RADIO REPORT

FCC 47 CFR Part 15C
ISED Canada RSS-210
ISED Canada RSS-Gen

Operation within the 13.110 – 14.010 MHz band

Report Reference No	G0M-2003-8906-TFC225RI-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	W.O.M. WORLD OF MEDICINE GmbH
Address	Salzufer 8 10587 Berlin GERMANY
Test Specification	47 CFR Part 15C RSS-210, Issue 10, 2019-12 RSS-Gen, Issue 5, Amendment 1, 2019-03
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model(s) / Type	PG145
Additional Model(s)	None
Brand Name(s)	Multi Flow plus / Multi Flow
Hardware Version(s)	02/2020
Software Version(s)	XP2 011 DD 0301
FCC-ID	2AS5K-TSHW42
IC	25004-TSHW42A
Test Result	**PASSED**

Possible test case verdicts:		
Required by standard but not tested	N/T	
Not required by standard	N/R	
Not applicable to EUT	N/A	
Test object does meet the requirement	P(PASS)	
Test object does not meet the requirement	F(FAIL)	
Testing:		
Test Lab Temperature	20 - 23 °C	
Test Lab Humidity	32 – 38 %	
Date of receipt of test item	2020-04-01	
Report:		
Compiled by	Wilfried Treffke	
Tested by (+ signature) (Responsible for Test)	Wilfried Treffke	W. Treffke .....
Approved by (+ signature) (Deputy Head of Lab)	Toralf Jahn	T. J .....
Date of Issue	2021-01-25	
Total number of pages	27	
General Remarks:		
The test results presented in this report relate only to the object tested. **The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.** This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2021-01-25	Initial Release	

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

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RFID	Radio Frequency Identification
RMS	Root mean square
VBW	Video bandwidth
V_{NOM}	Nominal supply voltage

REPORT INDEX

1 Equipment (Test Item) Under Test

Description	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy	
Model / Type	PG145	
Additional Model(s)	None	
Brand Name(s)	Multi Flow plus / Multi Flow	
Serial Number(s)	2002CE0319	
Hardware Version(s)	02/2020	
Software Version(s)	XP2 011 DD 0301	
FCC-ID	2AS5K-TSHW42	
IC-ID	25004-TSHW42A	
PMN	TS-HW42	
HVIN	1430	
FVIN	N/A	
HMN	APUH100	
Radio type	Transceiver	
Assigned frequency bands	13.110 - 14.010 MHz	
Radio technology	RFID	
Modulation	ASK	
Antenna	Type	External dedicated
	Model	TS-AH20
	FCC-ID	2AS5K-TSHW42
	IC-ID	25004-TSHW42A
	Manufacturer	GiS GmbH
	Gain	not specified
Supply Voltage	V_{NOM}	120 VAC
Operating Temperature	T_{NOM}	25 °C
Radio Module	Type	RFID Module 13.56MHz
	Model	TS-HW42
	FCC ID	2AS5K-TSHW42
	IC ID	25004-TSHW42A
	Manufacturer	GiS GmbH
	HW Version	HVIN 1430
	SW Version	unspecified
AC/DC-Adaptor	Model	None
	Vendor	None
	Input	None
	Output	None
Manufacturer	Aesculap AG Am Aesculap-Platz 78532 Tuttlingen	

