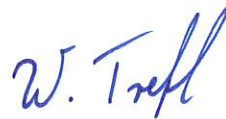


RADIO REPORT FCC 47 CFR Part 90I ISED Canada RSS-119 Issue 12	
Report Reference No	G0M-2201-1256-TFC090PMR-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAkkS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Kamstrup A/S
Address	Industrialvej 28, Stilling 8660 Skanderborg Denmark
Test Specification	47 CFR Part 90I ISED RSS-119, Issue 12: 2015-05
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Ultrasonic water meter
Model(s)	KWM4220
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	Assembly: 6202-006-06; RF PCB BOM: 55501900, rev. C1; Flow PCB BOM: 55501931, rev. C2
Software Version(s)	RF: 50981336, rev. P1; Meter: 50981595, rev E1
FCC-ID	OUY-KWM4220
IC	22376-KWM4220
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 °C – 23 °C	
Test Lab Humidity	32 % – 38 %	
Date of receipt of test item	2022-03-07	
Report:		
Compiled by	Toralf Jahn	
Tested by (+ signature) (Responsible for Test)	Toralf Jahn	
Approved by (+ signature) (Test Lab Engineer)	Wilfried Treffke	
Date of Issue	2022-05-11	
Total number of pages	147	
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	2022-05-11	Initial Release	

ADDITIONAL VARIANTS

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	Description	
1	Product Type Description	Ultrasonic water meter
	Model name	KWM4220
	Brand name (optional)	Kamstrup
	Hardware Version	Assembly: 6202-006-07 RF PCB BOM: 55501900, rev. C1 Flow PCB BOM: 55501931, rev. C2
	Software Version	RF: 50981336, rev. P1 Meter: 50981595, rev E1
	PMN	KWM4220
	HVIN	02E02G1GA8UB
	FVIN	50981336
	HMN	N/A
2	Product Type Description	Ultrasonic water meter
	Model name	KWM4220
	Brand name (optional)	Kamstrup
	Hardware Version	Assembly: 6202-006-08 RF PCB BOM: 55501900, rev. C1 Flow PCB BOM: 55501931, rev. C2
	Software Version	RF: 50981336, rev. P1 Meter: 50981595, rev E1
	PMN	KWM4220
	HVIN	02E02G1GJ8UB
	FVIN	50981336
	HMN	N/A
3	Product Type Description	Ultrasonic water meter
	Model name	KWM4220
	Brand name (optional)	Kamstrup
	Hardware Version	Assembly: 6202-006-09 RF PCB BOM: 55501900, rev. C1 Flow PCB BOM: 55501931, rev. C2
	Software Version	RF: 50981336, rev. P1 Meter: 50981595, rev E1
	PMN	KWM4220
	HVIN	02E02G1GS8UB
	FVIN	50981336
	HMN	N/A
Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated.		

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RBW	Resolution bandwidth
RMS	Root mean square
VBW	Video bandwidth
V _{NOM}	Nominal supply voltage
V _{MIN}	Miminal supply voltage
V _{MAX}	Maximal supply voltage
T _{NOM}	Nominal temperature
T _{MIN}	Miminal temperature
T _{MAX}	Maximal temperature
N/A	Not Applicable

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1 Equipment (Test Item) Under Test

Description	Ultrasonic water meter	
Model	KWM4220	
Additional Model(s)	None	
Brand Name(s)	None	
Serial Number(s)	Radiated: Sample ID 38836 Conducted: Sample ID 38837	
Hardware Version(s)	Assembly: 6202-006-06; RF PCB BOM: 55501900, rev. C1; Flow PCB BOM: 55501931, rev. C2	
Software Version(s)	RF: 50981336, rev. P1; Meter: 50981595, rev E1	
PMN	KWM4220	
HVIN	02E02G1FR8UB	
FVIN	50981336	
HMN	N/A	
IC	22376-KWM4220	
FCC-ID	OUY-KWM4220	
Equipment type	End Product	
Radio type	Transceiver	
Radio technologies	PMR	
Assigned frequency band	450 - 470 MHz	
Operating frequency range	450.25 - 469.9875 MHz	
Channels	Low: : Frequency 450.25 MHz Mid: : Frequency 460.11875 MHz High: : Frequency 469.9875 MHz	
Modulation(s)	4GFSK, 4.8 ksps, 3.6 kHz deviation	
Emission designator	F1D	
Channel bandwidth	12.5 kHz	
Authorized bandwidth	11.25 kHz	
Channel spacing	11.25 kHz	
Number of antennas	3	
Antenna 1	Type	external, helix antenna
	Model	30261216
	Manufacturer	Kamstrup A/S
	Gain	-2.9 dBi
Antenna 2	Type	external, wall antenna 2 meters cable length
	Model	6699490
	Manufacturer	Kamstrup A/S
	Gain	0.5 dBi
Antenna 3	Type	external, pit antenna 0.6 meters cable length
	Model	6697916
	Manufacturer	Kamstrup A/S
	Gain	-5.3 dBi

Supply Voltage	V _{NOM}	3.66 V
	V _{MIN}	3.0 V
	V _{MAX}	3.66 V
Operating Temperature	T _{NOM}	25 °C
	T _{MIN}	-30 °C
	T _{MAX}	65 °C
Battery supply	Yes	
AC/DC-Adaptor	Model	N/A
	Vendor	N/A
	Input	N/A
	Output	N/A
Manufacturer	Kamstrup A/S Industrialvej 28, Stilling 8660 Skanderborg Denmark	

1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laboratory power supply	Statron	2224.7	The EUT battery does not last to perform the tests. Therefore an external power supply was necessary.
CBL	Auxillary cable			To connect EUT and power supply.
SFT	Device Control Tool	Kamstrup	ver. 0.10	Tool for controlling RF modules and meters
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment:				

1.4 Test Modes

Mode	Description
Unmodulated	Tuned conducted power = 30 dBm Mode = Transmit Modulation = None Duty cycle = 100 %
Transmit	Tuned conducted power = 30 dBm Mode = Transmit Modulation = 4GFSK, 4.8 ksps, 3.6 kHz deviation Duty cycle = 100 %
Receive	Mode = Receive

1.5 Test Frequencies

Designator	Mode	Frequency [MHz]
F1	Tx / Rx	450.25
F2	Tx / Rx	460.11875
F3	Tx / Rx	469.9875

1.6 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 dB μ V. 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:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

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

Limit:

The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

Margin:

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

Example only:

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

Radiated power:

$$\text{EIRP (dBm)} = \text{E (dB}\mu\text{V/m)} + 20\log(\text{D}) - 104.8 \quad (\text{D is the measurement distance in m})$$

$$\text{ERP (dBm)} = \text{EIRP (dBm)} - 2.15$$

2 Result Summary

Test Summary				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
FCC 90.205 FCC 2.1046 RSS-119 5.4	Power	ANSI C63.26:2015 5.2	PASS	
FCC 90.209 FCC 90.210 FCC 2.1049 RSS-119 4.2,5,5,5.8	Authorized bandwidth Emission masks Occupied bandwidth	FCC 90.210 ANSI C63.26:2015 5.4	PASS	
FCC 90.210 FCC 2.1051 RSS-119 4.2,6.13	Spurious emissions at antenna terminal	FCC 90.210 ANSI C63.26:2015 5.7	PASS	
FCC 90.210 FCC 2.1053 RSS-119 4.2,6.13	Spurious emissions radiated	FCC 90.210 ANSI C63.26:2015 5.7	PASS	
RSS-Gen 7.1	Receiver spurious emissions	ANSI C63.26:2015 5.7	PASS	
FCC 90.213 FCC 2.1055 RSS-119 5.3	Frequency Stability	ANSI C63.26:2015 5.6	PASS	
FCC 90.214 RSS-119 5.9	Transient Frequency behavior	ANSI C63.26:2015 6.5	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 - Power

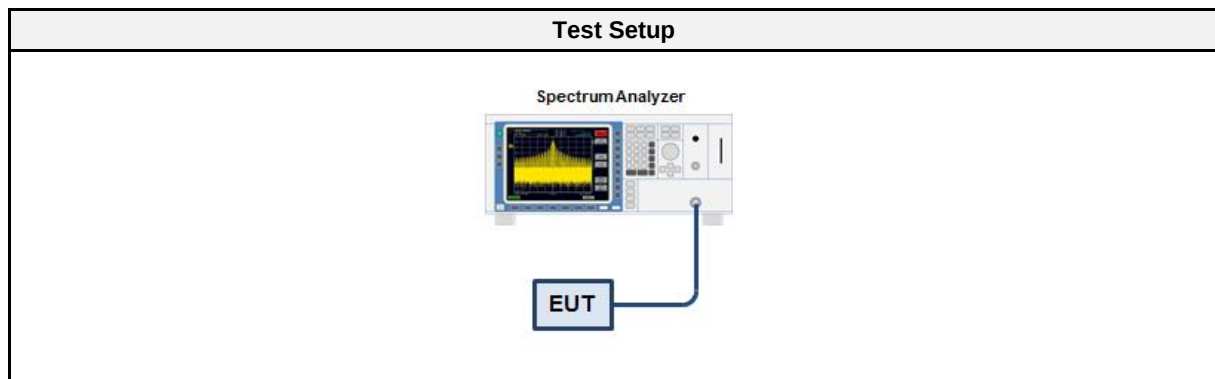
3.1.1 Information

Test Information	
Reference	FCC 90.205, FCC 90.2.1046 ISED RSS-119, Issue 12 (Section 5.4)
Measurement Method	ANSI C63.26:2015 5.2
Test Method	Conducted
Test Mode	Modulated
Maximum antenna gain	0.5 dBi (-1.65 dBd)
Measurement Uncertainty:	± 1.77 dB
Operator	Toralf Jahn
Date	2022-03-24

3.1.2 Limits

Limits	
Device	Power
Base / Fixed / Mobile	± 1 dB of rated power
Base / Fixed	110 W ERP (50.41 dBm)
Mobile	60 W ERP (47.78 dBm)

3.1.3 Setup



3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSW43	EF00896	2021-07	2022-07
Attenuator	Radiall GmbH	R416010000	EF01013	Cal before use	Cal before use
Cable	Gigalane	SMS111B	EF00779 CAAZ	2022-02	2023-02

3.1.5 Procedure

Test Procedure	
1.	EUT transmitter is activated in test mode under normal conditions
2.	The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum
3.	The resolution bandwidth is set to 3 MHz
4.	Peak power is determined from peak of spectrum envelope
5.	EIRP power is calculated by adding the antenna gain in dBi
6.	ERP power is calculated by subtracting 2.15 from EIRP power

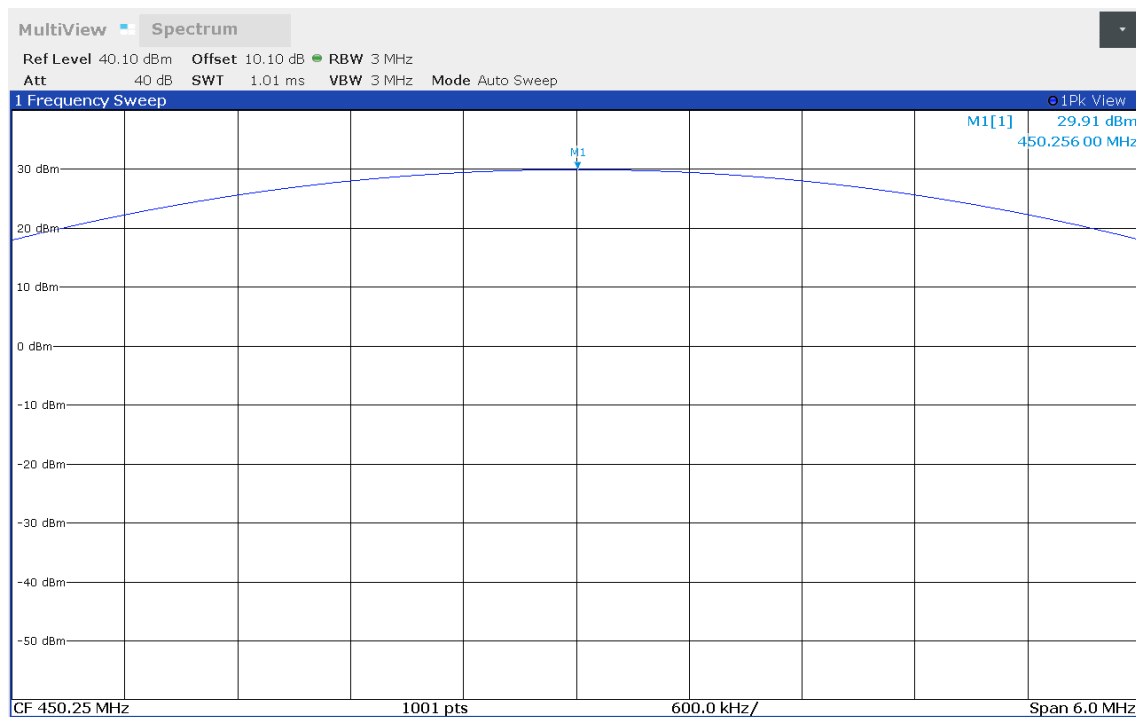
3.1.6 Results

Test Results Rated Power					
Channel [MHz]	Conducted Power [dBm]	Rated Power [dBm]	Lower Limit [dBm]	Upper Limit [dBm]	Verdict
450.25	29.91	30	29	31	PASS
460.11875	29.91	30	29	31	PASS
469.9875	29.90	30	29	31	PASS

