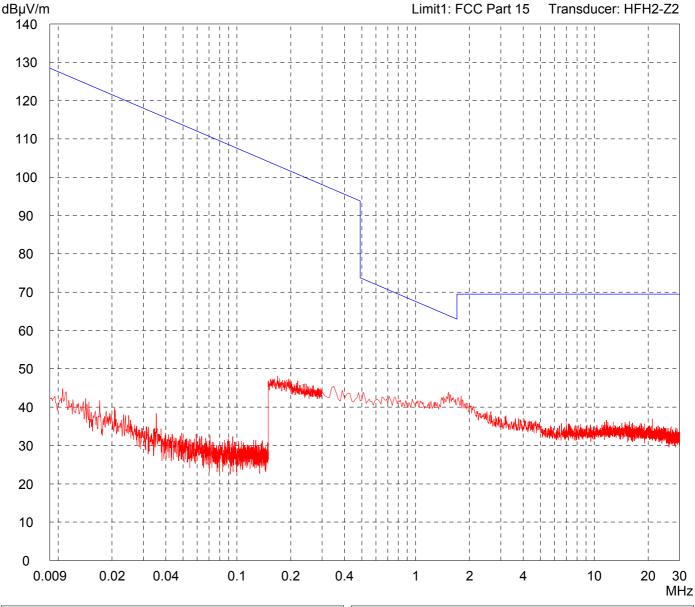
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result:
Prescan

Project file:
52305-80803

# Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C (FAR)

Model: Wheelchair M15		
Serial no.:		
Applicant: Ulrich Alber GmbH		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres Horizontal Polarization		
Date of test:	Operator:	
07/01/2008	M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector:		

Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

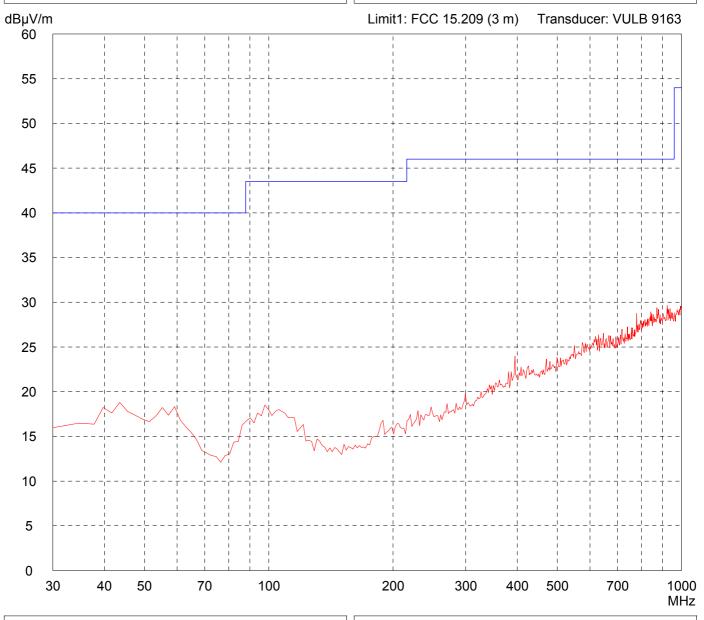
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result:
Prescan

Project file: 52305-80803

# Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C (FAR)

Model: Wheelchair M15		
Serial no.:		
Applicant: Ulrich Alber GmbH		
Test site: Fully anechoic room, cabin no. 2		
Tested on: Test distance 3 metres Vertical Polarization		
Date of test: 07/01/2008	Operator: M. Steindl	
Test performed: automatically	File name: default.emi	
Detector:		

Prescan

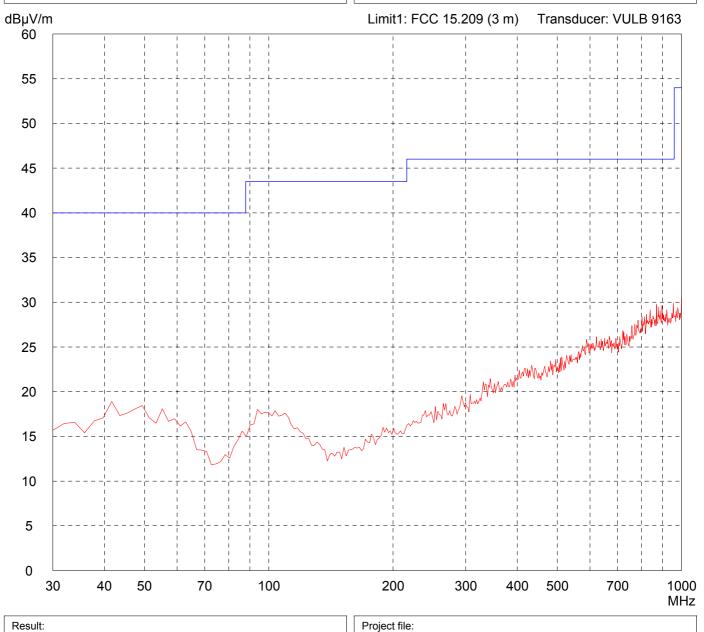
Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

Detector:

Peak

List of values:
10 dB Margin
50 Subranges



Carter Carbil / Acuses 5 Frability and record 45 / D 04245 Charabina / Carter At / D 04245 Charabina / D 04245 Charabi

52305-80803

### Radiated Emission Test 1 GHz - 4 GHz

	CC Part 15 Subpart C (FAR)
Model:	Comment:
Wheelchair M15	- Battery supply
Serial no.:	- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH	- Lowest frequency: 2405 MHz
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: Operator: M. Steindl	
Test performed: File name: automatically default.emi	
Detector: Peak	List of values: Selected by hand
dBμV/m	Limit1: FCC 15.209 (3 m) Transducer: EMCO 3115
100	*
90	
80	
70	
60	
50	I III
40	man harman and a second and a s

MHz Project file: Result: Prescan 52305-80803

2000

3000

4000

30

20

10

0

1000

# Radiated Emission Test 1 GHz - 4 GHz acc. to FCC Part 15 Subpart C (FAR)

Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabin no. 2	
Tested on:	
Test distance 3 metres Vertical Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi
Detector:	

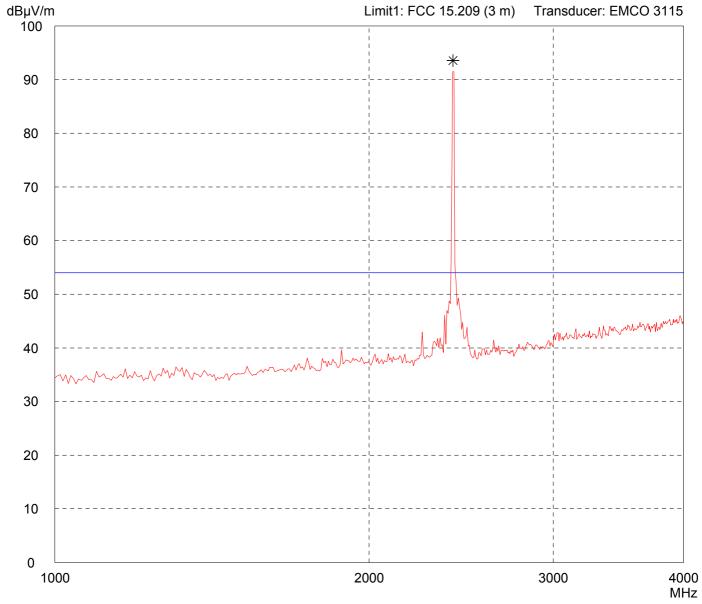
Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

Detector:

Peak

List of values:
Selected by hand



Result: Project file: 52305-80803

# Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 Subpart C (FAR)

Model:	
Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabin no. 2	
Tested on:	
Test distance 3 metres Horizontal Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi

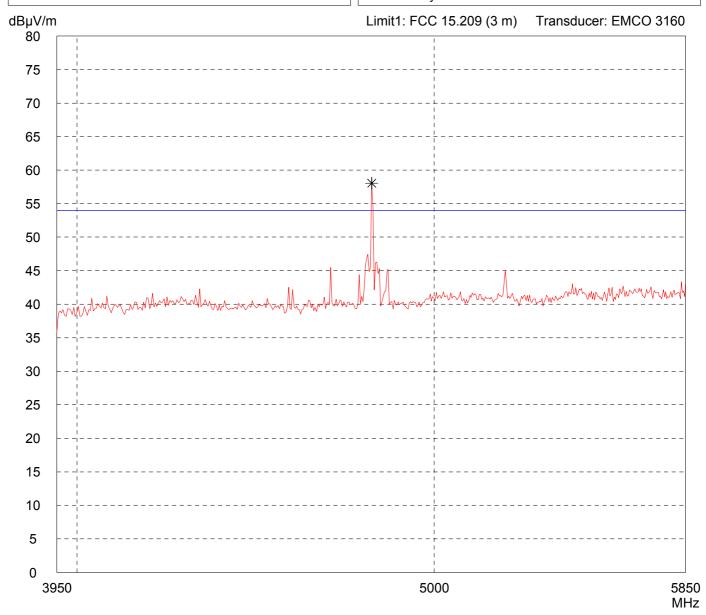
Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

Detector:

Peak

List of values:
Selected by hand



Result: Project file: 52305-80803

Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site: Fully anechoic room, cabin	no. 2
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 07/03/2008	Operator: M. Steindl
Test performed: automatically	File name: default.emi