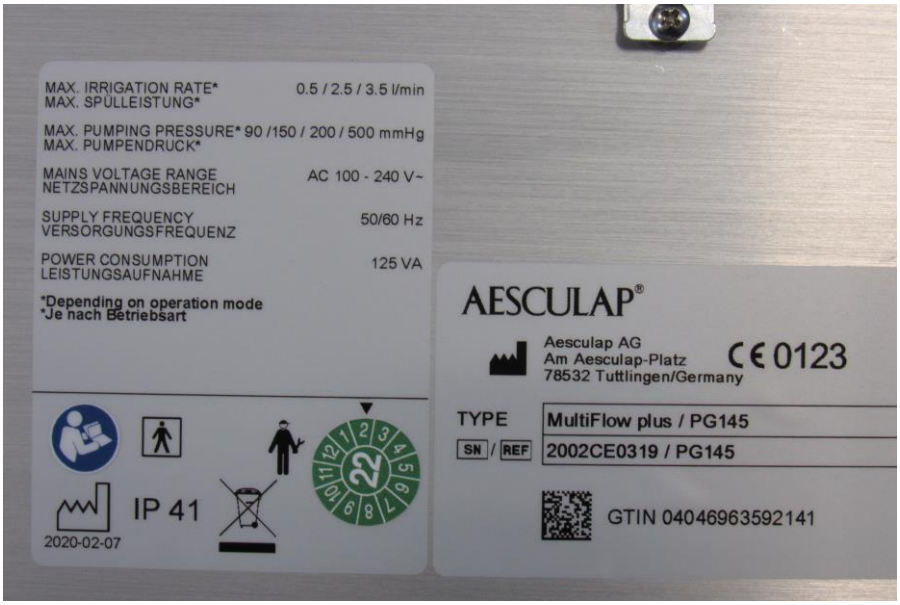
1.1 Photos – Equipment External

EUT Overview

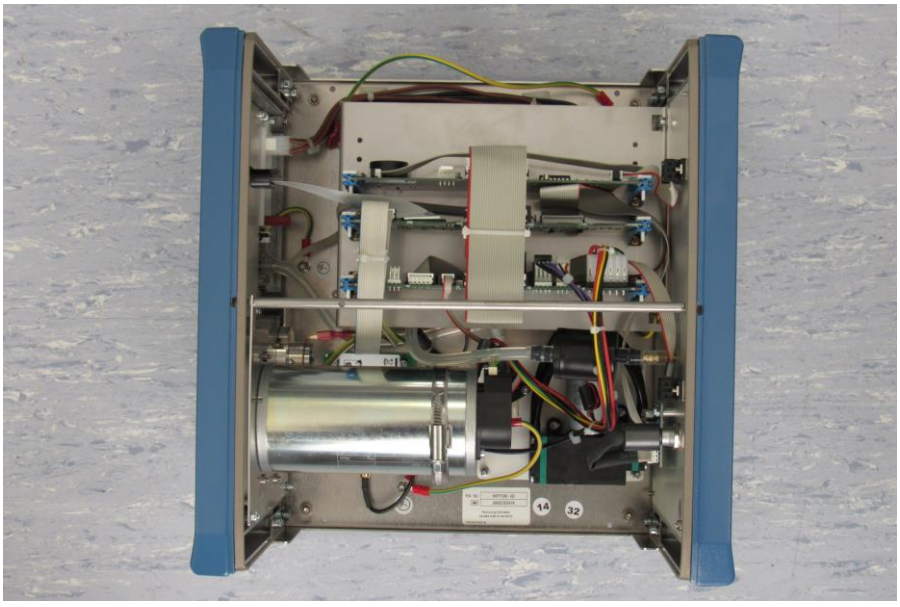

EUT Front View

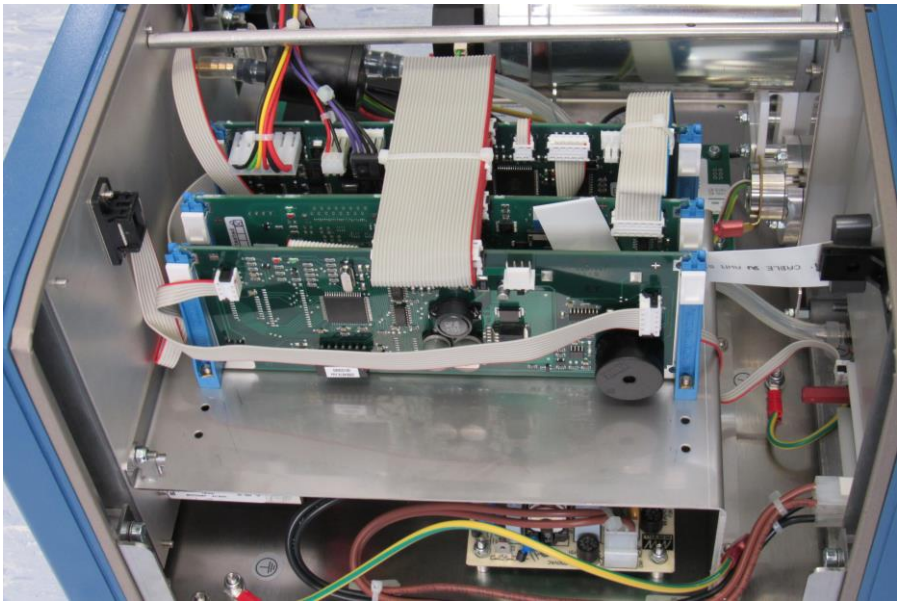

EUT Rear View

EUT Label View



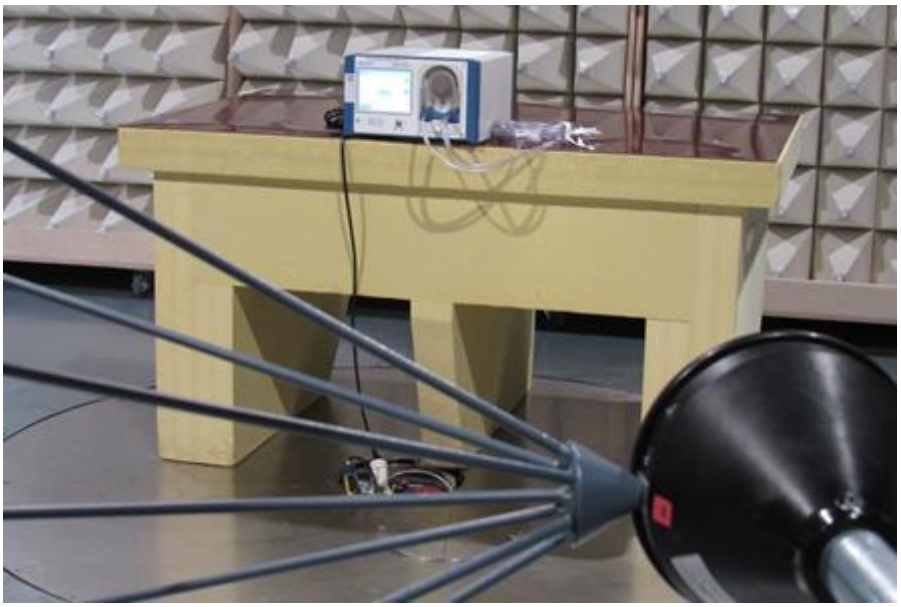
1.2 Photos – Equipment Internal

EUT Open View 1


EUT Open View 2


EUT Open, RF-Module View

1.3 Photos – Test Setup

Radiated Setup 1


Conducted Setup


1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
None				
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.5 Test Modes

Mode	Description
Transmit/Receive	Mode = Transmit Modulation = ASK Duty cycle = 100 %
Comment:	

1.6 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	0	13.5609

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB/m) = Net field strength (dBµV/m)

Net:

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

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-210, ISED RSS-Gen				
Product Standard Reference	**Requirement**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.7	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC 15.225(a-c) ISED RSS-210 B.6(a)	Fundamental in-band field strength emissions	ANSI C63.10-2013	PASS	
FCC 15.225(d) FCC 15.209 ISED RSS-210 B.6(d)	Emission radiated outside the specified frequency band	ANSI C63.10-2013	PASS	
FCC 15.225(e) ISED RSS-210 B.6	Frequency stability	ANSI C63.10-2013	N/T	Module integration