Test Results Maximum ERP					
Channel [MHz]	Conducted Power [dBm]	ERP Peak Power [dBm]	ERP Peak Power [W]	ERP Power Limit [dBm]	Margin [dB]
450.25	29.91	28.26	0.67	47.78	-19.52
460.11875	29.91	28.26	0.67	47.78	-19.52
469.9875	29.90	28.25	0.67	47.78	-19.53

Conducted power

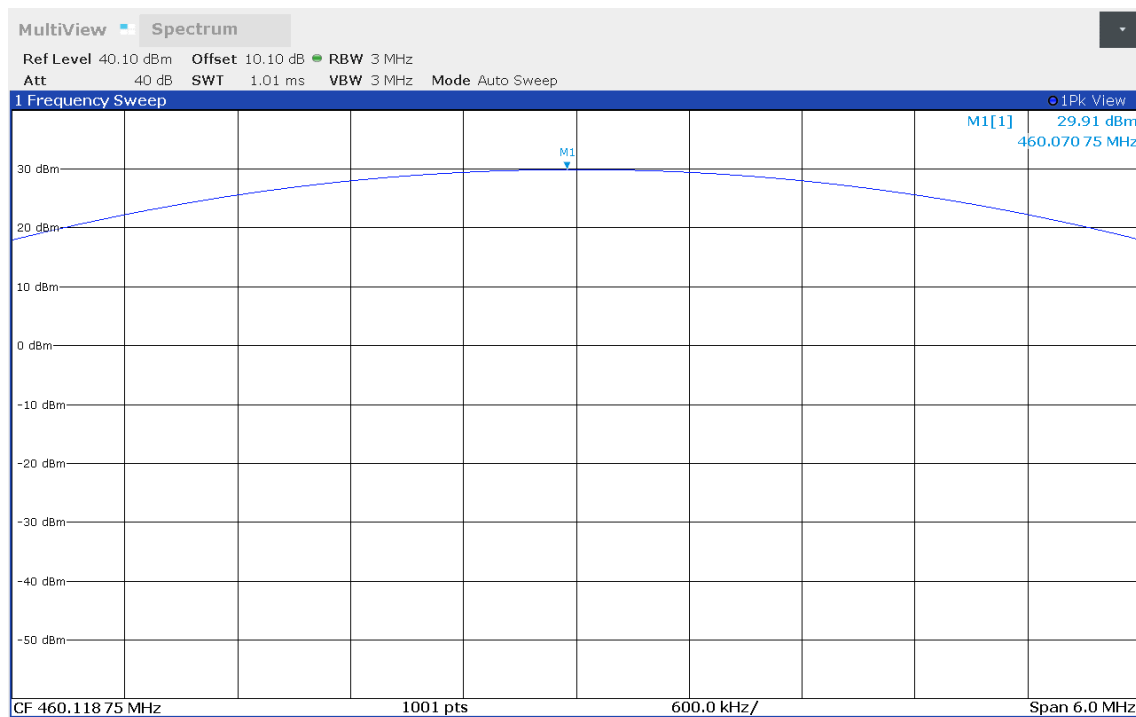
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz



17:06:28 24.03.2022

Conducted power

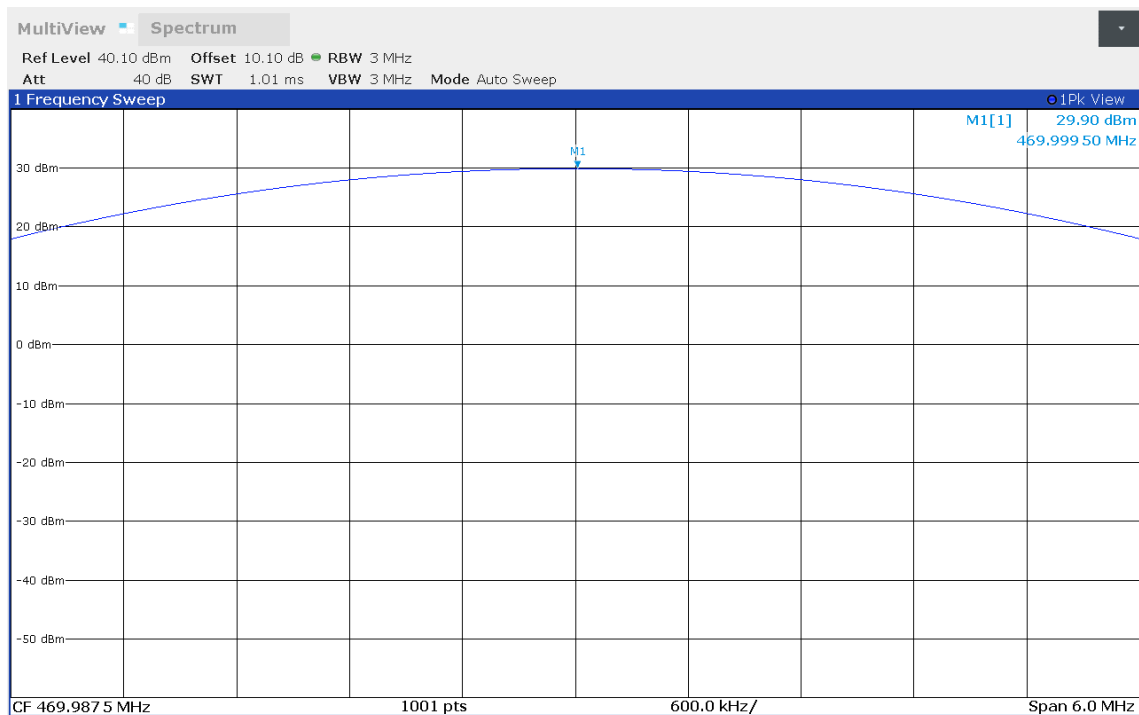
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz



17:08:01 24.03.2022

Conducted power

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz



17:11:02 24.03.2022

3.2 Test Conditions and Results - Emission mask and authorized bandwidth

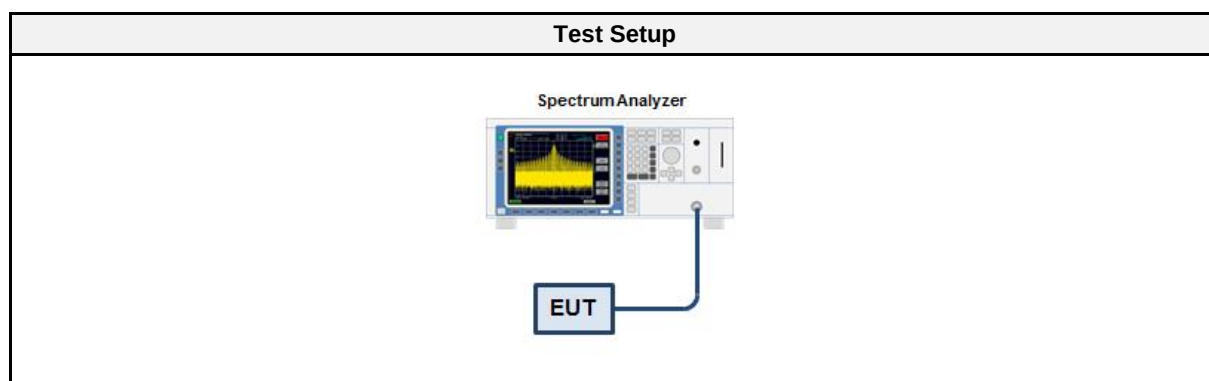
3.2.1 Information

Test Information	
Reference	FCC 90.209, FCC 90.210, FCC 2.1049 ISED RSS-119, Issue 12 (Sections 4.2,5.5,5.8)
Measurement Method	FCC 90.210, ANSI C63.26:2015 5.4
Test Method	Conducted
Test Mode	Modulated
Measurement Uncertainty:	± 1.80 dB (Emission mask) ± 1.26 % (Authorized bandwidth)
Operator	Toralf Jahn
Date	2022-03-28

3.2.2 Limits

Limits
Emission Mask D
Necessary bandwidth (Occupied bandwidth) < 11.25 kHz (Authorized bandwidth)

3.2.3 Setup



3.2.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSW43	EF00896	2021-07	2022-07
Attenuator	Radiall GmbH	R416010000	EF01013	Cal before use	Cal before use
Cable	Gigalane	SMS111B	EF00779 CAAZ	2022-02	2023-02
Rubidium frequency standard	EFRATOM	MFS	EF00308	2017-07	2022-07

3.2.5 Procedure

Test Procedure	
1.	EUT set to test mode
2.	Span set in order to cover the emission spectrum and emission mask
3.	Resolution bandwidth set to 100 Hz and VBW to 300 Hz
4.	Detector is set to peak max hold

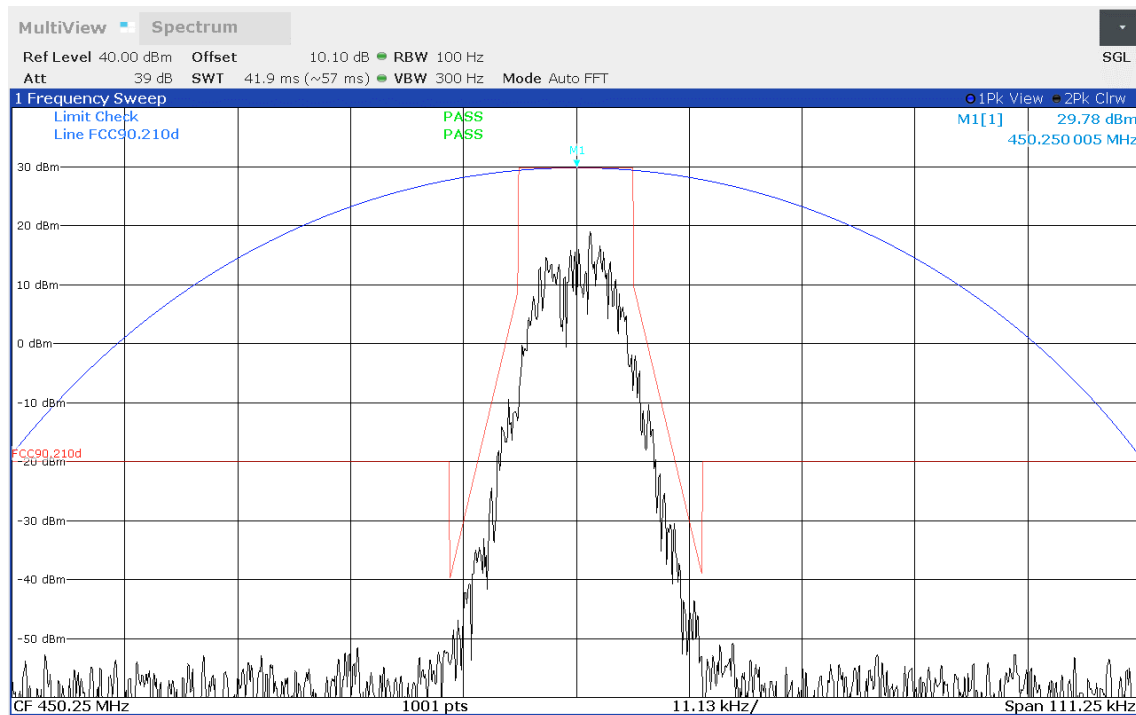
3.2.6 Results

Test Results - Emission Mask	
Channel [MHz]	Verdict
450.25	PASS
460.11875	PASS
469.9875	PASS

Test Results - Authorized bandwidth			
Channel [MHz]	Bandwidth [kHz]	Limit [kHz]	Verdict
450.25	9.75	11.25	PASS
460.11875	9.65	11.25	PASS
469.9875	9.67	11.25	PASS

Emission Mask

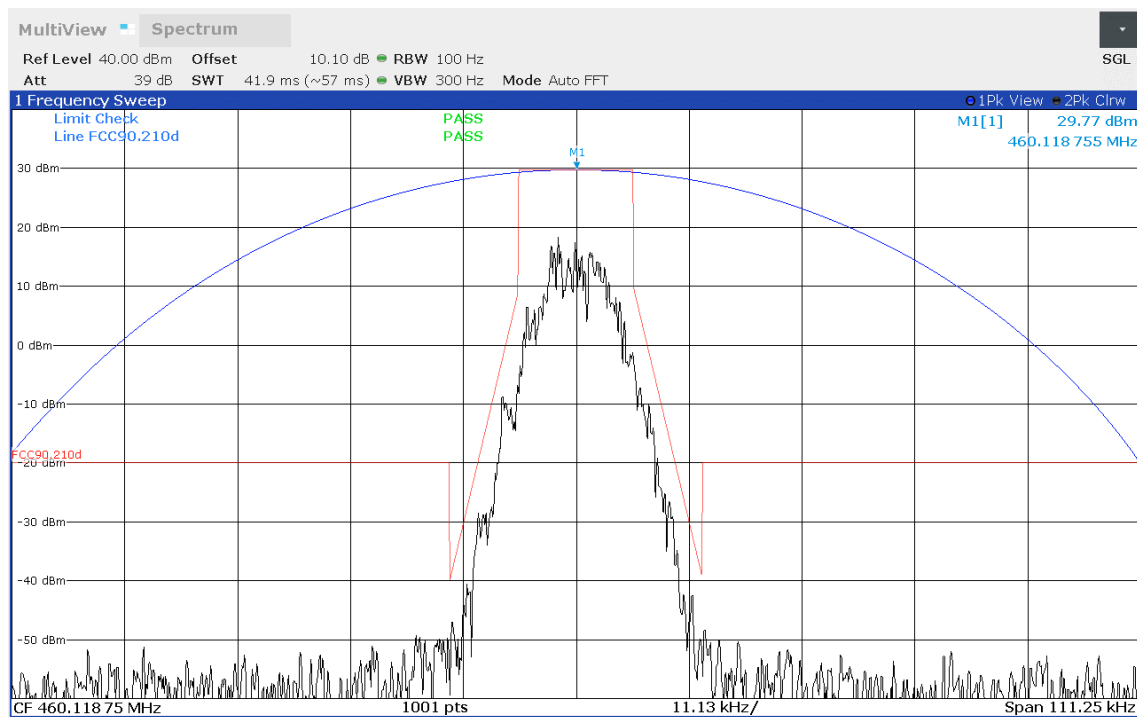
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz