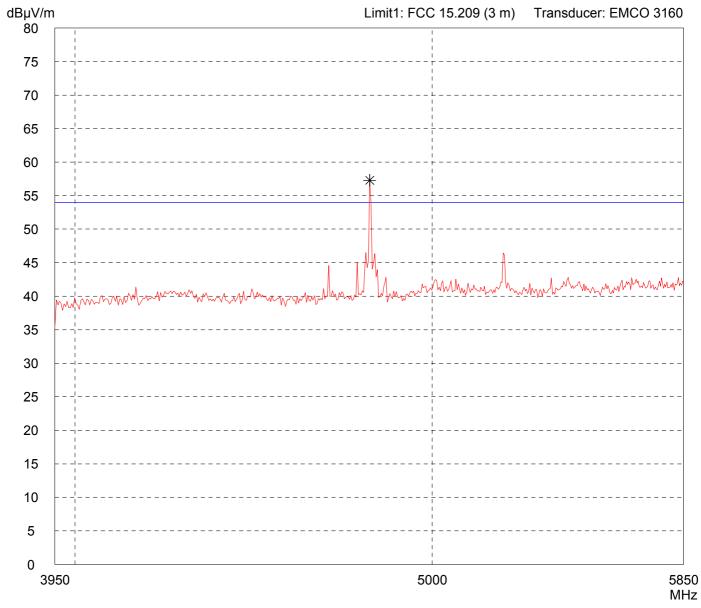
Comment:

- Battery supply
- Transmitting continously with modulation
- Lowest frequency: 2405 MHz

Detector:

Peak

List of values:
Selected by hand



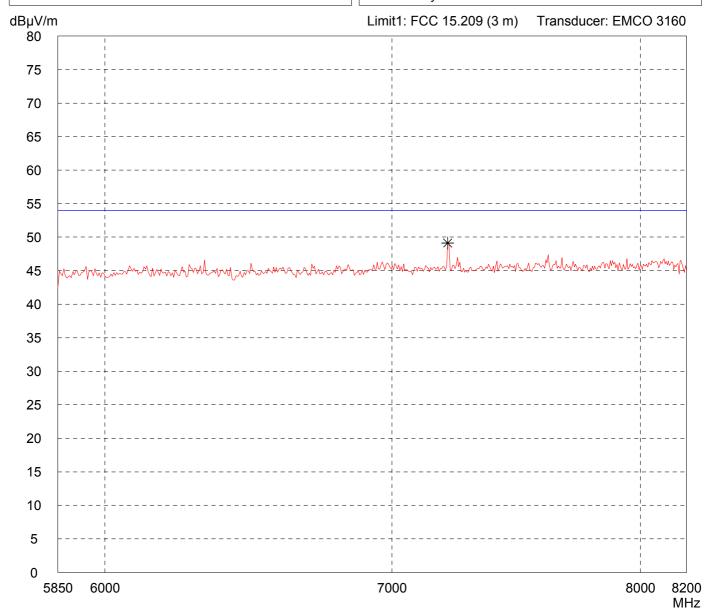
Result:
Prescan

Project file:
52305-80803

Model:		Commen
Wheelchair M15		- Batter
Serial no.:		- Trans
Applicant: Ulrich Alber GmbH		- Lowes
Test site: Fully anechoic room, cabin	no. 2	
Tested on: Test distance 3 metres Horizontal Polarization		
Date of test: 07/03/2008	Operator: M. Steindl	
Test performed: automatically	File name: default.emi	
Detector:		List of val

- y supply
- mitting continously with modulation
- st frequency: 2405 MHz

Peak Selected by hand

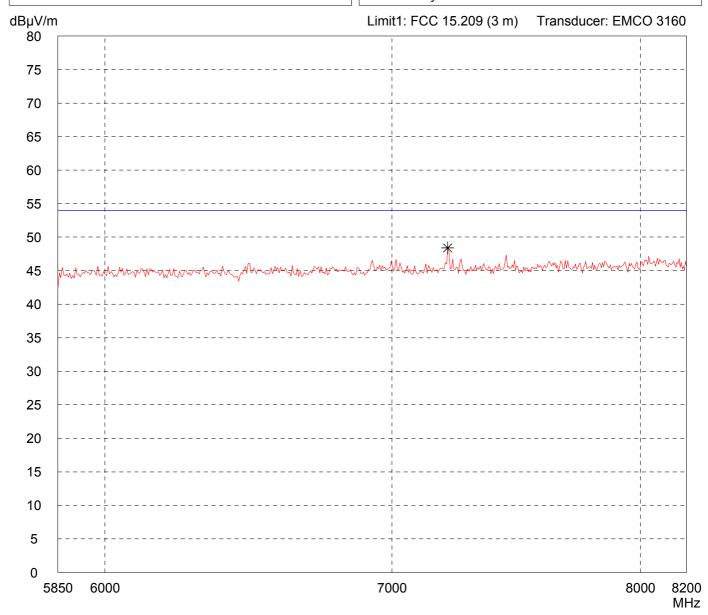


Result: Project file: Prescan 52305-80803

Model:		Comment:
Wheelchair M15		- Battery supply
Serial no.:		- Transmitting con
Applicant: Ulrich Alber GmbH		- Lowest frequency
Test site:		
Fully anechoic room,	, cabin no. 2	
Tested on:		
Test distance 3 metro Vertical Polarization	es	
Date of test:	Operator:	
07/03/2008	M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector:		List of values:
Deals		Calaatad bu baad

- tinously with modulation
- y: 2405 MHz

Selected by hand Peak



Project file: Result: Prescan 52305-80803

	uo	o. to 1 oo 1 art 1	- Cubpart O (1711)	
Model:	lab ata NAA F		Comment:	
Serial no	chair M15		- Battery supply	
Certai III	···		- Transmitting continously	with modulation
Applicar Ulrich	nt: Alber GmbH		- Lowest frequency: 2405	MHz
Test site				
Fully a	anechoic room, cabin no. 2			
Test d	on: istance 1 meter ontal Polarization			
Date of	•			
07/03/				
Test per autom	formed: File nar atically defaul			
Detecto Peak	r:		List of values:	50 Subranges
dBµV/m	1		Limit1: FCC 15.209 (1 m)	Transducer: EMCO 3160
80			1	
75			 	
70			i 	
65			 	
60			 	
55			 	
50	Al themselter and the territories and the second se	aturahanga Labatanga Labatan antunga		han way water the word of the standard of the
45			 	
40			 	
35			 	
30			! 	
25				
20			, 	
15			! !	
10			 	
5			; 	
0 82	200		0000	12400

Prescan 52305-80803

Project file:

MHz

Result:

Model:	Ichair M15	Comment:
Serial n		- Battery supply
		- Transmitting continously with modulation
Applica Ulrich	nt: Alber GmbH	- Lowest frequency: 2405 MHz
Test site		
Tested	anechoic room, cabin no. 2	
	listance 1 meter	
Vertic	al Polarization	
Date of 07/03/	·	
	rformed: File name:	
	natically default.emi	
Detecto	or:	List of values:
Peak		10 dB Margin 50 Subranges
dBµV/n	n	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
80		
75		
70		
70		
65		
60		
	*	
55		ير بين اللبائد الم
50	Marine alper Charalter approximation of a particular section of the section of th	Filen from lifty or loger grant and the control of
45		
40	ļ	
35		
30		
25		
20		
15		
10		
5		
5		
0	200	10000 1240
Ŏ,	200	10000 1240 MH
Result:		Project file:

52305-80803

Prescan

Model: Wheel	chair M15		Comment: - Battery supply	
Serial no	o.:		- Transmitting continously	with modulation
Applican Ulrich	nt: Alber GmbH		- Lowest frequency: 2405 I	MHz
Test site Fully a	e: nechoic room, cabin n	10. 2		
Tested o				
	istance 1 meter ntal Polarization			
Date of t		Operator: M. Steindl		
Test per	formed:	File name: default.emi		
Detector Peak			List of values: Selected by hand	
dBμV/m 80	1		Limit1: FCC 15.209 (1 m)	Transducer: EMCO 3160
75				
70				
65			nmhamman ma	~~~~~~~~~ <del>X</del>
60				
55	mmmmmmm	Mr.		
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
0 12	400			 18000 MHz
Result:	nn		Project file:	1411 12
Presca	<b>111</b>		52305-80803	

Model: Wheelchair M15	Comment: - Battery supply
Serial no.:	- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH	- Lowest frequency: 2405 MHz
Test site: Fully anechoic room, cabin no. 2	
Tested on:	
Test distance 1 meter Horizontal Polarization	
Date of test: Operator: 07/03/2008 M. Steindl	
Test performed: File name: automatically default.emi	
Detector: Peak	List of values: Selected by hand
dBμV/m	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
80	
75	
70	
65	
60	Manufacture of the control of the co
55	destrongent house the form and suppose the remaining of house of the house of the house of the house of the suppose of the sup
50 malermalement market have level and	
45	
40	
35	
30	
25	
20	
15	
10	
5	
0 12400	18000
	MHz
Result: Prescan	Project file: 52305-80803

Model: Wheel	chair M15		Comment: - Battery supply	
Serial no	o.:		- Transmitting continously	with modulation
Applican	nt: Alber GmbH		- Lowest frequency: 2405	MHz
Test site Fully a	e: inechoic room, cabin	no. 2		
	on: istance 1 meter al Polarization			
Date of t		Operator: M. Steindl		
Test per automa	formed: atically	File name: default.emi		
Detector Peak	r:		List of values: Selected by hand	
dBµV/m 80	1		Limit1: FCC 15.209 (1 m)	Transducer: EMCO 3160
75				
70				
65				<del></del>
60			thomas the the same of the sam	
55	mmmmhmm.	~~~		
50				
45				
40				
35				
30				
25				
20				
15				
10				
5				
0 12	400			 18000 MHz
Result: Presca	an		Project file: 52305-80803	