ISED RSS-Gen 4.10 ISED RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C63.10-2013	N/A	Permanently co-located transmitter
47 CFR 15.207 RSS-Gen 8.8	AC power line conducted emissions	ANSI C63.10-2013	PASS	
Comment:				

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

3 Test Conditions and Results

3.1 Test Conditions and Results - Fundamental in-band field strength emissions

3.1.1 Information

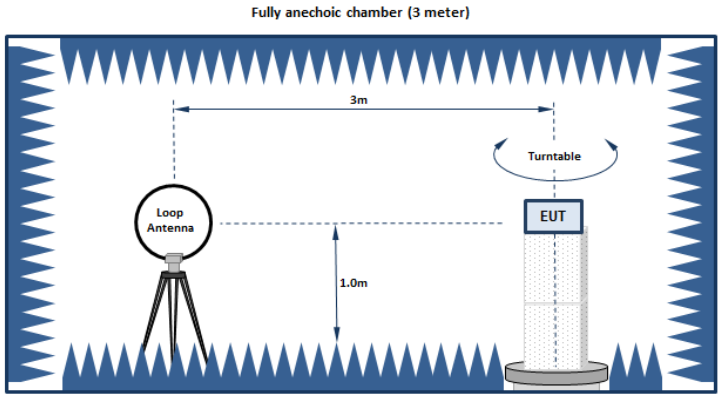
Test Information	
Product Standard Reference	FCC 47 CFR 15.225(a-c) / ISED RSS-210 B.6(a)
Measurement Method	Radiated
Operator	Wilfried Treffke
Date	2020-04-06

3.1.2 Limits

Limits			
Frequency ragne [MHz]	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
13.553 - 13.567	15848	84	30
13.410 - 13.553 13.567 - 13.710	334	50.5	30
13.110 - 13.410 13.710 - 14.010	106	40.5	30

3.1.3 Setup

Test Setup < 30 MHz



3.1.4 Equipment

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

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-Anechoic Chamber	Frankonia	AC2	EF00196	-	-
EMI Test Receiver	R&S	ESCS 30	EF00295	2019-07	2020-07
Antenna	R&S	HFH2-Z2	EF00184	2017-12	2020-12

3.1.5 Procedure

Test Procedure
1. EUT set to test mode 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector 4. Below 30MHz an extrapolation according ANSI 63.10; 6.4.4.2 is used.