10:34:35 28.03.2022

Emission Mask

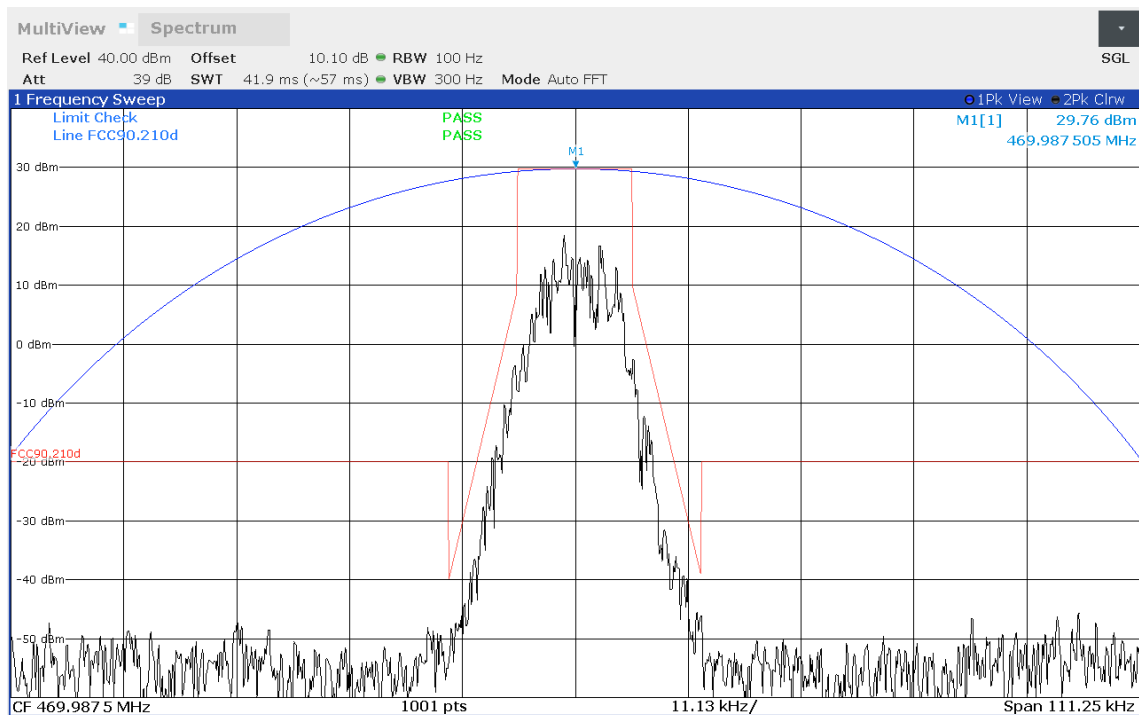
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz



10:36:19 28.03.2022

Emission Mask

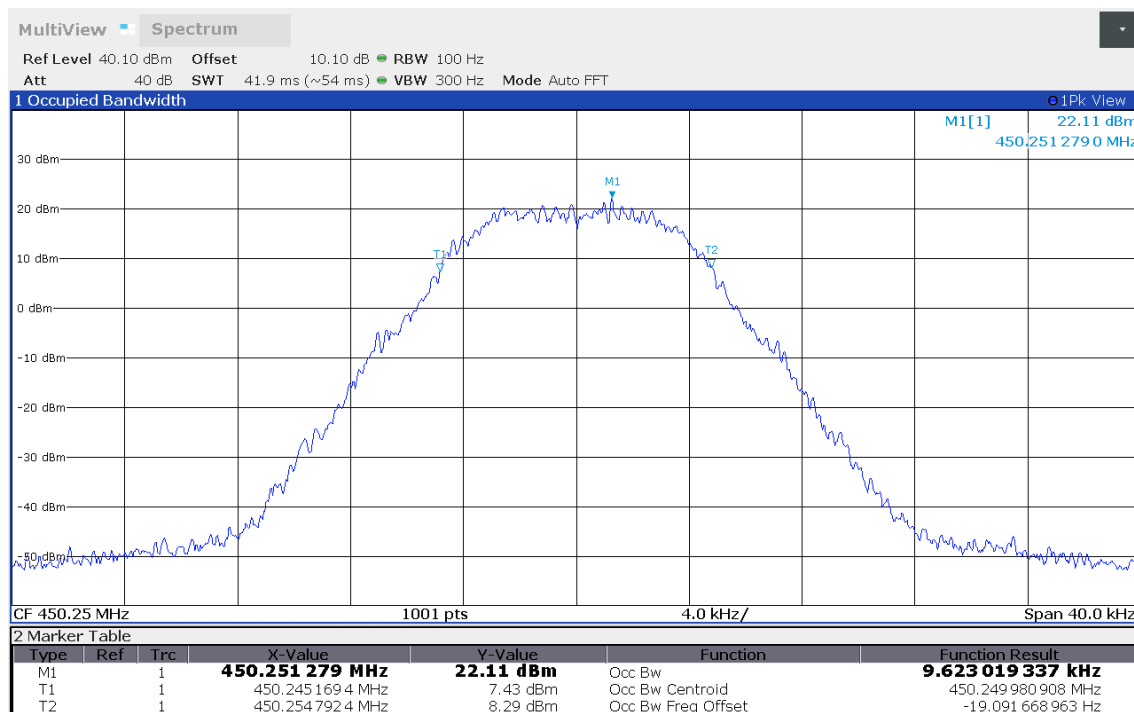
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz



10:37:37 28.03.2022

Authorized bandwidth

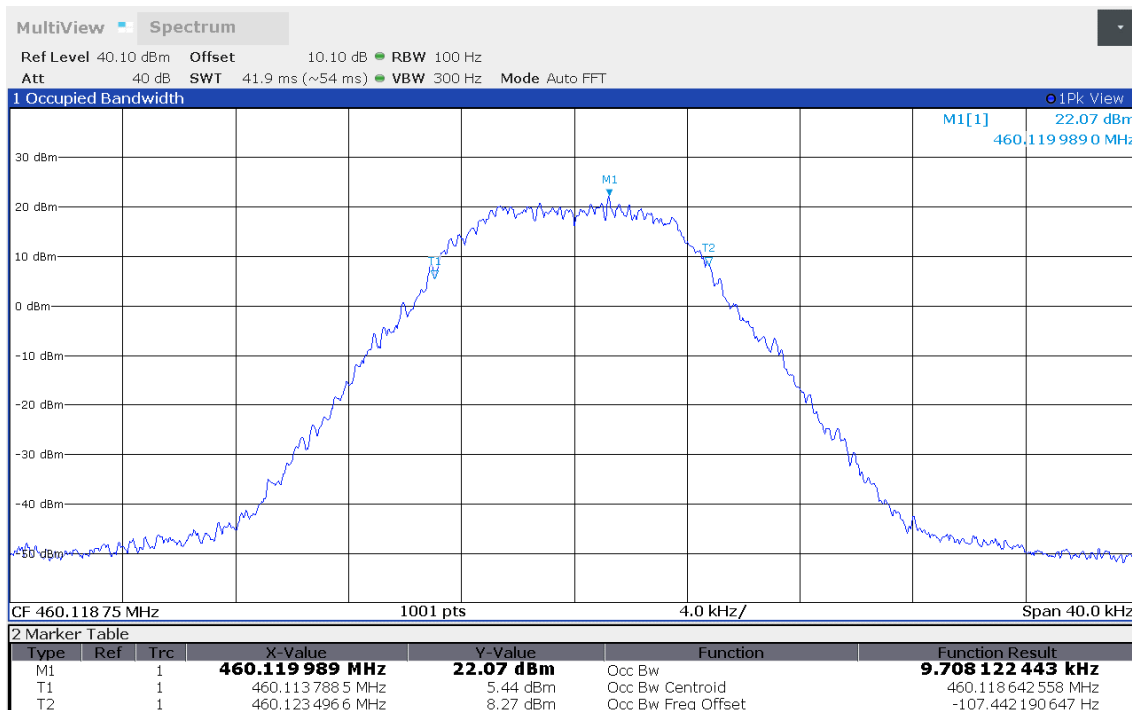
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz



19:02:32 24.03.2022

Authorized bandwidth

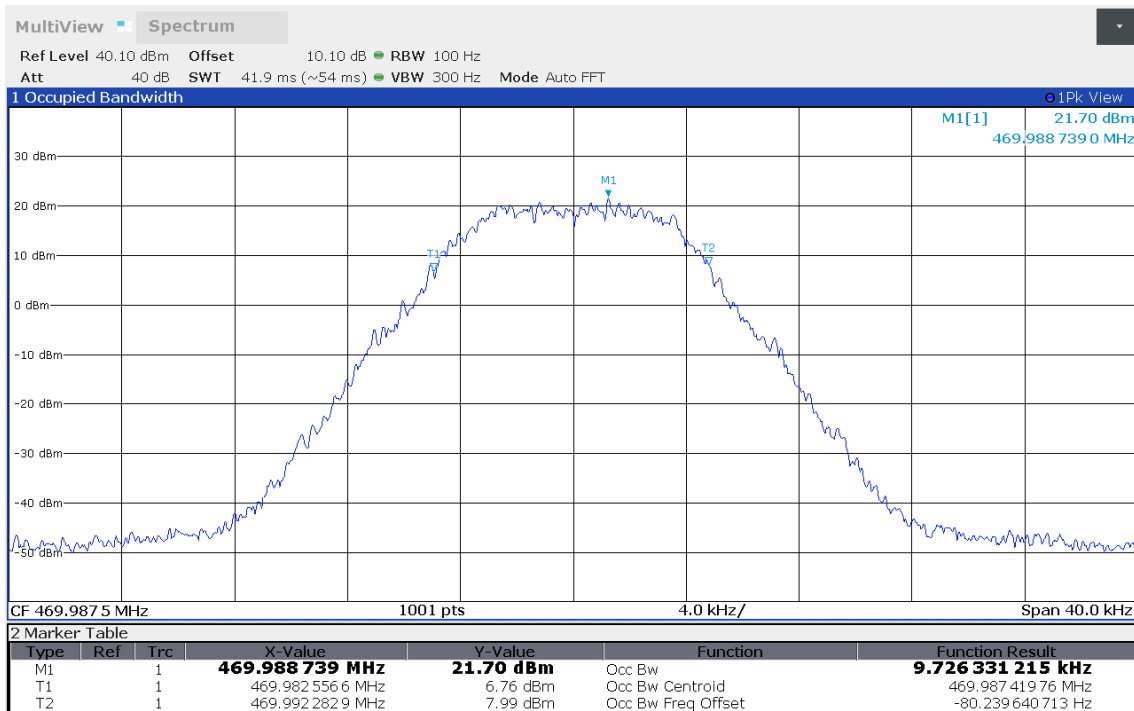
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz



19:04:24 24.03.2022

Authorized bandwidth

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz



19:05:46 24.03.2022

3.3 Test Conditions and Results - Spurious emissions at antenna terminal

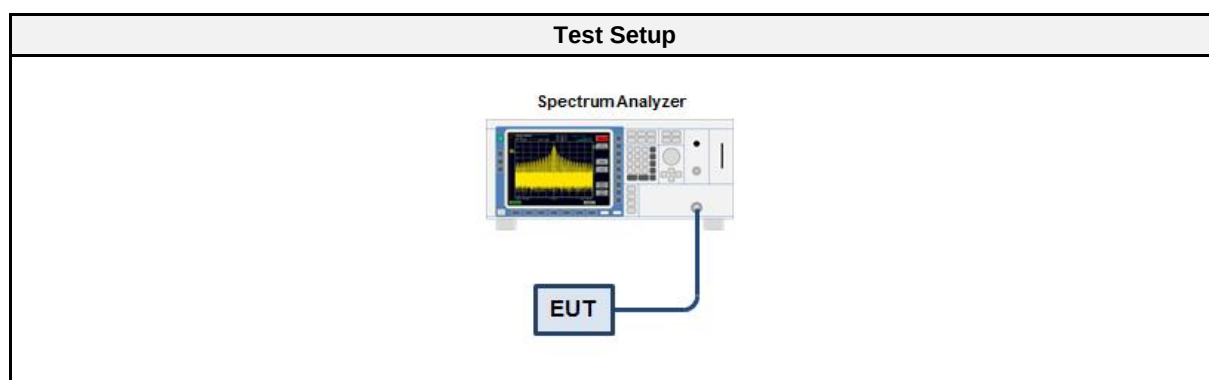
3.3.1 Information

Test Information	
Reference	FCC 90.210, FCC 2.1051 ISED RSS-119, Issue 12 (Sections 4.2,6.13)
Measurement Method	FCC 90.210 ANSI C63.26:2015 5.7
Test Method	Conducted
Test Mode	Unmodulated
Test Range	10 MHz to 10th Harmonic
Measurement Uncertainty:	± 4.25 dB
Operator	Toralf Jahn
Date	2022-03-24