Model: Wheel	chair M15		Comment: - Battery supply	
Serial no	o.:		- Transmitting continously	with modulation
Applican	nt: Alber GmbH		- Lowest frequency: 2405	MHz
Test site	2:			
Fully a	nechoic room, cabin no. 2			
Test di	istance 1 meter al Polarization			
Date of t	•	ator: Steindl		
Test per automa		name: ault.emi		
Detector Peak	r:		List of values: Selected by hand	
dBμV/m 80	1		Limit1: FCC 15.209 (1 m)	Transducer: EMCO 3160
75				
70				
65				
60				
		May I walled the second of the	low your and work allowed for the forther of modern of the lower of th	Waller Marker Ma
55	anner and the same			
50	STANDONNEL STEAMENT THE TAX AND TO			
45				
40				
35				
30				
25				
20				
15				
10				
5				
0	400			18000
	<del></del>			MHz
Result: Presca	an		Project file: 52305-80803	

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15  Serial No.:  Applicant: Ulrich Alber GmbH	Mode: - Battery supply - Transmitting continously with modulation - Lowest frequency: 2405 MHz - Polarisation: horizontal - Distance: 0.5 m
Ref.Level 74.8 dBµV ATT 5 dB/Div.	0 dB Ref. Offset 42.8 dB
	Marker 22.43/3333 GHz 60.52 dBμV
Start 18.000 GHz RBW 1 MHz  VBW  Tested by: M. Steindl  Date: 2008-07-04	Stop 25.000 GHz 1 MHz SWP 40 ms  Project-No.: 52305-080803

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15  Serial No.:  Applicant: Ulrich Alber GmbH	Mode: - Battery supply - Transmitting continously with modulation - Lowest frequency: 2405 MHz - Polarisation: vertical - Distance: 0.5 m
Ref.Level 74.8 dBµV ATT 5 dB/Div.	0 dB Ref. Offset 42.8 dB
	Marker 24.906667 GHz 61.61 dBµV
	61.61; dBµV
Start 18.000 GHz	Stop 25.000 GHz
	1 MHz SWP 40 ms Project-No.: 52305-080803

Model: Wheelchair M15		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Fully anechoic room, c	abin no. 2	
Tested on:		
Test distance 3 metres		
Date of test:	Operator:	
07/01/2008	M. Steindl	
Test performed:	File name:	
by hand	default.emi	

Comment:

- Battery supply
- Transmitting continously with modulation
- Middle frequency: 2445 MHz

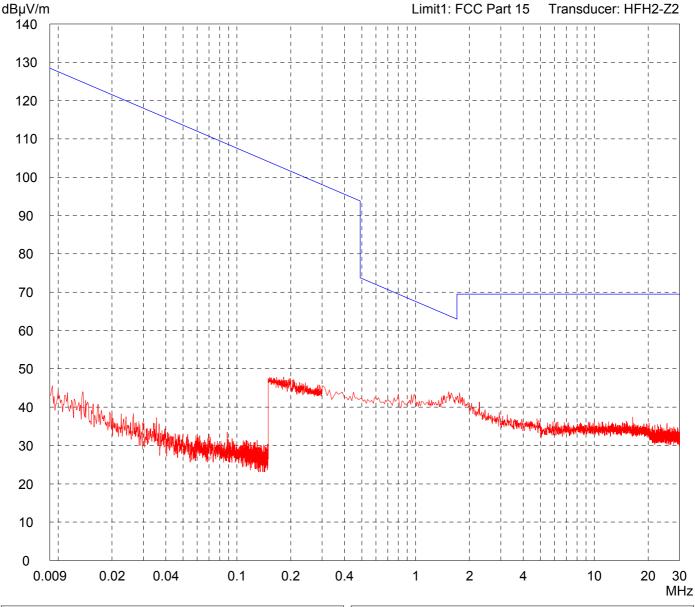
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result:
Prescan

Project file:
52305-80803

Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site: Fully anechoic room, cabir	n no. 2
Tested on:	
Test distance 3 metres Horizontal Polarization	
Date of test:	Operator:
07/01/2008	M. Steindl
Test performed:	File name:
automatically	default.emi
Detector:	

Comment:

- Battery supply
- Transmitting continously with modulation
- Middle frequency: 2445 MHz

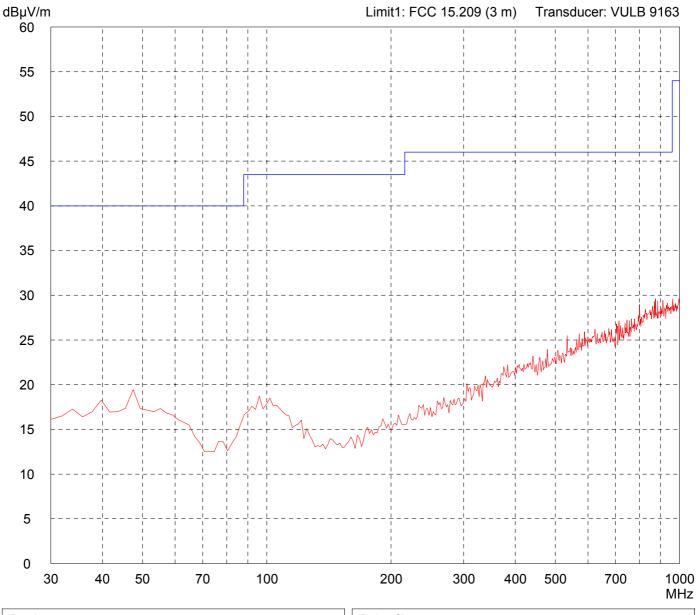
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result: Prescan

Project file: 52305-80803

Model:	
Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabin	ı no. 2
Tested on:	
Test distance 3 metres	
Vertical Polarization	
Date of test:	Operator:
07/01/2008	M. Steindl
Test performed:	File name:
automatically	default.emi
Detector:	

Comment:

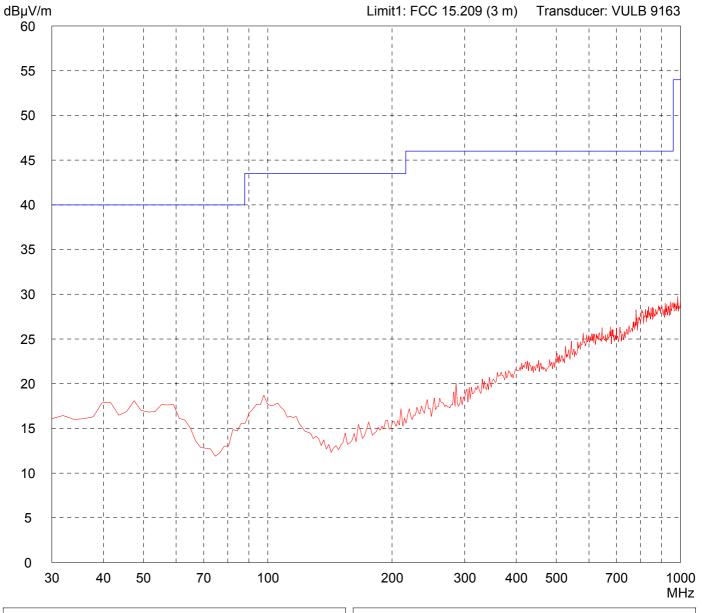
- Battery supply
- Transmitting continously with modulation
- Middle frequency: 2445 MHz

Detector:

Peak

List of values:
10 dB Margin

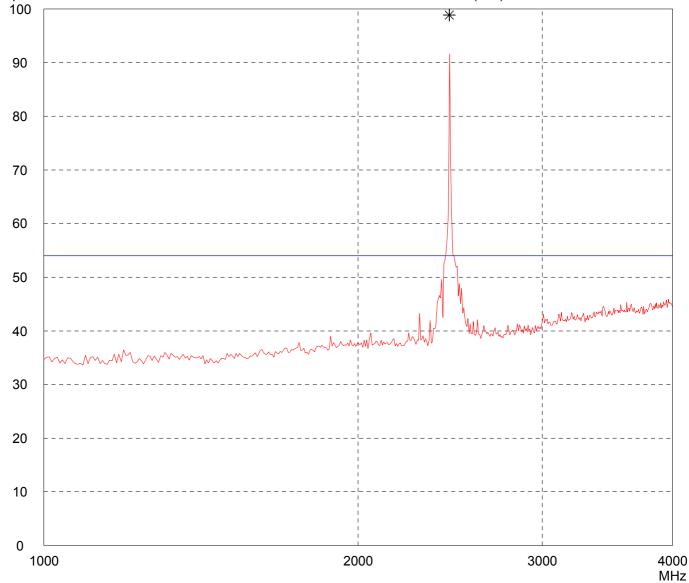
50 Subranges



Result: Prescan

Project file: 52305-80803

acc. to 1 CC 1 art 10 Cappart C (17111)		
Model:		Comment:
Wheelchair M15		- Battery supply
Serial no.:		- Transmitting continously with modulation
Applicant:		- Middle frequency: 2445 MHz
Ulrich Alber GmbH		
Test site:		
Fully anechoic room,	cabin no. 2	
Tested on:		
Test distance 3 metre Horizontal Polarizatio		
Date of test: 07/03/2008	Operator: M. Steindl	
Test performed: automatically	File name: default.emi	
Detector:		List of values:
Peak		Selected by hand
dBμV/m		Limit1: FCC 15.209 (3 m) Transducer: EMCO 3115
100		<del>*</del>