3.1.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level @ 30 m [dBµV/m]	Detector	Polarization	Limit @ 30 m [dBµV/m]	Margin
13.5609	13.56	23	pk	ver	84	-60.99

3.2 Test Conditions and Results - Emissions radiated outside the specified frequency band

3.2.1 Information

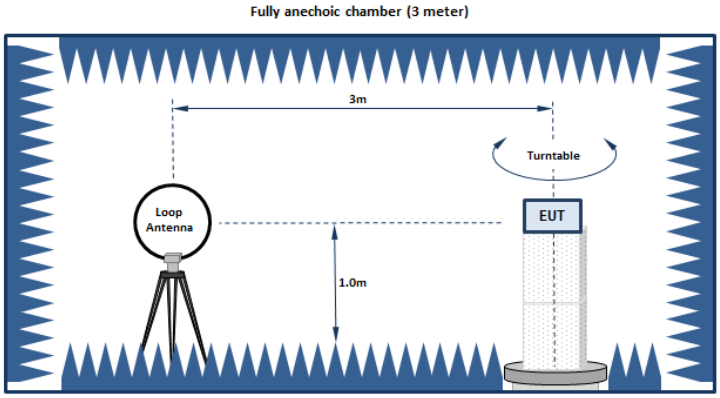
Test Information	
Product Standard Reference	FCC 47 CFR 15.225(d) / ISED RSS-210 B.6(d)
Measurement Method	Radiated
Operator	Wilfried Treffke
Date	2020-04-06

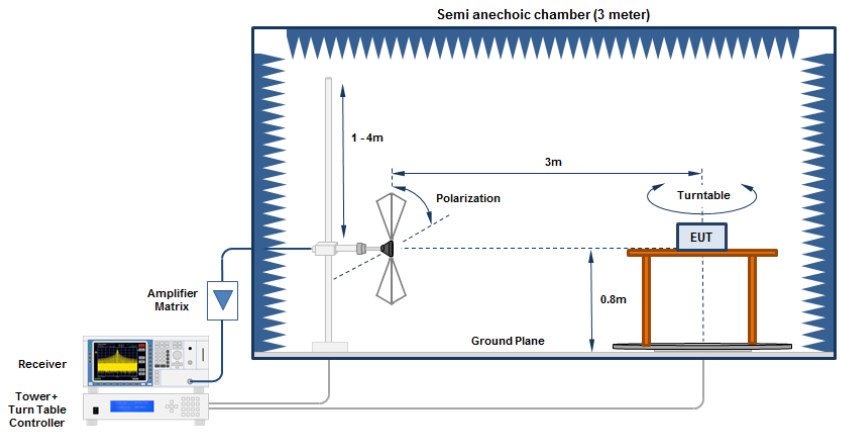
3.2.2 Limits

Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
0.009 - 0.490	Quasi-Peak	2400/F[kHz]	48.5 - 13.8	300
0.490 - 1.705	Quasi-Peak	2400/F[kHz]	13.8 - 2.97	30
1.705 -30	Quasi-Peak	30	29.5	30
30 - 88	Quasi-Peak	100	40	3
88 -216	Quasi-Peak	150	43.5	3

3.2.3 Setup

Test Setup < 30 MHz



Test Setup 30 - 216 MHz


3.2.4 Equipment

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

Test Equipment < 30 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-Anechoic Chamber	Frankonia	AC2	EF00196	-	-
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESCS 30	EF00295	2019-07	2020-07
Antenna	R&S	HFH2-Z2	EF00184	2017-12	2020-12

Test Equipment 30 - 216 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2018-07	2021-07
Measurement Receiver	R&S	N9038A-526/WXP	EF01070	2019-09	2020-09
Antenna	R&S	HK116	EF00203	2018-06	2020-06

3.2.5 Procedure

Test Procedure
1. EUT set to test mode 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Below 30MHz an extrapolation according ANSI 63.10; 6.4.4.2 is used. 5. Markers are set to maximum emission levels

3.2.6 Results

Test Results						
Channel [MHz]	Emission [MHz]	Level [dBµV/m]	Detector	Polarization	Limit [dBµV/m]	Margin [dB]
13.5609	0.0178	-42.30	avg	ver	42.60	-84.87
13.5609	0.0336	-48.20	avg	ver	37.10	-85.31

3.3 Test Conditions and Results - AC powerline conducted emissions

3.3.1 Information

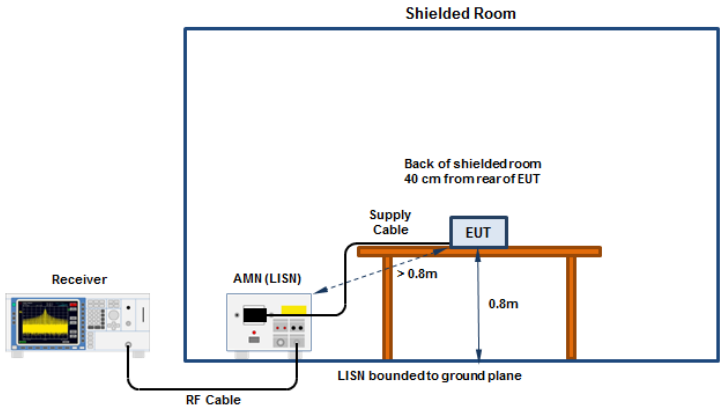
Test Information	
Reference	FCC 47 CFR 15.207; ISED RSS-Gen, Issue 5
Measurement Method	ANSI C63.10 6.2
Operator	Wilfried Treffke
Date	2020-04-07