3.3.2 Limits

Limits
-20 dBm

3.3.3 Setup



3.3.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum analyzer	R&S	FSW43	EF00896	2021-07	2022-07
Attenuator	Radiall GmbH	R416010000	EF01013	Cal before use	Cal before use
Cable	Gigalane	SMS111B	EF00779 CAAZ	2022-02	2023-02
Notch filter 210-500 MHz	Schomandl	BN 86882	EF00234	Cal before use	Cal before use
High pass filter	WHK	HP WHK 1050	EF01671	Cal before use	Cal before use

3.3.5 Procedure

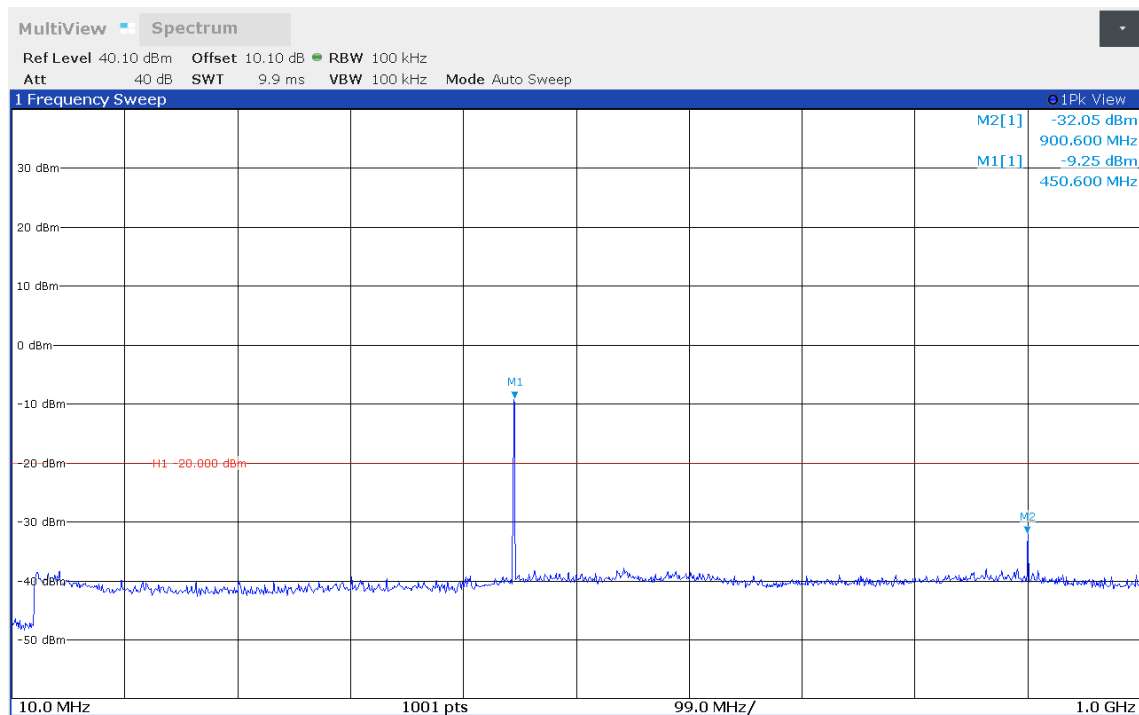
Test Procedure	
1.	EUT set to test mode
2.	Span is set according to measurement range
3.	Resolution bandwidth is set to 100 kHz below 1 GHz and 1 MHz above 1 GHz
4.	Detector is set to peak and trace mode to max hold

3.3.6 Results

Test Results	
Channel [MHz]	Verdict
450.25	PASS
460.11875	PASS
469.9875	PASS

Conducted spurious emission

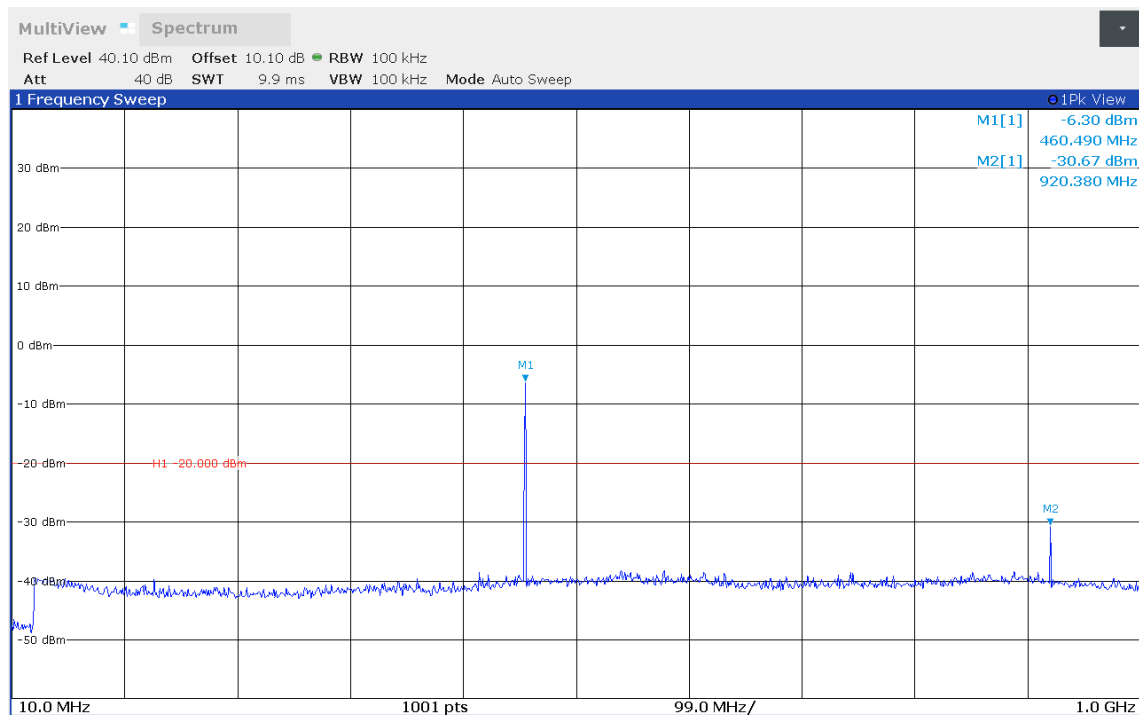
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 450.025 MHz
 Note 1: Notch filter



18:19:16 24.03.2022

Conducted spurious emission

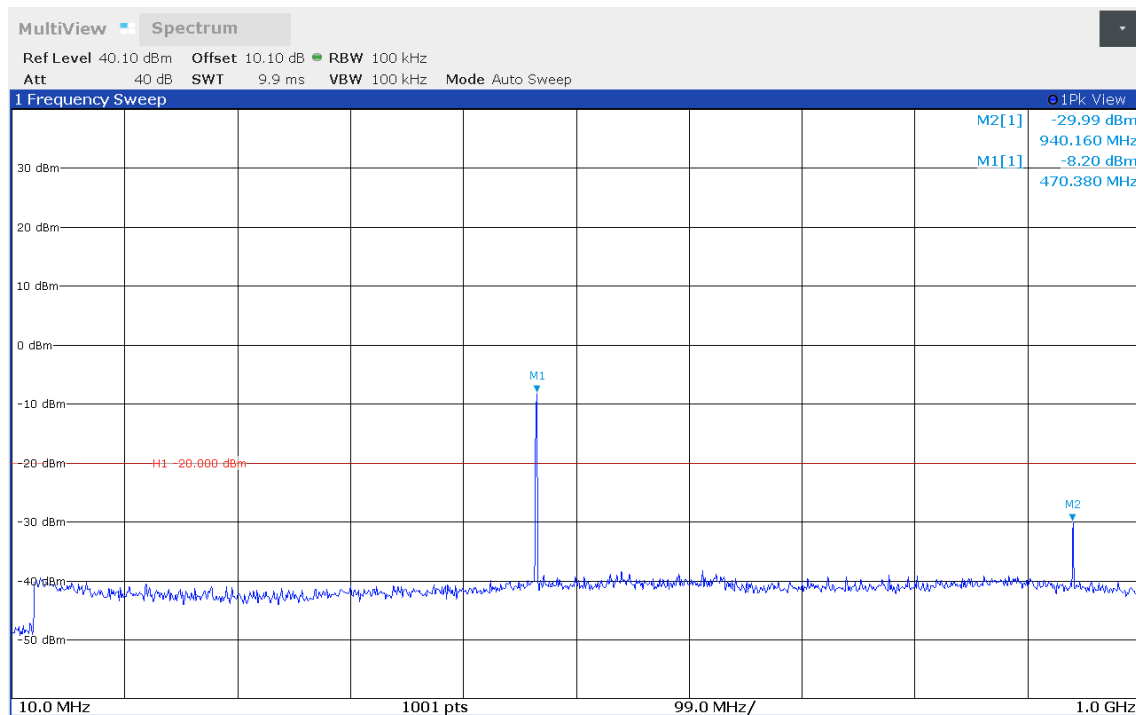
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz
 Note 1: Notch filter



18:21:49 24.03.2022

Conducted spurious emission

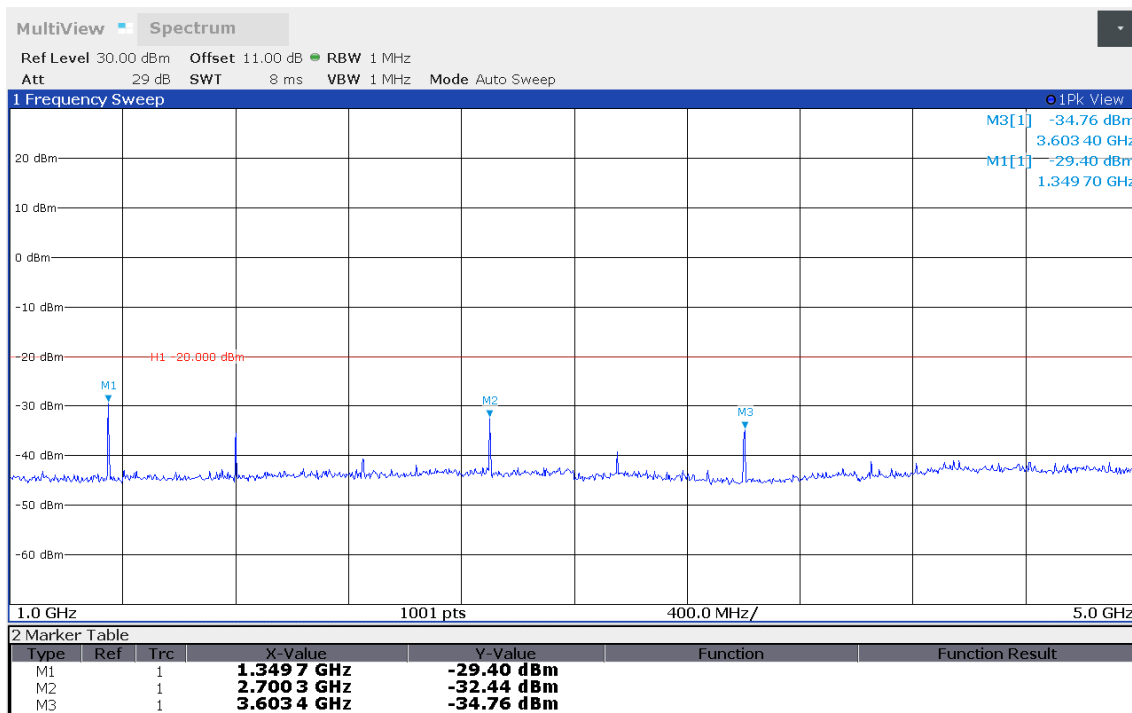
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz
 Note 1: Notch filter



18:23:32 24.03.2022

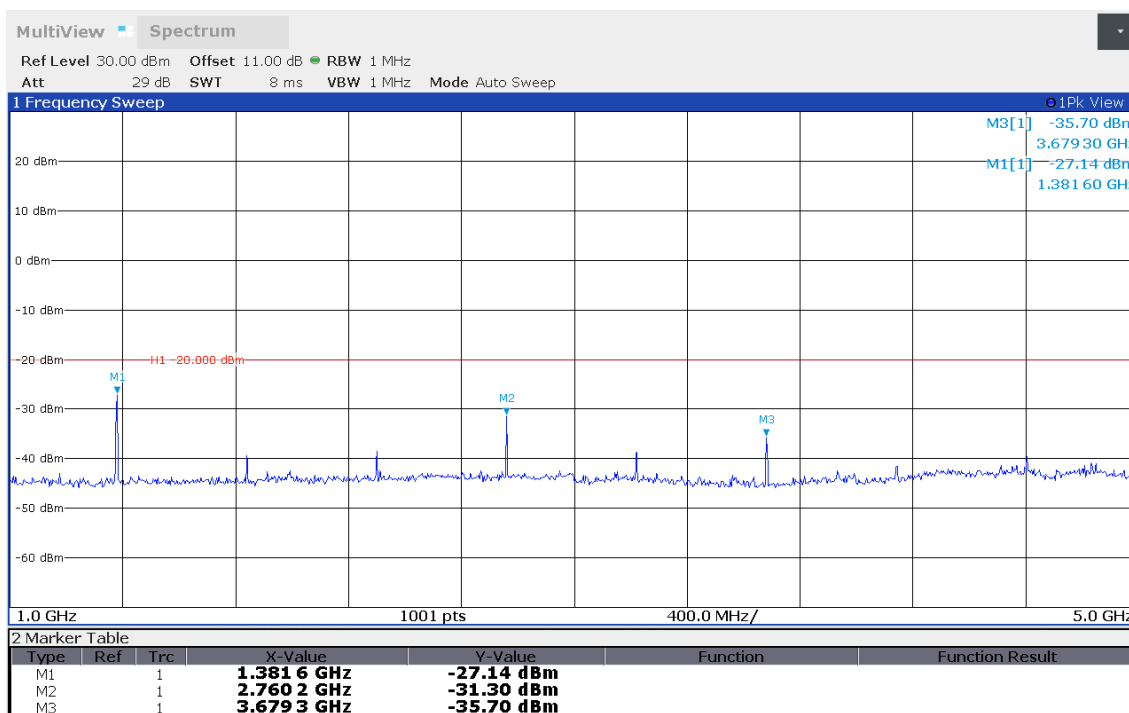
Conducted spurious emission

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 450.25 MHz
 Note 1: High pass filter