Project file:

Result:

## Radiated Emission Test 1 GHz - 4 GHz

	acc. to FCC P	ırt 15 Sub	part C (FAR)	
Model: Wheelchair M15		Commer		
Serial no.:		- Batte	ry supply	
Genario		- Trans	smitting continous	sly with modulation
Applicant: Ulrich Alber GmbH		- Middl	le frequency: 244	5 MHz
Test site: Fully anechoic room, cab	oin no. 2			
Tested on: Test distance 3 metres Vertical Polarization				
Date of test: 07/03/2008	Operator: M. Steindl			
Test performed: automatically	File name: default.emi			
Detector: Peak		List of va	alues: ed by hand	
dBμV/m 100		Limit1:	FCC 15.209 (3 m	n) Transducer: EMCO 3115
		 	*	 
90				·
80				
70				
60				
50				
40			4-1-41	. = Manhander and American and
· · · · · · · · · · · · · · · · · · ·	Municipality	mmmmm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	

1000 2000 3000 4000 MHz Project file: Result: Prescan 52305-80803

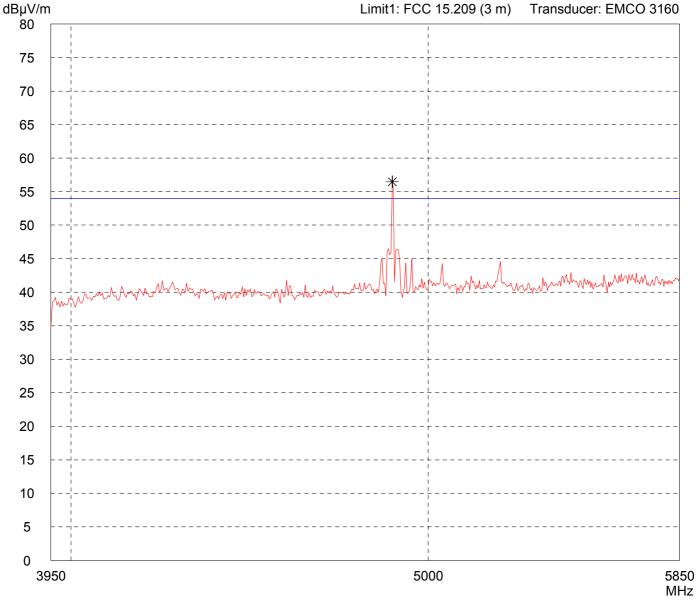
30

20

10

0

Model: Wheelchair M15		Comment: - Battery supply
Serial no.:		- Transmitting continously with modulati
Applicant: Ulrich Alber GmbH		- Middle frequency: 2445 MHz
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres Horizontal Polarization		
Date of test: 07/03/2008	Operator: M. Steindl	
Test performed: automatically	File name: default.emi	
Detector:		List of values:
Peak		Selected by hand



Model:	
Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cab	in no. 2
Tested on:	
Test distance 3 metres	
Vertical Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi
Detectors	

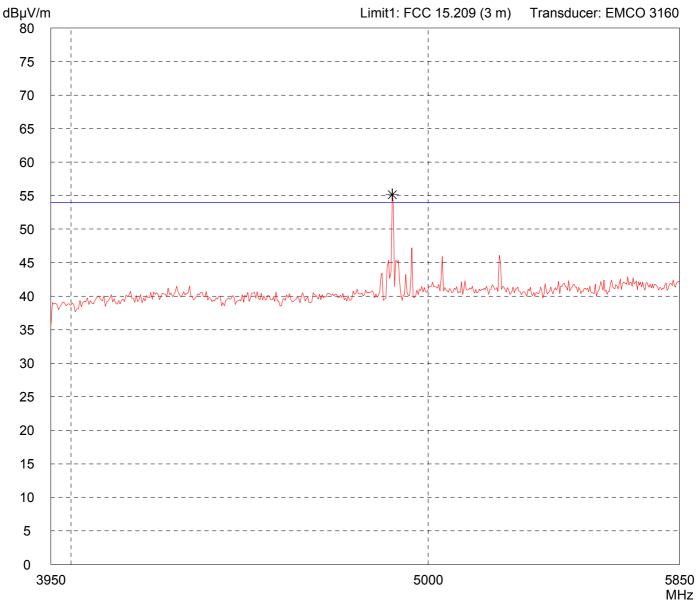
Comment:

- Battery supply
- Transmitting continously with modulation
- Middle frequency: 2445 MHz

Detector:

Peak

List of values:
Selected by hand



Result:
Prescan

Project file:
52305-80803

Model:		Comment:
Wheelchair M15 Serial no.:		- Battery supply
		- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH		- Middle frequency: 2445 MHz
Test site: Fully anechoic roor	n, cabin no. 2	
Tested on:		
Test distance 3 me Horizontal Polariza		
Date of test: 07/03/2008	Operator: M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector: Peak		List of values: Selected by hand
dBμV/m		Limit1: FCC 15.209 (3 m) Transducer: EMCO 3160
80		
75		
70		
65		
60		
55		
50		
45 - 4-1-1	A-A A	amandurano - La alamanda de la comanda de la
	A DWWW. and a Magazine	
40		
35		
30		
25		
20		
15		
10		
_		
5		

Result: Prescan

Project file:

Model:	Labata 8445		Comment:	
Whee Serial r	elchair M15		- Battery supply	
			- Transmitting continously with modulation	
Applica Ulrich	nt: Alber GmbH		- Middle frequency: 2445 MHz	
Test sit	e: anechoic room, c	eahin no 2		
Tested		ADIII 110. Z		
	distance 3 metres al Polarization	3		
Date of		Operator:		
07/03 Test pe	rformed:	M. Steindl File name:		
I .	natically	default.emi		
Detecto Peak	or:		List of values: Selected by hand	
dBµV/r	n		Limit1: FCC 15.209 (3 m) Transducer: EMCO	3160
80				
75				
70				
65				
60				
55				
50				
		a	mana sa	Www
45		=1,44 - Mad 4,400 - 24		
40				
35				
30				
25	<u> </u>			
20				
15				
10				
5				
0 5	850 6000		7000 8000	820 MH
Result:			Project file:	

Prescan

	200 10	0000 124 MH
0		
10 5		
15		
20		
25		
30		
35		
40		
45		
50	Mariente Carlowin metapolitica in 14 horante halve no 140 horante horante de principo de frança for mario	Welley Mandred and an enter the designation and research from a result of the property of the
55		motion that the second of the second
60	*	   
65		
70		
75		- <del>-</del>
80		
BµV/m	n	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
Detecto Peak	r:	List of values: 10 dB Margin 50 Subranges
	rformed: File name: patically default.emi	
07/03/	/2008 M. Steindl	
	ontal Polarization	
Tested	on: listance 1 meter	
Test site Fully a	e: anechoic room, cabin no. 2	
Applicar Ulrich	<sup>nt:</sup> Alber GmbH	- Middle frequency: 2445 MHz
Serial n		- Transmitting continously with modulation
	Ichair M15	Comment: - Battery supply

Result: Prescan

Project file:

			. ,	
Model:	Ichair M15		ment:	
Serial no			attery supply	
Applicar	n.t.		ansmitting continously	
Applicar Ulrich	Alber GmbH	- Mi	ddle frequency: 2445 N	ЛНZ
Test site	e: anechoic room, cabin no. 2			
Tested of				
	listance 1 meter al Polarization			
Date of	test: Operator:			
07/03/	/2008 M. Steindl rformed: File name:			
	atically default.emi			
Detector	r:		of values:	FO Cubrance
Peak dBµV/m	n		dB Margin t1: FCC 15.209 (1 m)	50 Subranges Transducer: EMCO 3160
80		Lilling	11.1 00 10.200 (1111)	Transducer. Liveo 5100
75				
70				
65		<del> </del>		
60		* !		
55				
50	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		**************************************	Will or Milk to that I A A Company with the second to the
45		<del> </del>		
40	<u>'</u>			
35		<del>-</del>		
30		 		
25				
20				
15		<del> </del>		
10		<del> </del>		
5				
0				
	200	10000		1240 MHz
Result:		Proie	ect file:	

Prescan

Model: Wheel	chair M15	Comment: - Battery supply
Serial no	D.:	- Transmitting continously with modulation
	Alber GmbH	- Middle frequency: 2445 MHz
Test site Fully a	nechoic room, cabin no. 2	
	on: istance 1 meter ntal Polarization	
Date of t	•	
Test per automa		
Detector Peak	·:	List of values: Selected by hand
dBµV/m 80		Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75		
70		
65		
60		harman properties of the second of the secon
55	Lymyleynlan, med and my few from the few fro	
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0 124	400	 18000 MHz
Result:	ın	Project file: 52305-80803

Model: Wheel	chair M15	Comment: - Battery supply
Serial no	D.:	- Transmitting continously with modulation
Applicar	nt:	- Middle frequency: 2445 MHz
	Alber GmbH	-
Test site Fully a	nechoic room, cabin no. 2	
Tested o		
	istance 1 meter ntal Polarization	
Date of t	•	
Test per		
autom		
Detector Peak	:	List of values: Selected by hand
dBµV/m	1	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
80	· [	
75		
70		
65		
60		<del></del>
55		water was a superior of the su
50	phelamone-thananedhalamenthalament	
45		
40		
35		
30		
25		
20		
15		
10		
5		
0	400	4000
12	400	18000 MHz
Result:		Project file:

Prescan - VBW = 100 kHz

Model:	Comment:
Wheelchair M15	- Battery supply
Serial no.:	- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH	- Middle frequency: 2445 MHz
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 1 meter Vertical Polarization	
Date of test: Operator: 07/03/2008 M. Steindl	
Test performed: File name: automatically default.emi	
Detector: Peak	List of values: Selected by hand
dBµV/m 80	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75	
70	
65	
60	Marker of the support of the contract of the c
55 marriage	
50	
45	
40	
35	
30	
25	
20	
15	
10	
5	
0 12400	18000 MHz
Result: Prescan	Project file: 52305-80803

Model: Wheel	chair M15	Comment: - Battery supply
Serial no		- Transmitting continously with modulation
Applican	ıt:	- Middle frequency: 2445 MHz
	Alber GmbH	Wilding Hoquerloy. 2110 Will 2
Test site Fully a	: nechoic room, cabin no. 2	
Tested c		
	stance 1 meter al Polarization	
Date of t	•	
Test per		
automa		
Detector Peak	:	List of values: Selected by hand
dBµV/m		Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
80		Elimeti. 1 de 16:200 (1 m) Transadori. Elimet 6 100
75		
70		
65		
60		
	property was a superior of the	harmelle allengen mengemen mengel engane in proposition proposition and all and the proposition and the pr
55	- many and many many many many many many many many	
50	Papter Treatment of the Atom o	
45		
40		
35		
30		
25		
20		
15		
10		
5		
0		
	400	18000 MHz
Result:		Project file:

Prescan - VBW = 100 kHz

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15  Serial No.:  Applicant: Ulrich Alber GmbH		Mode: - Battery supply - Transmitting continously with n - Middle frequency: 2445 MHz - Polarisation: horizontal - Distance: 0.5 m	
Ref.Level 74.8 dBµV 5 dB/Div.	ATT	dB	Ref. Offset 42.8 dB
		Morke	
	-	22.09	2000 011
	MANAMAN	22.09 61.00	
Start 18.000 GHz RBW 1 MHz	VBW 1	MHz	Stop 25.000 GHz SWP 40 ms
Tested by: M. Steindl	V D V V	Project-No.: 52305-080803	OWF 40 IIIS
Date: 2008-07-04			

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15 Serial No.:  Applicant: Ulrich Alber GmbH	Mode: - Battery supply - Transmitting continously with modulation - Middle frequency: 2445 MHz - Polarisation: vertical - Distance: 0.5 m
Ref.Level 74.8 dBµV ATT 5 dB/Div.	0 dB Ref. Offset 42.8 dB
Start 18.000 GHz	Stop 25.000 GHz
	1 MHz SWP 40 ms  Project-No.: 52305-080803

Model: Wheelchair M15		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metres		
Date of test:	Operator:	
07/01/2008	M. Steindl	
Test performed:	File name:	
by hand	default.emi	

Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

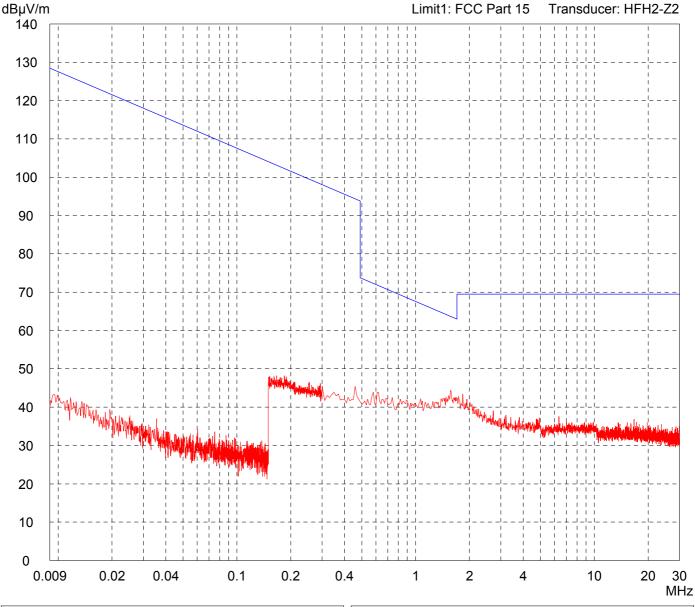
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site: Fully anechoic room, cabir	n no. 2
Tested on:	
Test distance 3 metres Horizontal Polarization	
Date of test:	Operator:
07/01/2008	M. Steindl
Test performed:	File name:
automatically	default.emi
Detector:	

Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

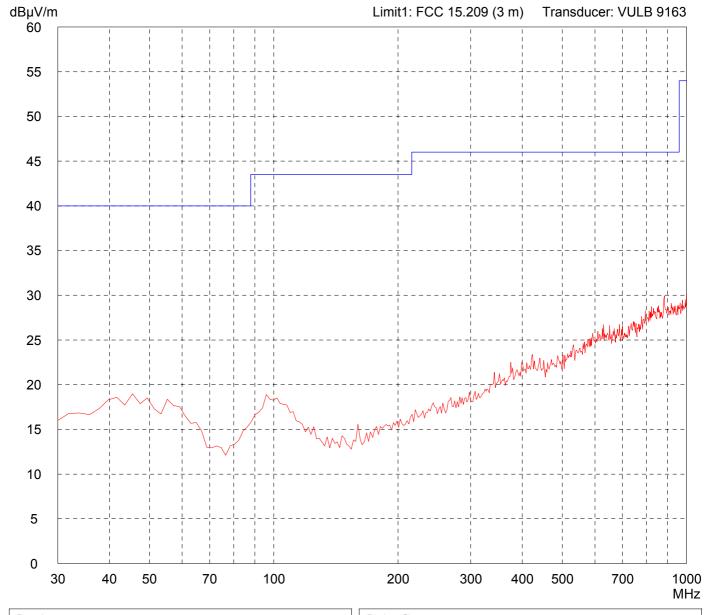
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result: Prescan

Project file: 52305-80803

Model: Wheelchair M15		
Wheelchail W15		
Serial no.:		
Applicant:		
Ulrich Alber GmbH		
Test site:		
Fully anechoic room, c	abin no. 2	
Tested on:		
Test distance 3 metres		
Vertical Polarization		
Date of test:	Operator:	
07/01/2008	M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector:		
Peak		

Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

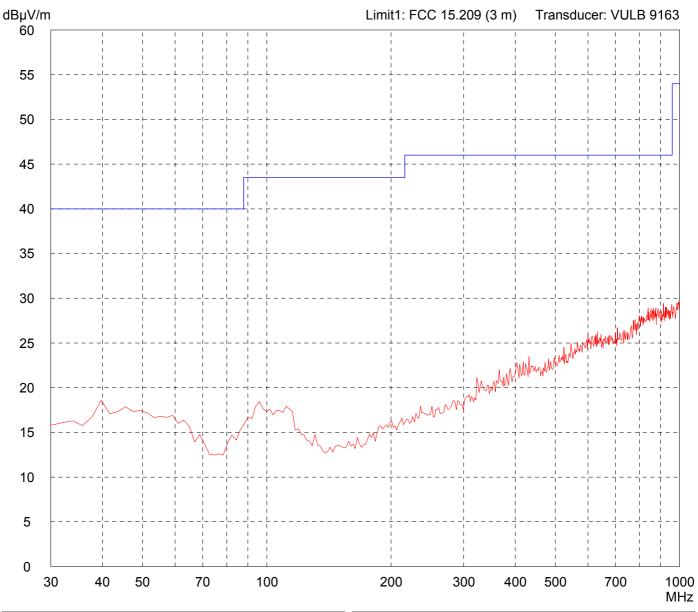
Detector:

Peak

List of values:

10 dB Margin

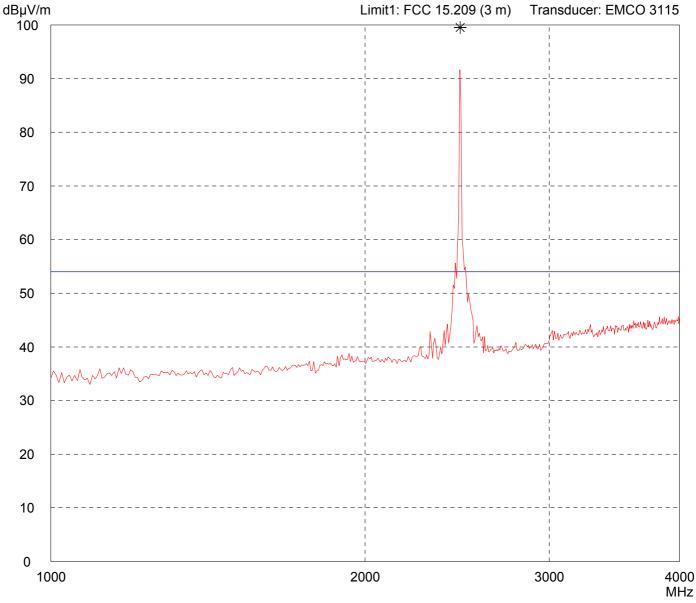
50 Subranges



Result: Prescan

Project file: 52305-80803

Model: Wheelchair M15		Comment: - Battery supply
Serial no.:		- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH		- Highest frequency: 2465 MHz
Test site:		
Fully anechoic room,	cabin no. 2	
Tested on:		
Test distance 3 metre Horizontal Polarization		
Date of test:	Operator:	
07/03/2008	M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector:		List of values:
Peak		Selected by hand



Project file:

Result:

Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site: Fully anechoic room, cabir	ı no. 2
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 07/03/2008	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector:	

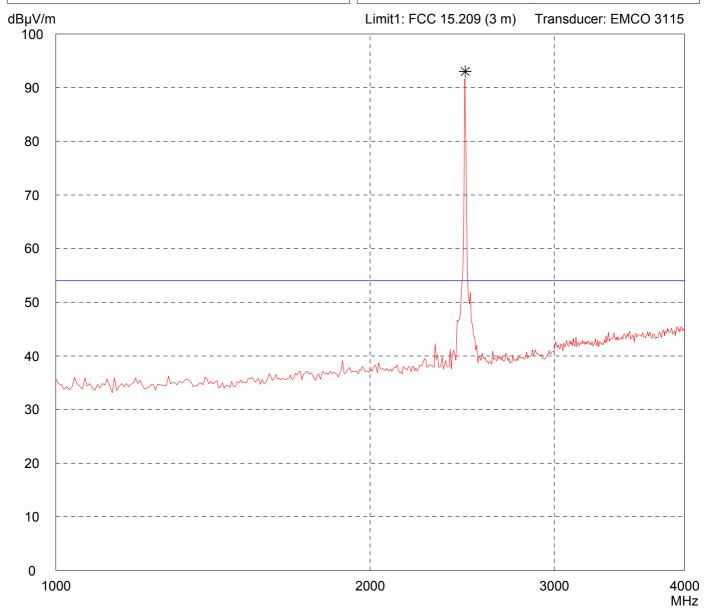
Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

Detector:

Peak

List of values:
Selected by hand



Model: Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabi	n no. 2
Tested on:	
Test distance 3 metres Horizontal Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi

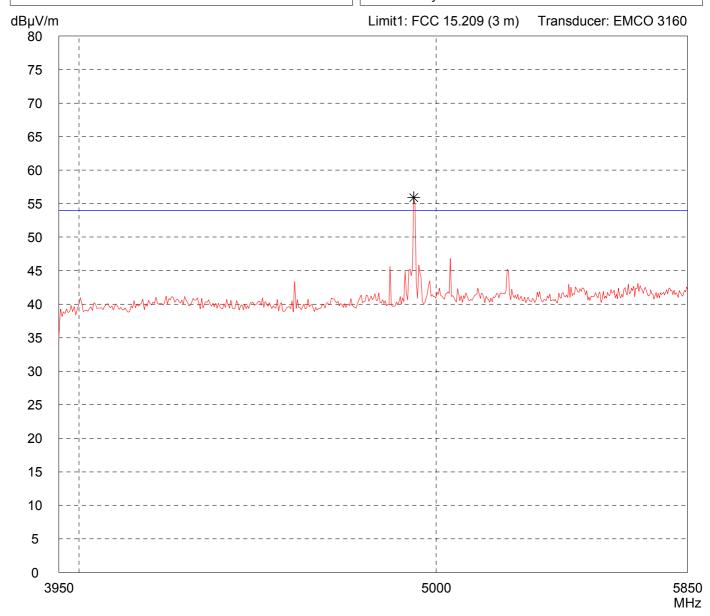
Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

Detector:

Peak

List of values:
Selected by hand



Model: Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabi	n no. 2
Tested on:	
Test distance 3 metres Vertical Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi

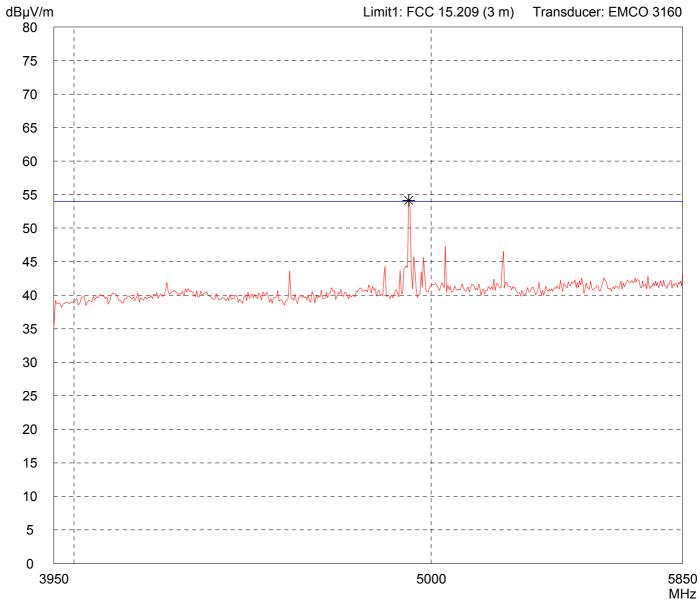
Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

Detector:

Peak

List of values:
Selected by hand



Model: Wheelchair M15	
Serial no.:	
Applicant: Ulrich Alber GmbH	
Test site: Fully anechoic room, cabi	in no. 2
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 07/03/2008	Operator: M. Steindl
Test performed: automatically	File name: default.emi
Detector:	

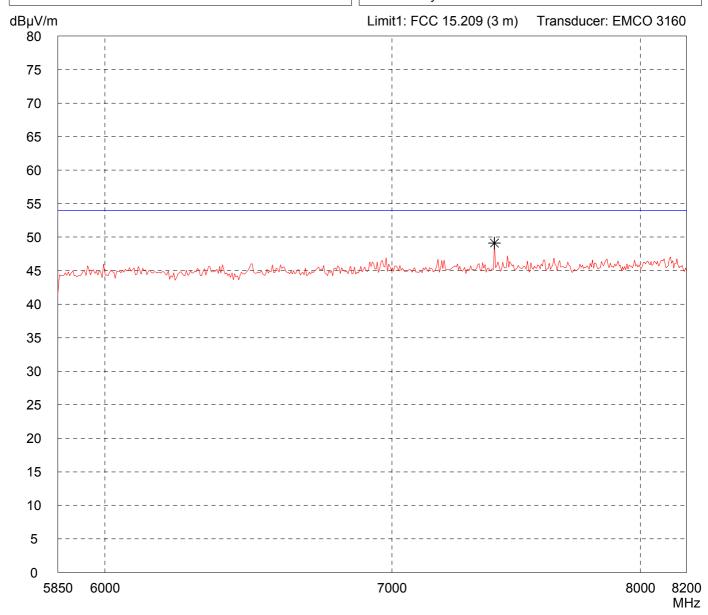
Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

Detector:

Peak

List of values:
Selected by hand



Result:
Prescan

Project file:
52305-80803

Model: Wheelchair M15		
Serial no.:		
Applicant: Ulrich Alber GmbH		
Test site: Fully anechoic room, cabi	n no. 2	
Tested on: Test distance 3 metres Vertical Polarization		
Date of test: 07/03/2008	Operator: M. Steindl	
Test performed: automatically	File name: default.emi	
Detector:		

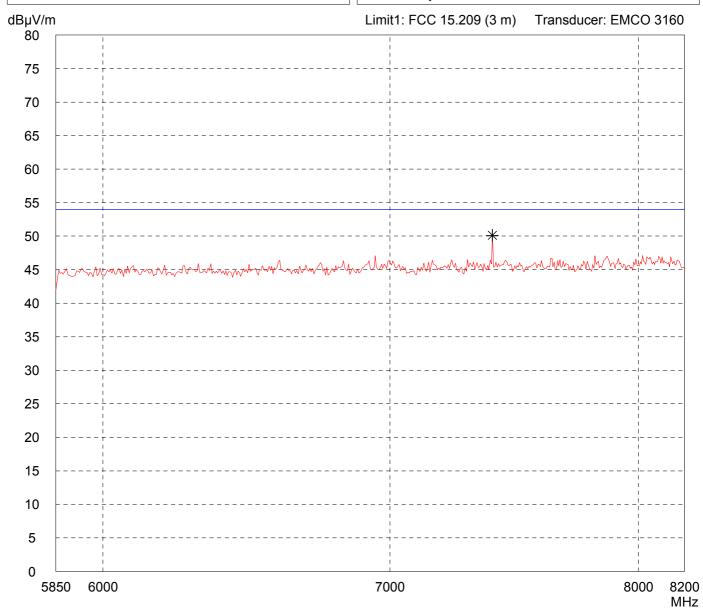
Comment:

- Battery supply
- Transmitting continously with modulation
- Highest frequency: 2465 MHz

Detector:

Peak

List of values:
Selected by hand

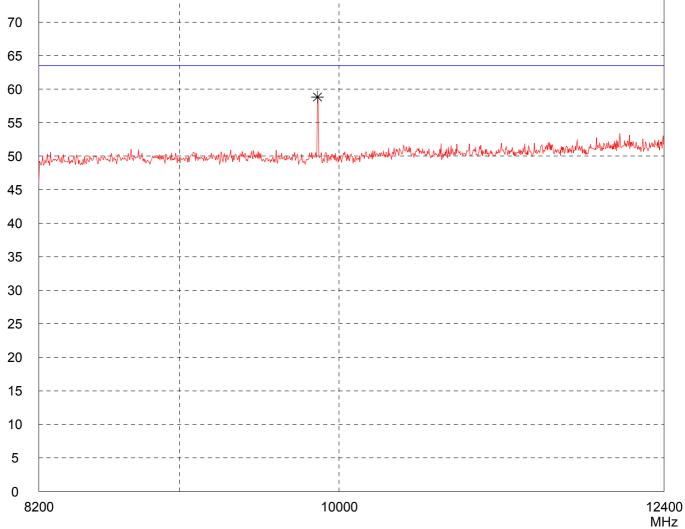


Result:
Prescan

Project file:
52305-80803

#### Radiated Emission Test 8.2 GHz - 12.4 GHz

		acc. to FCC Par	t 1	5 Subpart C (FAR)
Model:				Comment:
Wheel	chair M15			- Battery supply
Serial no	o.:			- Transmitting continously with modulation
Applicar Ulrich	nt: Alber GmbH			- Highest frequency: 2465 MHz
Test site Fully a	e: nnechoic room, cabin no	. 2		
	on: istance 1 meter intal Polarization			
Date of t		perator: 1. Steindl		
Test per automa		ile name: efault.emi		
Detector Peak	r:			List of values: 10 dB Margin 50 Subranges
dBµV/m	1	1		Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75		; ; ; ; ;		i 
70		 		 
65		1 1 1 1		
60		; ; ;	 <del>K</del>	
55		' 		Land of the second seco
	Mythantalle new hardy and a party and a party	white the second of the second	Щфим	worked the second of the secon
45	<b> </b>	+		+