3.3.2 Limits

Limits		
Frequency [MHz]	Quasi-Peak [dBµV]	Average [dBµV]
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50
* Limit decreases linearly with the logarithm of the frequency		

3.3.3 Setup

Test Setup



3.3.4 Equipment

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

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R&S	ESU 26	EF00241	2019-07	2021-07
LISN	R&S	NSLK 8127 RC	EF01592	2019-10	2020-10

Conducted emissions at the mains power port
according to FCC 47 CFR 15 Subpart C, ISED RSS-Gen

Project Number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
Model Description:	Multi-indication pump with irrigation functions for arthroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Date:	2020-04-07
Operating Conditions:	ambient temperature: 23°C power input: 120 VAC
LISN:	Schwarzbeck NSLK 8127 RC
Mode:	RFID; 13.56 MHz; pump turn on
Applied to Port:	AC-mains

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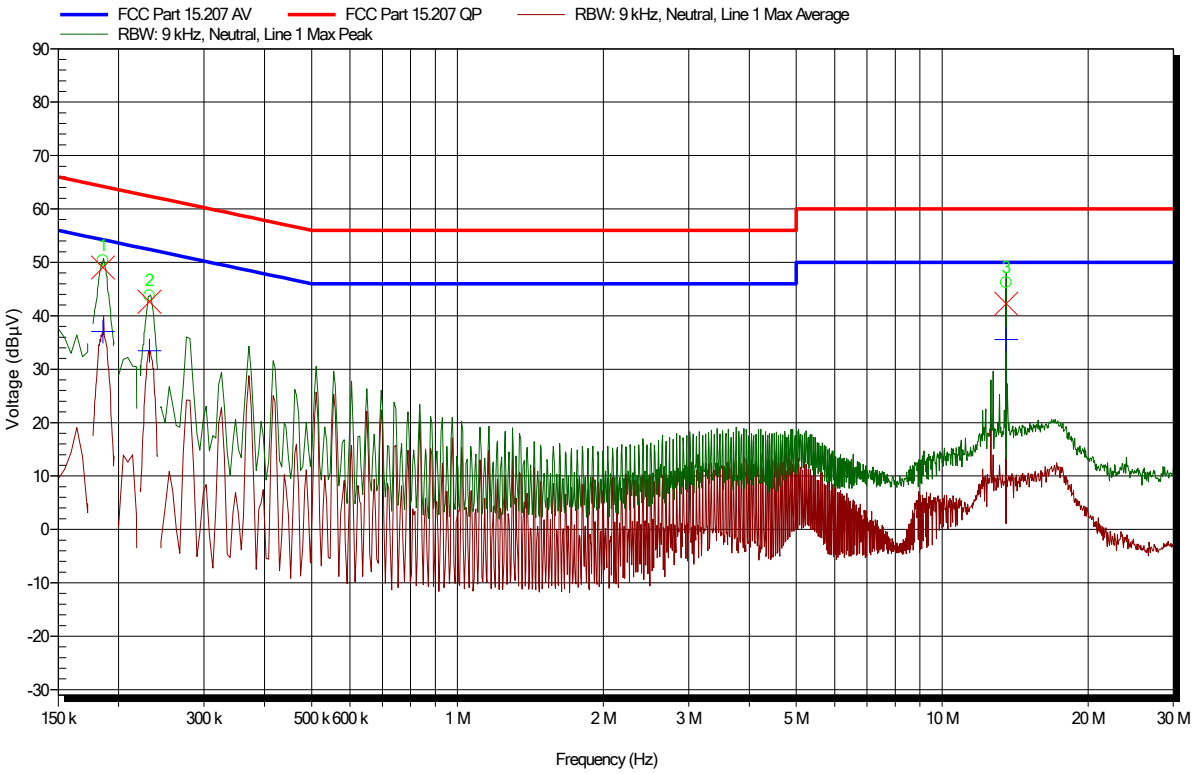

Peak Number	Frequency	Peak	LISN
1	185.55 kHz	50.38 dBµV	Line 1
2	231.45 kHz	43.79 dBµV	Neutral
3	13.556 MHz	46.21 dBµV	Neutral

Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	185.55 kHz	49.04 dBµV	64.23 dBµV	-15.19 dB	Pass	Line 1
2	231.45 kHz	42.63 dBµV	62.4 dBµV	-19.77 dB	Pass	Neutral
3	13.556 MHz	42.27 dBµV	60 dBµV	-17.73 dB	Pass	Neutral

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	185.55 kHz	37.07 dBµV	54.23 dBµV	-17.17 dB	Pass	Line 1
2	231.45 kHz	33.48 dBµV	52.4 dBµV	-18.92 dB	Pass	Neutral
3	13.556 MHz	35.54 dBµV	50 dBµV	-14.46 dB	Pass	Neutral