Conducted spurious emission

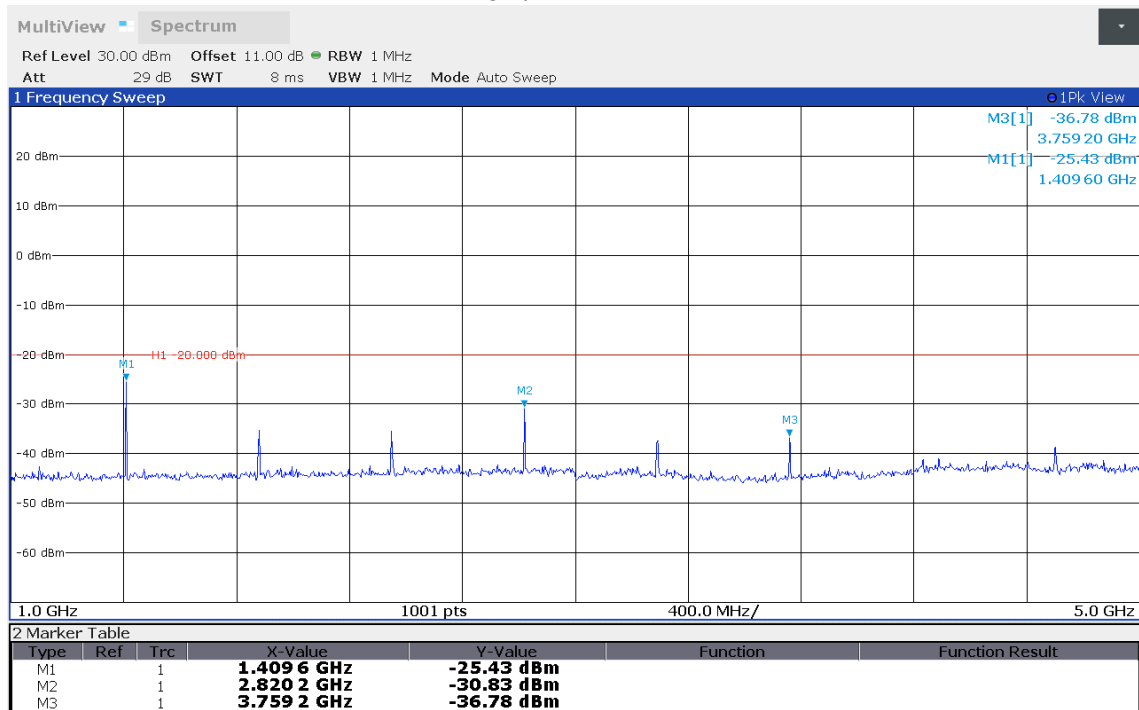
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 460.11875 MHz
 Note 1: High pass filter



18:36:27 24.03.2022

Conducted spurious emission

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-24
 Operating Conditions: Tnom/Vnom
 Mode: 469.9875 MHz
 Note 1: High pass filter



18:38:58 24.03.2022

3.4 Test Conditions and Results - Transmitter radiated emissions

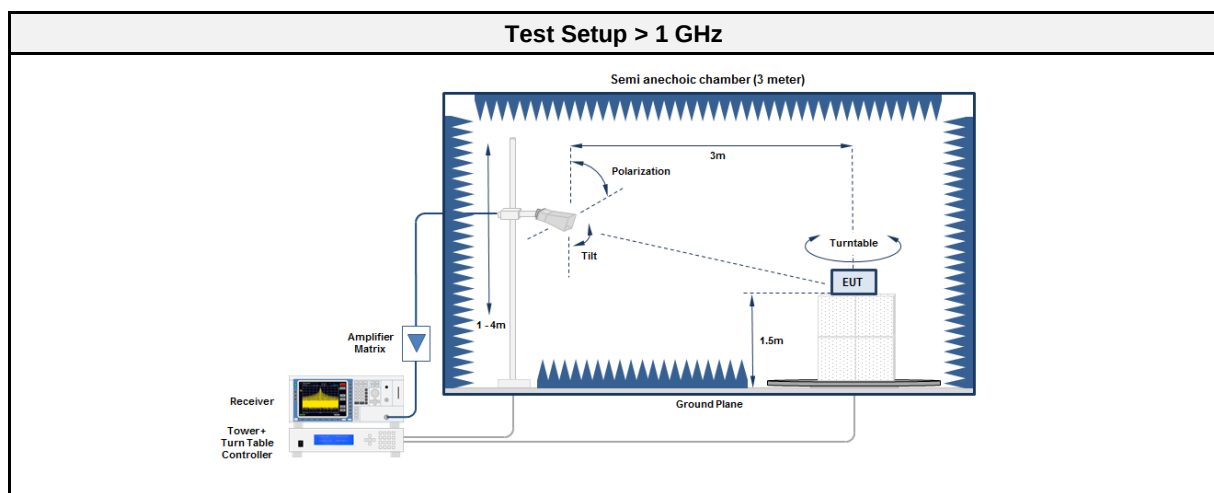
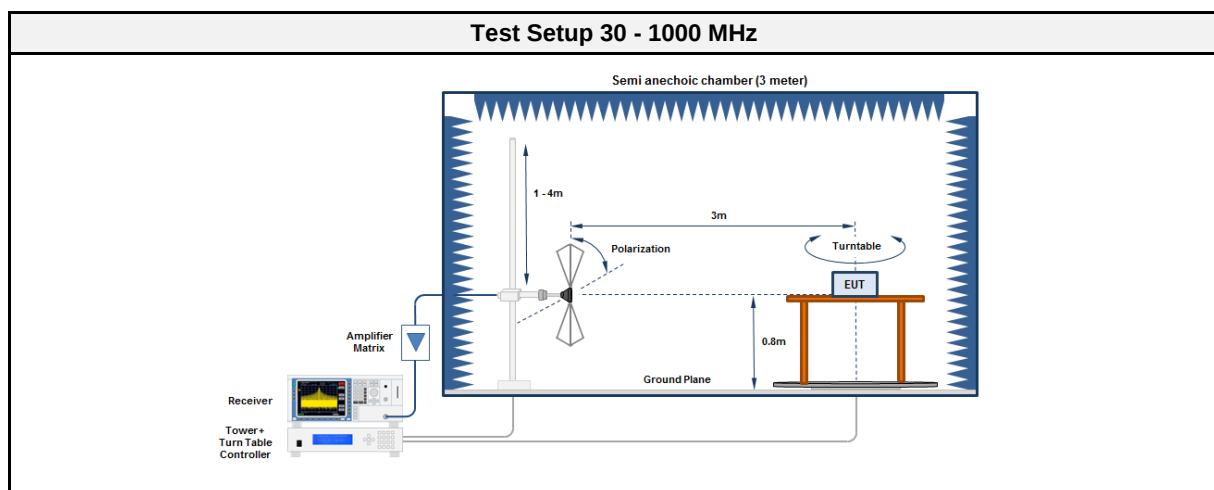
3.4.1 Information

Test Information	
Reference	FCC 90.210 FCC 2.1053 ISED RSS-119, Issue 12 (Sections 4.2,6.13)
Measurement Method	FCC 90.210 ANSI C63.26:2015 5.7
Test Method	Radiated
Test Mode	Unmodulated
Test Range	30 MHz to 10th Harmonic
Measurement Uncertainty:	± 5.7 dB
Operator	Toralf Jahn
Date	2022-03-22

3.4.2 Limits

Limits
-20 dBm

3.4.3 Setup



3.4.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC 2	EF01616	2021-09	2022-09
Spectrum analyzer	R&S	FSU43	EF01631	2021-07	2022-07
Horn antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10

3.4.5 Procedure

Test Procedure 30 - 1000 MHz	
1. EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

Test Procedure > 1 GHz	
1. EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground 2. EUT set to test mode 3. The receiver is set to peak detection with max hold 4. The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m 5. All significant emissions are measured again using the corresponding final detector	

3.4.7 Results

Test Results – 50 ohms load						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
450.25	No significant spurious emissions					
460.11875	No significant spurious emissions					
469.9875	No significant spurious emissions					

Test Results – Helix antenna						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
450.25	900.5	-41.20	pk	hor	-20.00	-21.19
450.25	900.5	-40.70	pk	ver	-20.00	-20.65
460.11875	920.24	-40.70	pk	hor	-20.00	-20.68
460.11875	920.24	-38.90	pk	ver	-20.00	-18.95
469.9875	939.98	-44.20	pk	hor	-20.00	-24.16
469.9875	939.98	-42.00	pk	ver	-20.00	-21.95
450.25	1351	-34.60	pk	ver	-20.00	-14.63
460.11875	1380	-35.70	pk	ver	-20.00	-15.73
469.9875	1410	-35.70	pk	ver	-20.00	-15.74

Test Results – Pit antenna						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
450.25	900.5	-31.10	pk	ver	-20.00	-11.09
460.11875	920.24	-28.60	pk	ver	-20.00	-08.61
469.9875	490	-37.50	pk	ver	-20.00	-17.49
469.9875	939.989	-27.20	pk	ver	-20.00	-07.21
450.25	1801	-26.20	pk	ver	-20.00	-06.23
460.11875	1380	-34.00	pk	ver	-20.00	-13.96
460.11875	1840	-30.60	pk	ver	-20.00	-10.59
469.9875	1410	-32.20	pk	ver	-20.00	-12.25
469.9875	1880	-38.40	pk	ver	-20.00	-18.36

Test Results – Wall antenna						
Channel [MHz]	Emission [MHz]	Level [dBm]	Det.	Pol.	Limit [dBm]	Margin [dB]
450.25	490.267	-35.00	pk	ver	-20.00	-15.01
450.25	900.495	-30.50	pk	ver	-20.00	-10.46
460.11875	420.12	-41.50	pk	ver	-20.00	-21.46
460.11875	500.12	-37.90	pk	ver	-20.00	-17.93
460.11875	920.24	-30.70	pk	ver	-20.00	-10.68
469.9875	429.98	-39.10	pk	ver	-20.00	-19.12
469.9875	939.98	-33.20	pk	ver	-20.00	-13.17
450.25	1351	-31.30	pk	ver	-20.00	-11.31
450.25	1801	-26.30	pk	ver	-20.00	-06.32
460.11875	1380	-33.00	pk	ver	-20.00	-13.00
460.11875	1840	-36.70	pk	ver	-20.00	-16.74
460.11875	2761	-35.80	pk	ver	-20.00	-15.82
469.9875	1410	-27.50	pk	ver	-20.00	-07.48
469.9875	1880	-36.00	pk	ver	-20.00	-16.02