Project file: Result: Prescan 52305-80803

	15 Subpart C (FAR)
Model:	Comment:
Wheelchair M15	_   - Battery supply
Serial no.:	- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH	- Highest frequency: 2465 MHz
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 1 meter Vertical Polarization	
Date of test: Operator: 07/03/2008 M. Steindl	
Test performed: File name: automatically default.emi	
Detector: Peak	List of values: 10 dB Margin 50 Subranges
dBμV/m 80	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75	
70	
65	
60	
55	
50 takakaitanaanokhkuranengoandohtaanankanomeneranaanantaanohtaanank	orangaphan, marapalila Malheranak sahapahapada Mahakansah Nalan Julia Halli Hallina Manakan Malakan manakat In
45	
40	
35	<del> </del>
30	

0 8200 10000 12400  $\mathsf{MHz}$ Project file: Result: Prescan 52305-80803

25

20

15

10

5

Model: Wheel	chair M15		Comment: - Battery supply
Serial no	o.:		- Transmitting continously with modulation
Applicar Ulrich	nt: Alber GmbH		- Highest frequency: 2465 MHz
Test site	e: nnechoic room, cabin no. 2		
	on: istance 1 meter intal Polarization		
Date of test: Operator: 07/03/2008 M. Steindl			
Test per autom	formed: File name: atically default.emi		
Detector Peak	r:		List of values: Selected by hand
dBµV/m 80	1		Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75			
70			
65			<del></del>
60		www.	who will be a second of the se
55	Lammy Many		
50			
45			
40			
35			
30			
25			
20			
15			
10			
5			
0 12	400		18000 MHz
Result:	an		Project file: 52305-80803

Model: Wheel	chair M15		Comment: - Battery supply	
Serial no	o.:		- Transmitting continously	with modulation
Applicar Ulrich	nt: Alber GmbH		- Highest frequency: 2465	MHz
Test site	e: Inechoic room, cabir	nno 2		
Tested of		1110. 2		
1	istance 1 meter ntal Polarization			
Date of t		Operator: M. Steindl		
Test per		File name:		
autom	atically	default.emi		
Detector Peak	r:		List of values: Selected by hand	
dBμV/m	١		Limit1: FCC 15.209 (1 m)	Transducer: EMCO 3160
80				
75				
70				
65				
60				
55			m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.m.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
50	MANAMAN M	LMM		
45				
40				
35				
30				
25				
20				
15				
10				
5				
0	400			
IΖ	<del>-</del>			MHz
Dogult:			Draiget file:	

52305-80803

Prescan - VBW = 100 kHz

Model: Wheelcl	hair M15	Comment: - Battery supply
Serial no.:		- Transmitting continously with modulation
Applicant: Ulrich A	lber GmbH	- Highest frequency: 2465 MHz
Test site: Fully an	echoic room, cabin no. 2	
	: tance 1 meter Polarization	
Date of te	•	
Test perfo		
Detector: Peak		List of values: Selected by hand
dBμV/m 80 ┌		Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75		
70		
65		**************************************
60		mmy my
55	mmmmmmmm	
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0 124	00	18000 MHz
Result: Prescar	1	Project file: 52305-80803

acc. to FCC Pa	art 15 Subpart C (FAR)
Model: Wheelchair M15	Comment: - Battery supply
Serial no.:	- Transmitting continously with modulation
Applicant: Ulrich Alber GmbH	- Highest frequency: 2465 MHz
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 1 meter	
Vertical Polarization	
Date of test: Operator: O7/03/2008 M. Steindl	
Test performed: File name: automatically default.emi	
Detector: Peak	List of values: Selected by hand
dBμV/m 80	Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160
75	
70	
65	
60	<del>*</del> -
	gunnaman hallen hamman
50	
45	
40	
70	



Result:

Prescan - VBW = 100 kHz

Project file:

52305-80803

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15  Serial No.:  Applicant: Ulrich Alber GmbH	Mode: - Battery supply - Transmitting continously with modulation - Highest frequency: 2465 MHz - Polarisation: horizontal - Distance: 0.5 m
Ref.Level 74.8 dBµV ATT 5 dB/Div.	0 dB Ref. Offset 42.8 dB
	Marker 24.828889 GHz 60.33 dΒμV
Start 18.000 GHz RBW 1 MHz  VBW  Tested by: M. Steindl  Date: 2008-07-04	Stop 25.000 GHz 1 MHz SWP 40 ms  Project-No.: 52305-080803

#### Radiated Emission Test acc. to FCC Part 15 Subpart C

Model: Wheelchair M15  Serial No.:  Applicant: Ulrich Alber GmbH	Mode: - Battery supply - Transmitting continously with modulation - Highest frequency: 2465 MHz - Polarisation: vertical - Distance: 0.5 m					
Ref.Level 74.8 dBµV A <sup>-</sup> 5 dB/Div.	TT 0 dB Ref. Offset 42.8 dB					
	Marker23.180000 GHz60.78 dBμV60.78 dBμV					
Start 18.000 GHz RBW 1 MHz  Tested by: M. Steindl  Date: 2008-07-04	Stop 25.000 GHz W 1 MHz SWP 40 ms  Project-No.: 52305-080803					

Result:	+0	J0	70	100	Project file			700	MHz
0 30	40	50	70	100	200	300 4	00 500	700	1000
5		<del> </del>				; 	; 		1
10			- <del> </del>				·		<del> </del>
15		<del> </del>			<del></del>				
20 -					+	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			+
25							in white	policinal policinal — —	+
30		<del> </del>	- L		<u> </u>	mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm			Araphyllup.
35									1
40				<u>                                     </u>	<del>-</del>	         			· -
45			-			          			
50 -	 	<del> </del>				         			+ -         
55	 	 				 			
60 F	 	 				1 00 10.200 (0 111	, ransuu		-
Peak dBµV/m					10 dB M	argin FCC 15.209 (3 m	50 Subra	nges cer: VULB	9163
Detector:					List of valu				
Test perfor	med:		File name:						
Date of tes	t:		Operator: M. Steind	1					
Test dist	ance 3 me al Polariza								
	echoic roo	m, cabin	no. 2						
Applicant: Ulrich Al Test site:	ber GmbH	l				J			
Serial no.:					- Norma Receiv	l operation mode ing			
Wheelch	air M15				Comment:				
Model:					Comment:				

0	30	40	50	7	0	1	00		200	300	400	500	700	100 MF
5			 	1					<del> </del>	<sup>1</sup>	<u> </u>   			<u>                                     </u>
10			       			     	         		<del> </del>	       	<del> </del>   		-    	
15		<del>-</del>		† - \ -		/-	; <sub>1</sub>	~~~\\\\\	; ; 4,7, <u>4,</u> ,	       	<del> </del>   			
20				+	 	i	<u></u>		+	MMM.			-  <del> </del>	
25		         		+         	 		L		<del>+</del>		<del>-</del>	MMMMM	PA-TEMANNIA PALIT	+ 
30		         		1 1 1 1 1		         			<del> </del>		<u>-</u>         			Milliport Inplain
35									<del> </del>		<del> </del>			
40			 	 			 		<del> </del>		<del>-</del>	 	  -   	
45				+   			     			          	<del> </del>	        		1 - +
50		       	        	 		        			+       				-	
55			        						<del> </del>	 	<del> </del>	 		
dBµV/r 60	n	 	 	1 1 1		[ ] [	 	L	imit1: FC	C 15.209	(3 m)	Transdu	icer: VUL	В 9163 
Peak								10	t of values: dB Marg			50 Subra		D 0400
auton	erformed: natically	1			name ault.e									
	al Pola				rator: Steir	ndl								
Tested			n, cabin	no. 2	2									
Applica Ulrich Test sit	Alber (	GmbH							3					
Serial no.:							- Normal operation mode Receiving							
Model: Whee	lchair N	<i>I</i> 115						- E	Battery su	ipply				

Model: Wheelchair M15	
Serial no.:	
Applicant:	
Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabir	n no. 2
Tested on:	
Test distance 3 metres Horizontal Polarization	
Date of test:	Operator:
07/03/2008	M. Steindl
Test performed:	File name:
automatically	default.emi