ANNEX A Transmitter in-band emissions

Radiated H-Field strength according to FCC 47 CFR 15.225, ISED RSS-210

Project number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
EUT Name:	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 23 °C, Vnom: 120 VAC
Antenna:	HFH2-Z2
Measurement distance:	3 m converted to 30 m
Mode:	TX; RFID; 13.56 MHz; pump turn on
Test Date:	2020-04-06
Note:	

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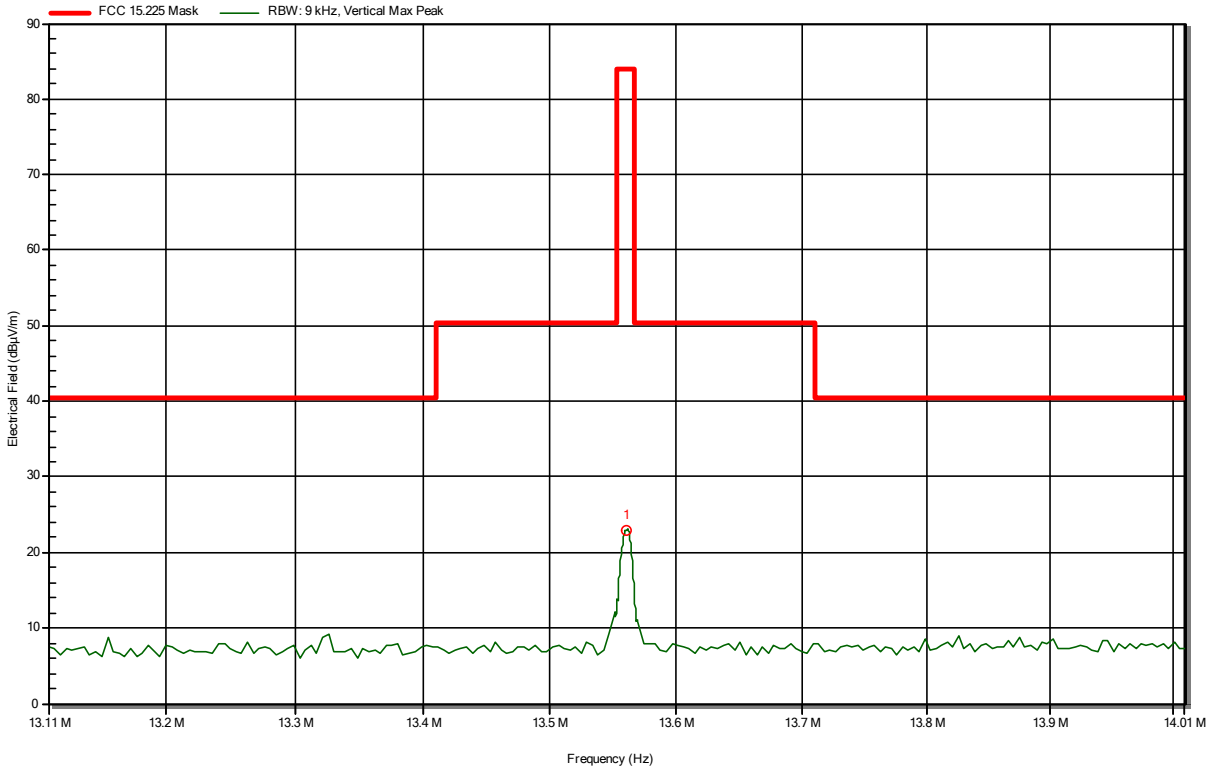
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
13.56 MHz	23 dBµV/m	84 dBµV/m	-60.99 dB	Pass

ANNEX B Transmitter radiated spurious emissions

Spurious emissions according to FCC 47 CFR 15.225, ISED RSS-210

Project number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
EUT Name:	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 23 °C, Vnom: 120 VAC
Antenna:	HFH2-Z2
Measurement distance:	3 m converted to 300 m
Mode:	TX; RFID; 13.56 MHz; pump turn on
Test Date:	2020-04-06
Note:	