3.5 Test Conditions and Results - Receiver spurious emissions

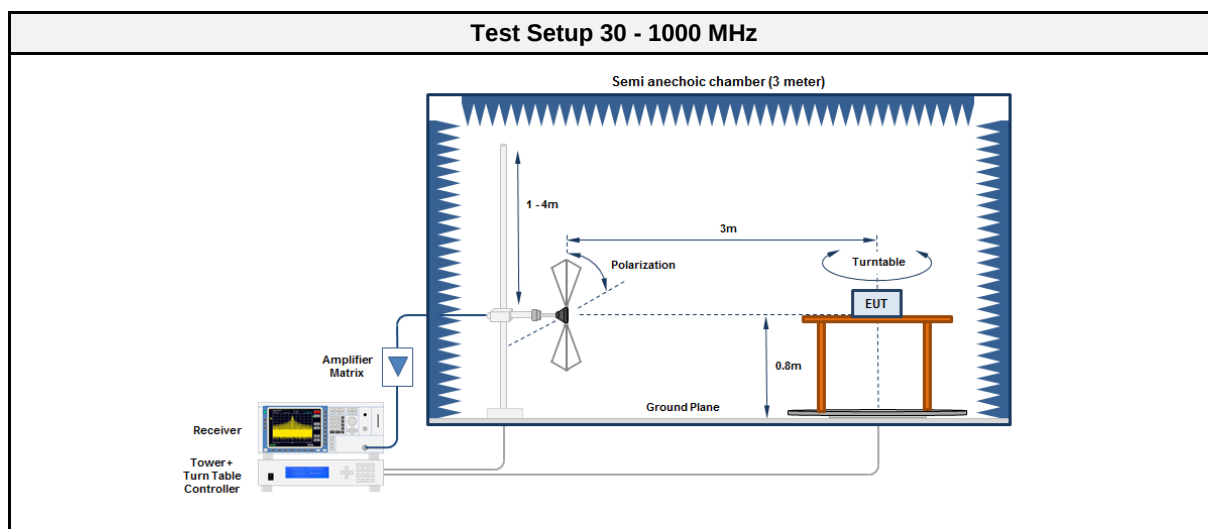
3.5.1 Information

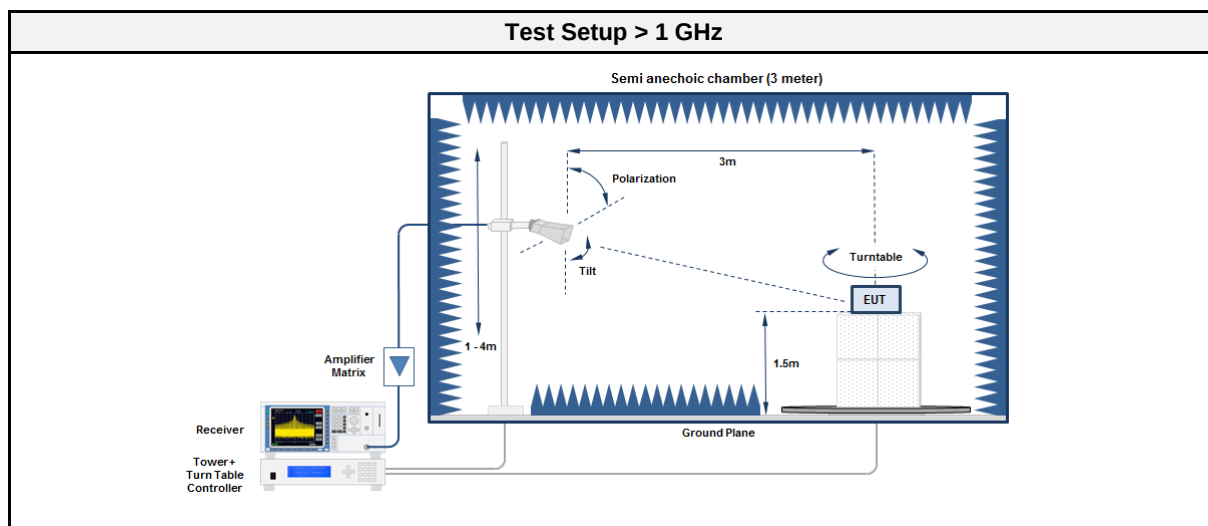
Test Information	
Reference	ISED RSS-Gen, Issue 5 (Sections 7.1)
Measurement Method	ANSI C63.26:2015 5.7
Test Method	Radiated
Test Mode	Receive
Test Range	30 MHz to 5th Harmonic
Measurement Uncertainty:	± 5.3 dB
Operator	Florian Voigt
Date	2022-03-22

3.5.2 Limits

Limits			
Frequency [MHz]	Detector	Field strength [$\mu\text{V/m}$]	Measurement distance [m]
30 - 88	Quasi-Peak	100	3
88 - 216	Quasi-Peak	150	3
216 - 960	Quasi-Peak	200	3
960 - 1000	Quasi-Peak	500	3
>1000	Average	500	3

3.5.3 Setup





3.5.4 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	RadiMation	2020.1.8

Test Equipment 30 - 1000 MHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	R&S	HK 116	EF00030	2021-05	2024-05
Antenna	R&S	HL 223	EF00187	2019-05	2022-05

Test Equipment > 1 GHz					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic Chamber	Frankonia	AC1	EF00062	2021-02	2024-02
Measurement Receiver	Agilent	N9038A-526/WXP	EF01070	2021-07	2022-07
Antenna	Schwarzbeck	BBHA 9120D	EF00018	2019-10	2022-10

3.5.5 Procedure

Test Procedure 30 - 1000 MHz	
1.	EUT is placed on a non conducting support at the center of a turn table 0.8 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5.	All significant emissions are measured again using the corresponding final detector

Test Procedure > 1 GHz	
1.	EUT is placed on a non conducting support at the center of a turn table 1.5 m above the ground
2.	EUT set to test mode
3.	The receiver is set to peak detection with max hold
4.	The EUT is rotated through 360° and the height of the antenna is varied from 1 m to 4 m
5.	All significant emissions are measured again using the corresponding final detector

3.5.7 Results

Test Results - Pit antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	32.6403	27.10	pk	ver	40.00	-12.91
460.11875	858.5765	35.40	pk	ver	46.00	-10.64

Test Results - Helix antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	No significant spurious emissions					

Test Results - Wall antenna						
Channel [MHz]	Emission [MHz]	Level [dBμV/m]	Det.	Pol.	Limit [dBμV/m]	Margin [dB]
460.11875	31.5602	25.60	pk	ver	40.00	-14.41
460.11875	718.953	34.40	pk	hor	46.00	-11.61
460.11875	5869	46.31	pk	ver	74.00	-27.69
460.11875	5869	38.55	avg	ver	53.98	-15.43

3.6 Test Conditions and Results - Frequency stability

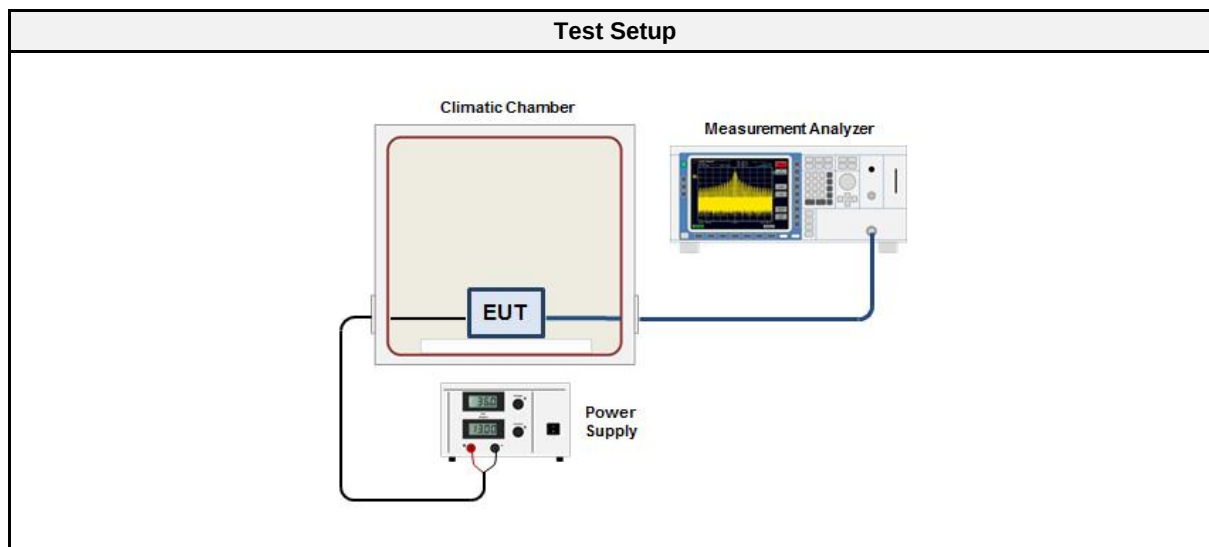
3.6.1 Information

Test Information	
Reference	FCC 90.213, FCC 2.1055 ISED RSS-119, Issue 12 (Sections 5.3)
Measurement Method	ANSI C63.26:2015 5.6
Test Method	Conducted
Test Mode	Unmodulated
Measurement Uncertainty:	± 0.06 PPM
Operator	Toralf Jahn
Date	2022-03-29

3.6.2 Limits

Limits		
Device Type	Channel bandwidth	Limit
Base / Fixed	12.5	1.5 ppm
Base / Fixed	6.25	0.5 ppm
Mobile	12.5	2.5 ppm
Mobile	6.25	1.0 ppm

3.6.3 Setup



3.6.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2021-07	2022-07
Climatic chamber	Vötsch	VT 4010	EF00134	2021-06	2022-06
Cable	Gigalane	SMS111B	EF00779 CAAZ	2022-02	2023-02
Rubidium frequency standard	EFRATOM	MFS	EF00308	2017-07	2022-07

3.6.5 Procedure

Test Procedure with respect to ambient temperature	
1.	The EUT is turned off and placed inside the temperature chamber
2.	The temperature chamber is set to the highest operating temperature
3.	The EUT is turned on at nominal supply voltage and the carrier frequency is measured at startup, at 2 minutes, 5 minutes and 10 minutes after EUT is energized
4.	The EUT is turned off again
5.	The temperature of the chamber is lowered by 10 °C
6.	The carrier frequency measurement is repeated after temperature has stabilized
7.	The procedure is repeated until the lowest operating frequency is reached

Test Procedure when varying supply voltage	
1.	The EUT is supplied with nominal supply voltage or a fully charged battery at room temperature (15 to 25 °C)
2.	The carrier frequency is measured
3.	The procedure is repeated at 85 % and 115 % of the nominal supply voltage or at the battery endpoint for battery operated equipment

Test Procedure of carrier frequency measurement	
1.	The emission spectrum is measured using a resolution band width of 100 kHz with peak detection and maximum hold
2.	The peak of the emission spectrum is determined
3.	The left most frequency f_1 10 dB below the peak emission is searched
4.	The right most frequency f_2 10 dB below the peak emission is searched
5.	The center frequency is calculated from $f_c = (f_1 + f_2) / 2$
6.	The center frequency and the deviation from the nominal center frequency are recorded

3.6.6 Results

Sample ID: 38837

Test Results - Variation of temperature						
Channel [MHz]	Voltage [V]	Temperature [°C]	Time after activation	Frequency [MHz]	Deviation [kHz]	Deviation [ppm]
460.11875	3.66	65	0	460.118764	0.092	0.20
460.11875	3.66	60	0	460.118742	0.070	0.15
460.11875	3.66	50	0	460.118675	0.003	0.01
460.11875	3.66	40	0	460.118653	-0.019	-0.04
460.11875	3.66	30	0	460.118703	0.031	0.07
460.11875	3.66	20	0	460.118672	reference	reference
460.11875	3.66	10	0	460.118758	0.086	0.19
460.11875	3.66	0	0	460.118704	0.032	0.07
460.11875	3.66	-10	0	460.118718	0.046	0.10
460.11875	3.66	-20	0	460.118717	0.045	0.10
460.11875	3.66	-30	0	460.118720	0.048	0.10
Comment: The EUT transmits in normal operation mode only for a milli seconds.						

Test Results - Variation of supply voltage					
Channel [MHz]	Voltage [V]	Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [ppm]
460.11875	3.66	20	460.118672	reference	reference
460.11875	3.0	20	460.118687	0.015	0.03

3.7 Test Conditions and Results - Transient frequency behavior

3.7.1 Information

Test Information	
Reference	FCC 90.214 ISED RSS-119, Issue 12 (Sections 5.9)
Measurement Method	ANSI C63.26:2015 6.5
Test Method	Conducted
Test Mode	Unmodulated
Measurement Uncertainty:	± 5.03 %
Operator	Toralf Jahn
Date	2020-04-30

3.7.2 Limits

Limits

Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals ^{1,2}	Maximum frequency difference ³	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t ₁ ⁴	±25.0 kHz	5.0 ms	10.0 ms
t ₂	±12.5 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t ₁ ⁴	±12.5 kHz	5.0 ms	10.0 ms
t ₂	±6.25 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t ₁ ⁴	±6.25 kHz	5.0 ms	10.0 ms
t ₂	±3.125 kHz	20.0 ms	25.0 ms
t ₃ ⁴	±6.25 kHz	5.0 ms	10.0 ms

¹ _{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t₁ is the time period immediately following t_{on}.

t₂ is the time period immediately following t₁.

t₃ is the time period from the instant when the transmitter is turned off until t_{off}.

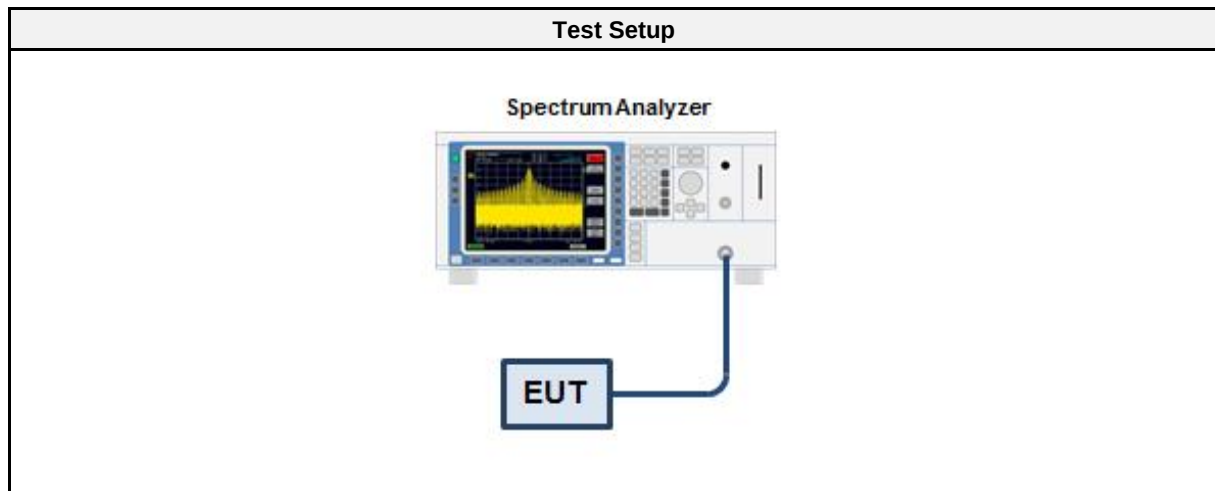
t_{off} is the instant when the 1 kHz test signal starts to rise.

² During the time from the end of t₂ to the beginning of t₃, the frequency difference must not exceed the limits specified in §90.213.