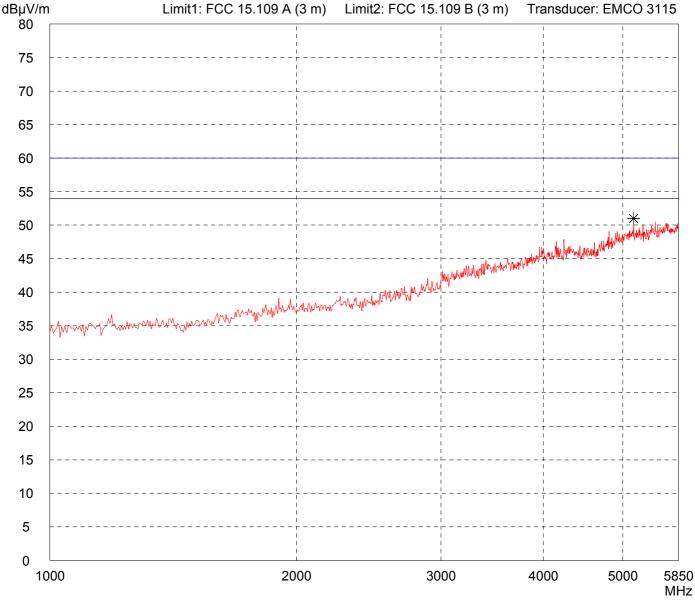
Comment:

- Battery supply
- Normal operation mode Receiving

Detector:

Peak

List of values:
Selected by hand



Result: Project file: 52305-80803

Model:		C
Wheelchair M15		
Serial no.:		
		-
Applicant:		
Ulrich Alber GmbH		
Test site:		
Fully anechoic room, cabin no. 2		
Tested on:		
Test distance 3 metre	S	
Vertical Polarization		
Date of test:	Operator:	
07/03/2008	M. Steindl	
Test performed:	File name:	
automatically	default.emi	
Detector:		

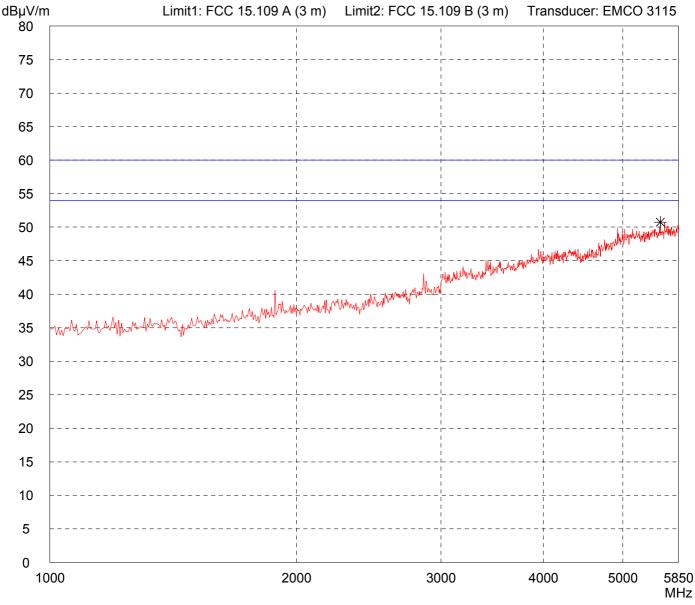
Comment:

- Battery supply
- Normal operation mode Receiving

Detector:

Peak

List of values:
Selected by hand



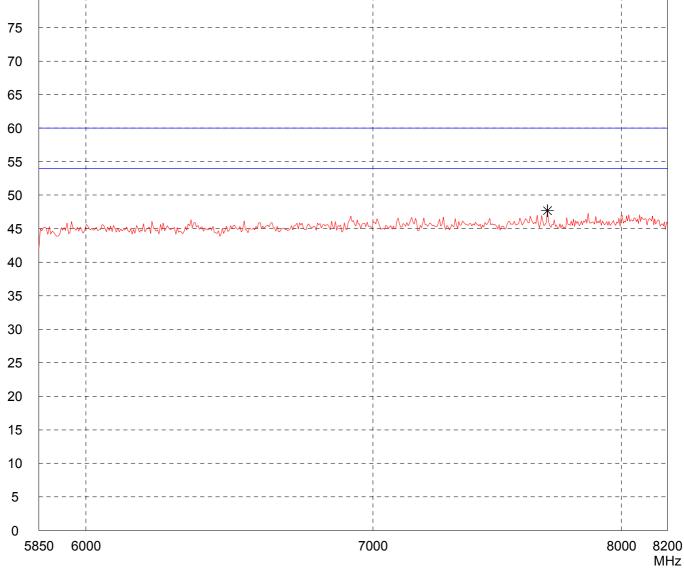
Result: Project file: 52305-80803

Model:	elchair M15			mment: Battery supply	
Serial no.:		  - N	- Normal operation mode		
Applica	int: Alber Gmbl	ц	R	Receiving	
Test sit	e:				
Fully Tested		om, cabin no. 2			
Test of	on. distance 3 m ontal Polariz				
Date of 07/03		Operator: M. Steindl			
	erformed:	File name:			
	natically	default.emi			
Detector Peak	or:		1 1	t of values: elected by hand	
dBµV/r	n	Limit1: FCC 15.109 A (3 m)		2: FCC 15.109 B (3 m) Transducer: EMCO 3160	
80					
75					
70				 	
65	<del> </del>			 	
60					
55	 				
50	<del> </del>			 	
45	77W-42-7 <del>-</del> 7W-		,,,, <u>*</u>	Varturanista in many many management	
40				 	
35					
30					
25					
20					
15					
10					
5					
0	850 6000		7	7000 8000 8	
				N	
Result:			Proi	oject file:	

52305-80803

Prescan

acc. to FCC Part	t 15 Subpart B (FAR)
Model: Wheelchair M15	Comment:
Serial no.:	- Battery supply
	- Normal operation mode Receiving
Applicant: Ulrich Alber GmbH	
Test site:	
Fully anechoic room, cabin no. 2	
Tested on:	
Test distance 3 metres Vertical Polarization	
Date of test: Operator: O7/03/2008 M. Steindl	
Test performed: File name:	
automatically default.emi	
Detector:	List of values:
Peak	Selected by hand
dBμV/m Limit1: FCC 15.109 A (3 m)	Limit2: FCC 15.109 B (3 m) Transducer: EMCO 3160
75	
75	
70	
65	
60	
55	



Result:
Prescan

Project file:
52305-80803

Model: Wheel	chair M15	Comment: - Battery supply
Serial no	D.:	- Normal operation mode Receiving
Applican Ulrich	nt: Alber GmbH	Receiving
Test site Fully a	e: nechoic room, cabin no. 2	
Tested o	on:	
	istance 1 meter ntal Polarization	
Date of t	•	
Test per		
Detector Peak	·	List of values: 10 dB Margin 50 Subranges
dBµV/m	Limit1: FCC 15.109 A (1 m)	
80	 	
75		
70		 
65	 	
60		·
55	· · · · · · · · · · · · · · · · · · ·	
50		My Many Many Many Many Many Many Many Ma
45	 	
40	¦ 	!
35		
30		
25	¦ 	
20	i 	·
15		
10	<del>-</del>	
5	, , , ,	
0		40000
82	200	10000 12400 MHz
Result: Presca	an	Project file: 52305-80803

Model: Wheel	chair M15		Comment: - Battery supply	
Serial no	o.:		- Normal operation mode	
Applican	nt: Alber GmbH		Receiving	
Test site:		phin no. 2		
Tested o		ADIII IIO. 2		
	istance 1 meter al Polarization			
Date of t		Operator: M. Steindl		
Test per automa	formed: atically	File name: default.emi		
Detector Peak	r:		List of values: 10 dB Margin 50 Subranges	
dBμV/m 80	1	Limit1: FCC 15.109 A (1 m)	Limit2: FCC 15.109 B (1 m) Transducer: EMCO 3160	
75		; ; <del>-</del>		
70				
65				
60				
55		; <del>-</del>		
50	Murchaptur purchanden	ing pangkalanda pangkarang pangkarang pangkarang pangkarang pangkarang pangkarang pangkarang pangkarang pangkar	- Auth Colores by provide say have been freely freely the strain of the freely freely the following of the providence of the providence of the freely the	
45				
40			 	
35				
30				
25				
20				
15				
10		<del>-</del>		
5				
0 82	200	<u> </u>	10000 1240	
			MHz	
Result: Presca	an		Project file: 52305-80803	

Model: Wheel	chair M15		Comment: - Battery supply
Serial no	o.:		- Normal operation mode
Applicar			Receiving
Ulrich Test site	Alber GmbH	_	
	anechoic room, cabin no. 2		
	on: istance 1 meter ontal Polarization		
Date of 07/03/	·		
Test per			
Detecto Peak	r:		List of values: Selected by hand
dBµV/m	Limit1: FCC 15.109 A (1 m)	Lir	mit2: FCC 15.109 B (1 m) Transducer: EMCO 3160
75			
70			
65			
60			
55	My - Language of the state of t	<u> </u>	mmmmmmhhmmhmmmhmmmhmmmhmmmmhmmmmhmm
50			
45			
40			
35			
30			
25			
20			
15			
10			
5			
0			
	400		13000 MHz
Result:	an		Project file: 52305-80803

Model: Wheel	chair M15	Comment: - Battery supply
Serial no	).:	- Normal operation mode
Applican		Receiving
Test site	Alber GmbH	
	nechoic room, cabin no. 2	
Tested of	on: istance 1 meter	
	al Polarization	
Date of t	·	
Test per		
automa		
Detector Peak	:	List of values: Selected by hand
dBµV/m 80	Limit1: FCC 15.109 A (1 m)	Limit2: FCC 15.109 B (1 m) Transducer: EMCO 3160
75		
70		
65		
60		* .
55	hower-warmy more than the service of	wall war
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0		
	400	13000 MHz
Result:		Project file:
Presca	an	52305-80803