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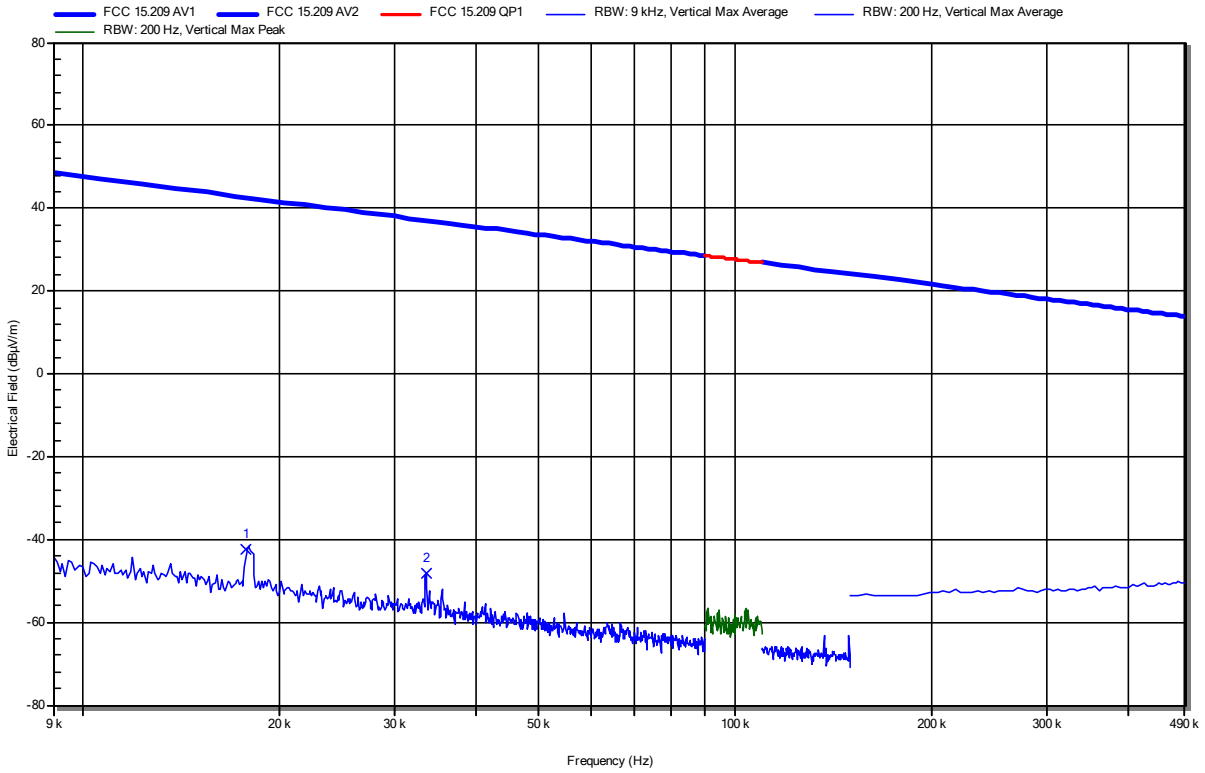
RadiMation



Frequency	Average	Average Limit	Average Difference	Average Status
17.8 kHz	-42.3 dBµV/m	42.6 dBµV/m	-84.87 dB	Pass
33.6 kHz	-48.2 dBµV/m	37.1 dBµV/m	-85.31 dB	Pass

Spurious emissions according to FCC 47 CFR 15.225, ISED RSS-210

Project number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
EUT Name:	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Treffke
Test Conditions:	Tnom: 23 °C, Vnom: 120 VAC
Antenna:	HFH2-Z2
Measurement distance:	3 m converted to 30 m
Mode:	TX; RFID; 13.56 MHz; pump turn on
Test Date:	2020-04-06
Note:	

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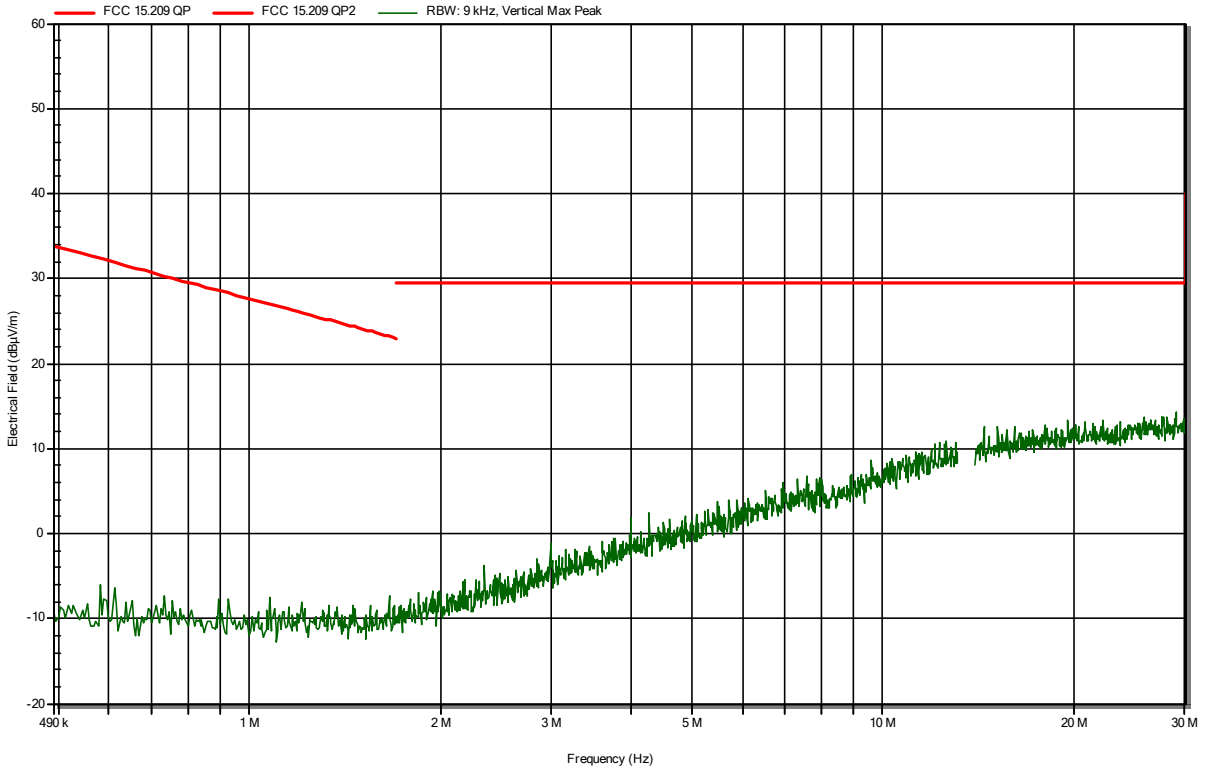
RadiMation