³ Difference between the actual transmitter frequency and the assigned transmitter frequency.

⁴ If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

3.7.3 Setup



3.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2021-07	2022-07
Attenuator	Radiall GmbH	R416010000	EF01013	cal before use	cal before use
Cable	Gigalane	SMS111B	EF00779 CAAZ	2022-02	2023-02
Rubidium frequency standard	EFRATOM	MFS	EF00308	2017-07	2022-07

3.7.5 Procedure

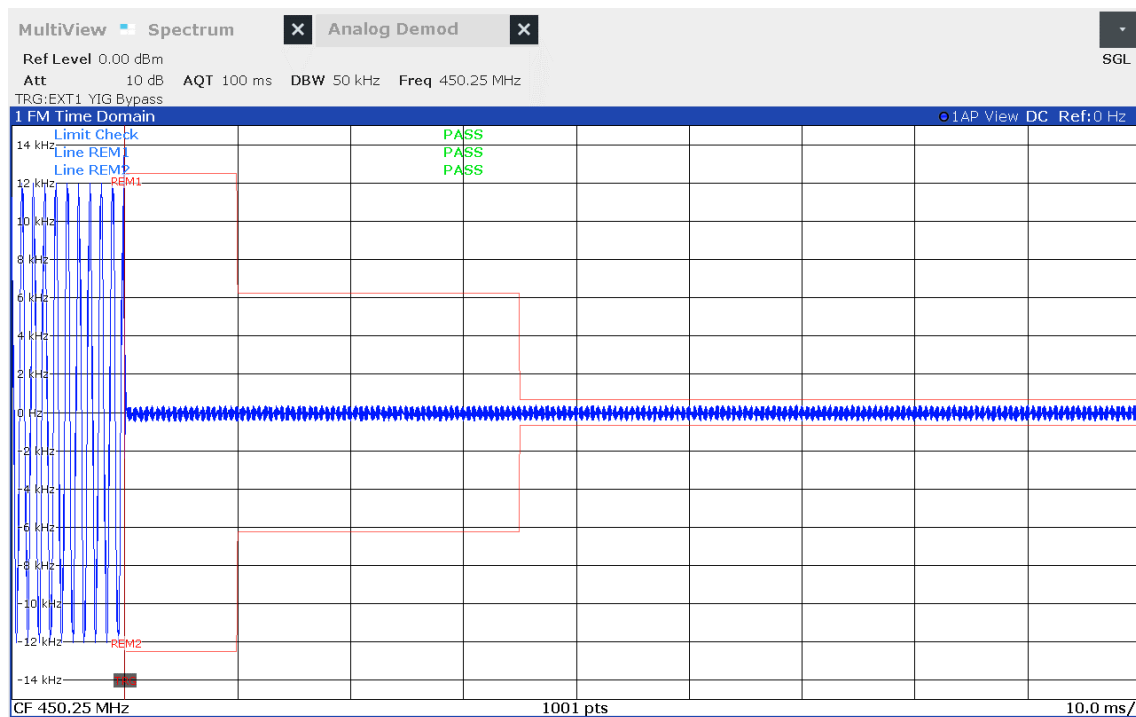
Test Procedure
1. The EUT is set to test frequency 2. The EUT is connected to modulation analyzer 3. The EUT is switched on and off in order to determine the transient switching behavior

3.7.6 Results

Test Results		
Channel [MHz]	State	Verdict
450.25	Tx Off	PASS
460.11875	Tx Off	PASS
469.9875	Tx Off	PASS
450.25	Tx On	PASS
460.11875	Tx On	PASS
469.9875	Tx On	PASS

Screen Capture

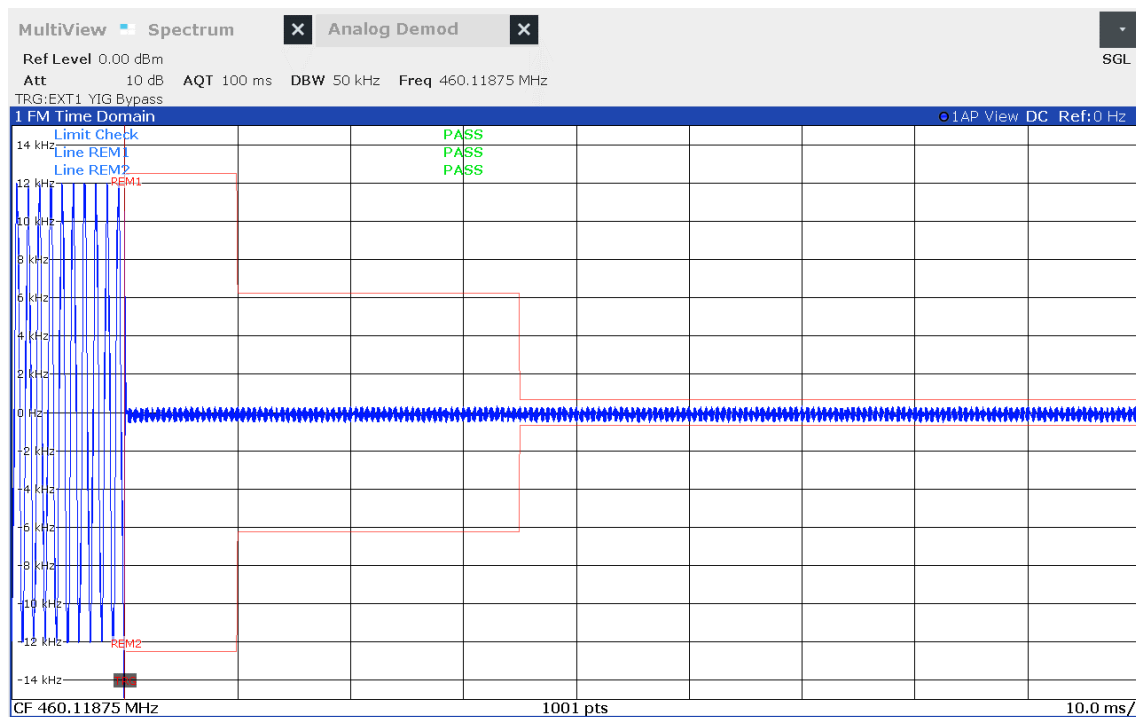
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXon 450.25 MHz



12:13:27 28.03.2022

Transient frequency behavior

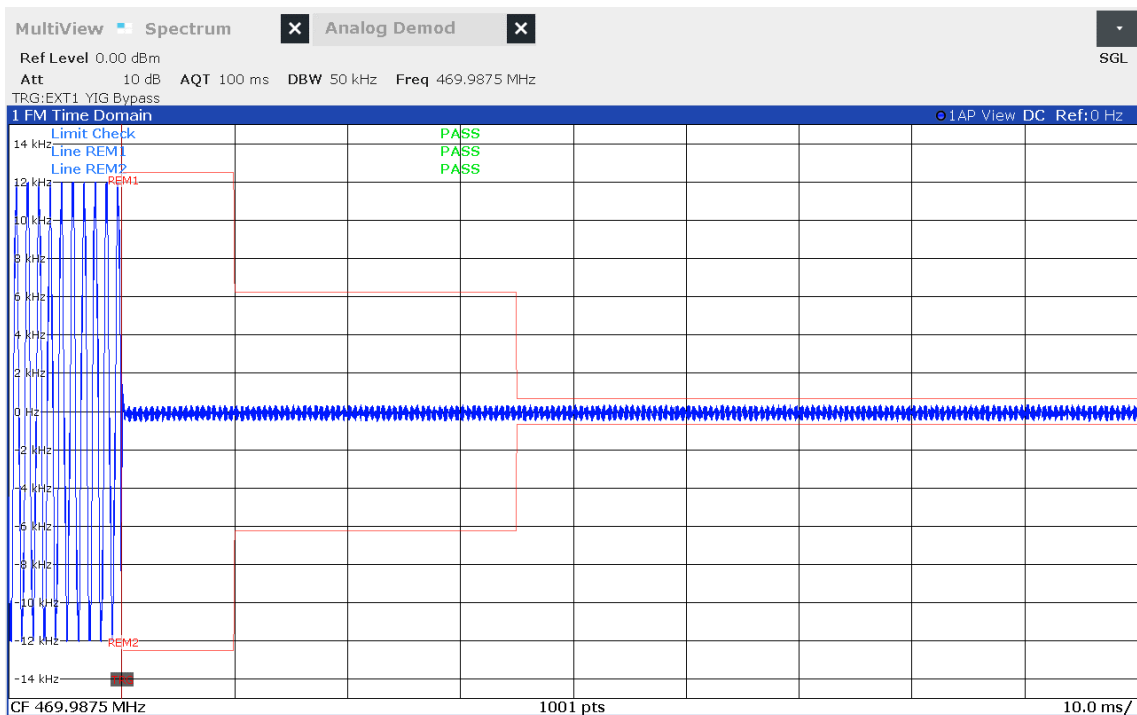
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXon 460.11875 MHz



12:14:51 28.03.2022

Transient frequency behavior

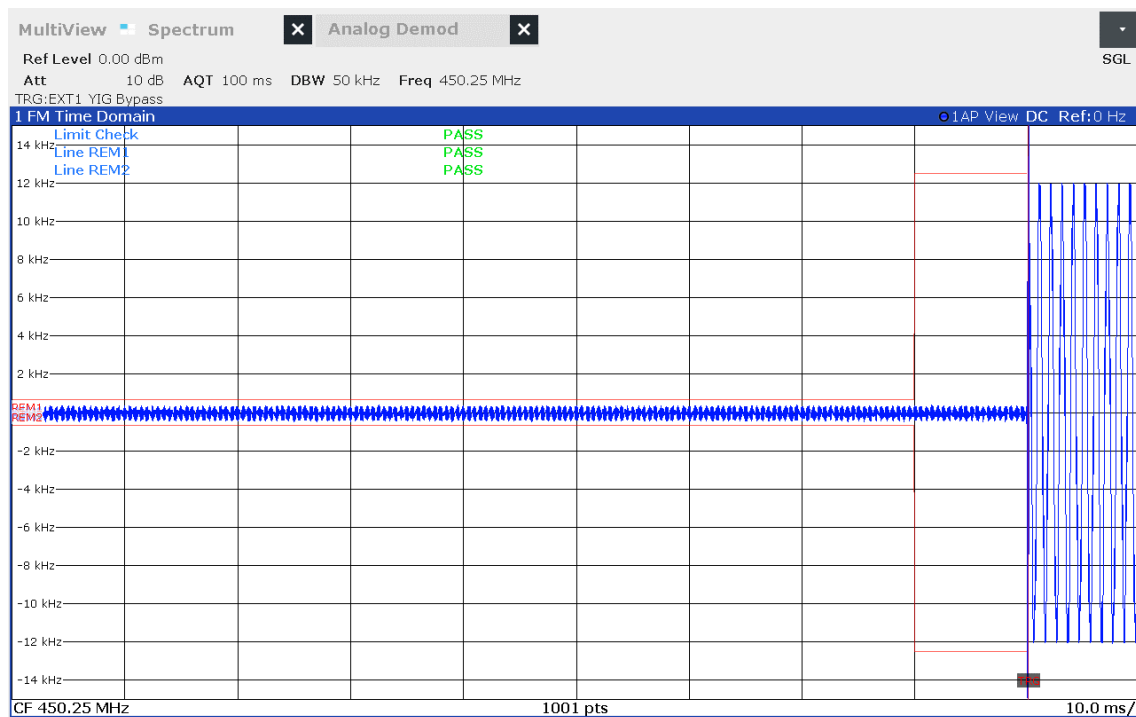
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXon 469.9875 MHz



12:16:30 28.03.2022

Transient frequency behavior

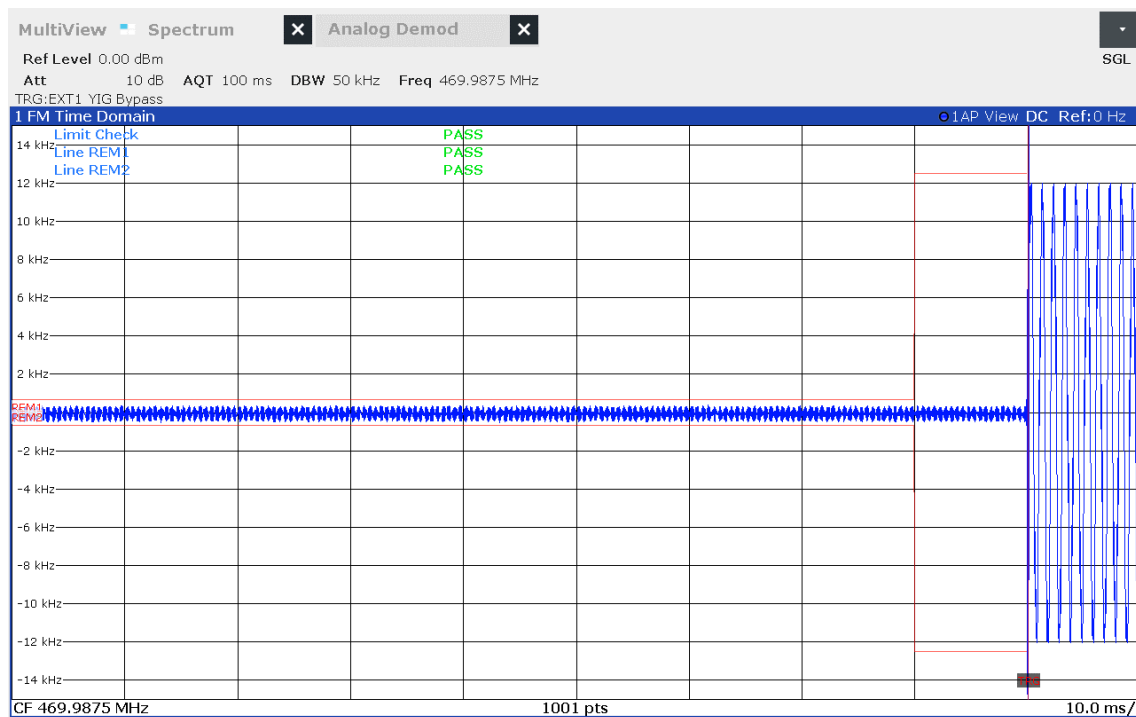
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXoff 450.25 MHz