Spurious emissions according to FCC 47 CFR 15.225, ISED RSS-210

Project number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
EUT Name:	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HK 116, Horizontal
Measurement distance:	3 m
Mode:	RX; RFID; 13.56 MHz; pump turn on
Test Date:	2020-04-06
Note:	

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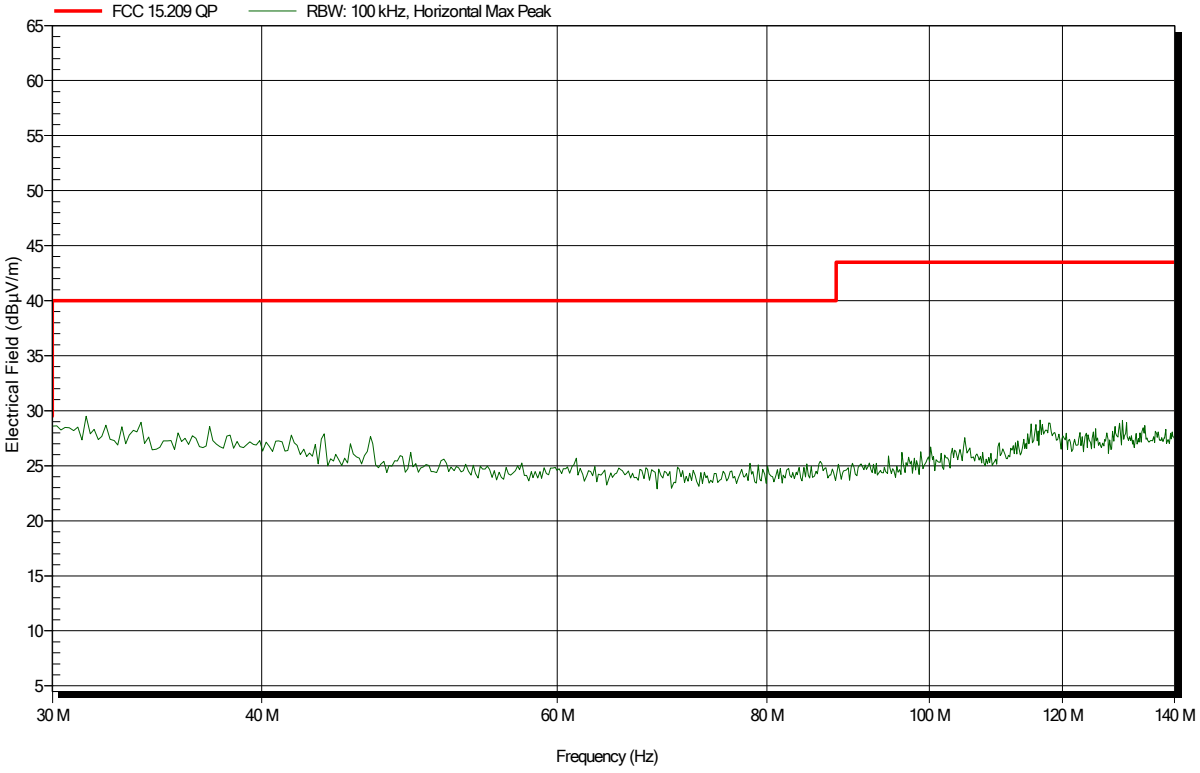

Spurious emissions according to FCC 47 CFR 15.225, ISED RSS-210

Project number:	G0M-2003-8906
Applicant:	W.O.M. WORLD OF MEDICINE GmbH
EUT Name:	Multi-indication pump with irrigation functions for arthroscopy, laparoscopy, urology and hysteroscopy
Model:	PG145/PG130
Test Site:	Eurofins Product Service GmbH
Operator:	Wilfried Treffke
Test Conditions:	Tnom: 23°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3 m
Mode:	RX; RFID; 13.56 MHz; pump turn on
Test Date:	2020-04-06
Note:	

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