11:53:05 28.03.2022

Transient frequency behavior

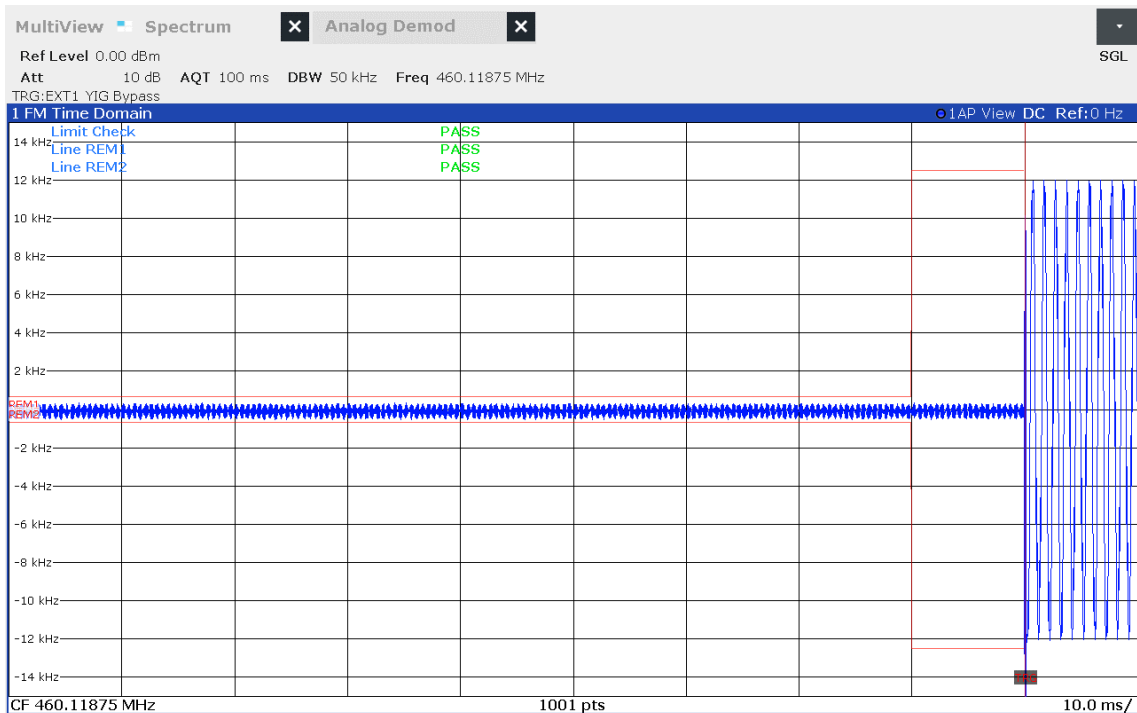
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXoff 469.9875 MHz



12:01:24 28.03.2022

Transient frequency behavior

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Operator: Toralf Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2022-03-28
 Operating Conditions: Tnom/Vnom
 Mode: TXoff 460.11875 MHz

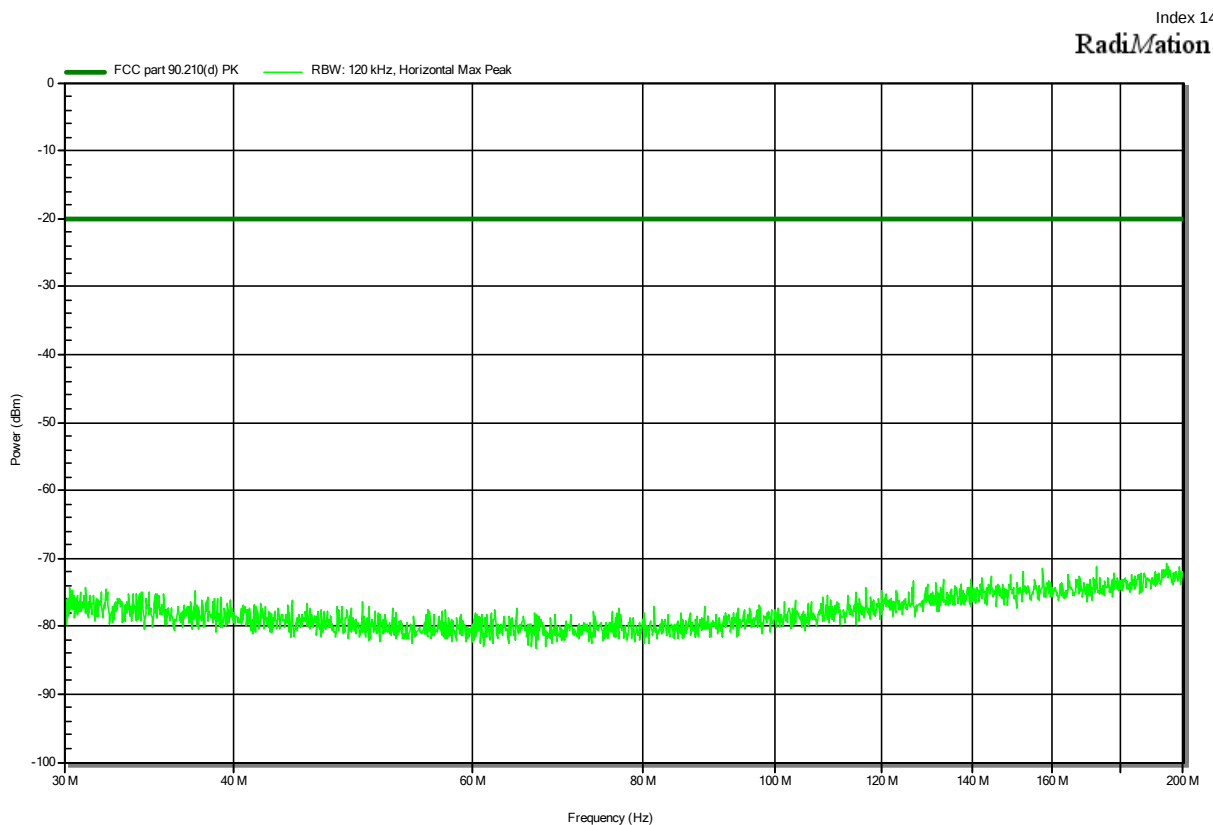


12:04:11 28.03.2022

ANNEX A Transmitter radiated emissions

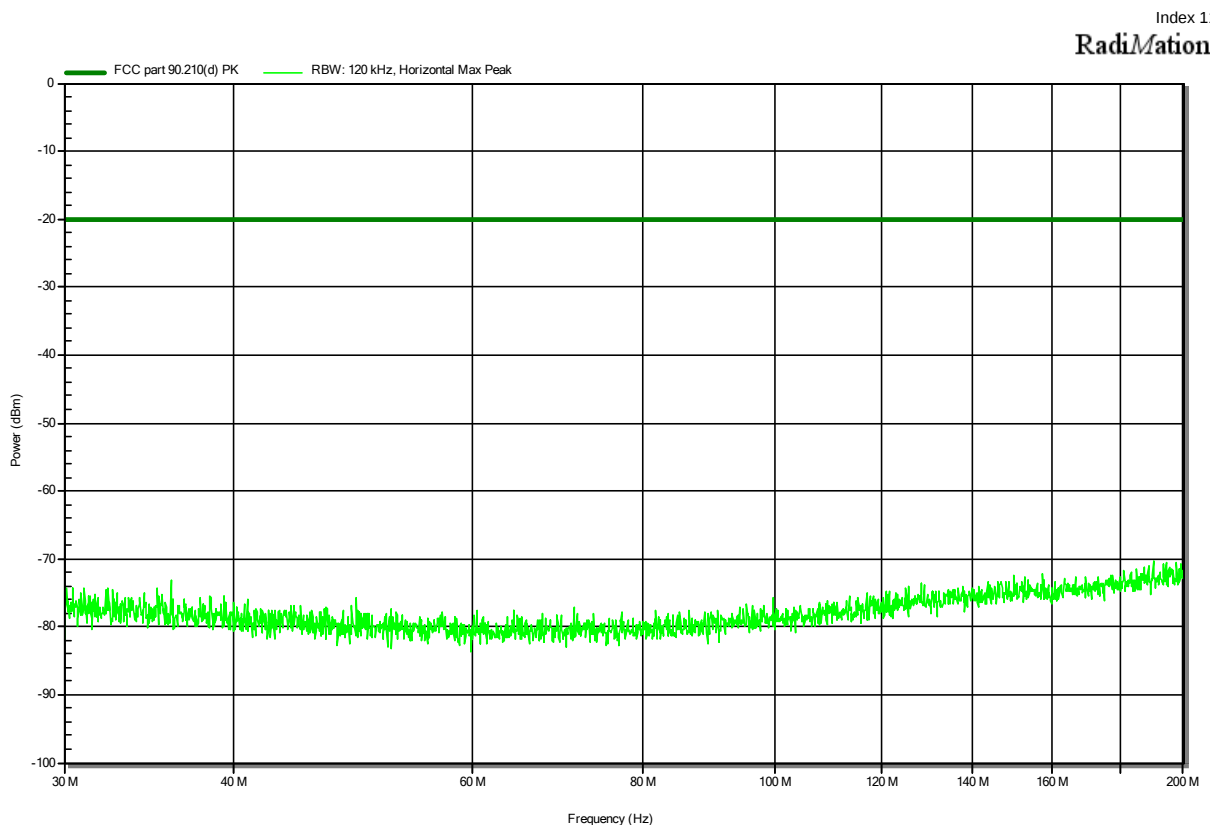
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 450.250 MHz
 Test Date: 2022-03-22
 Note:



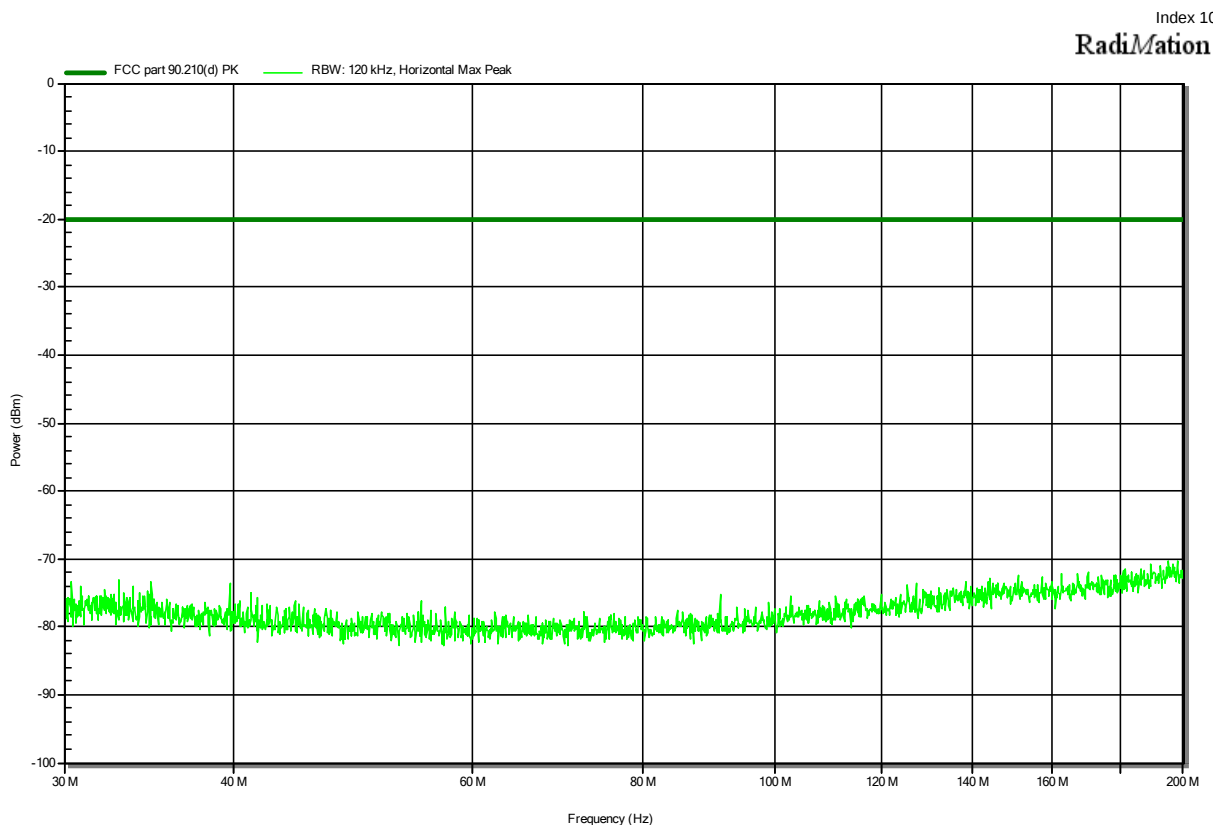
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

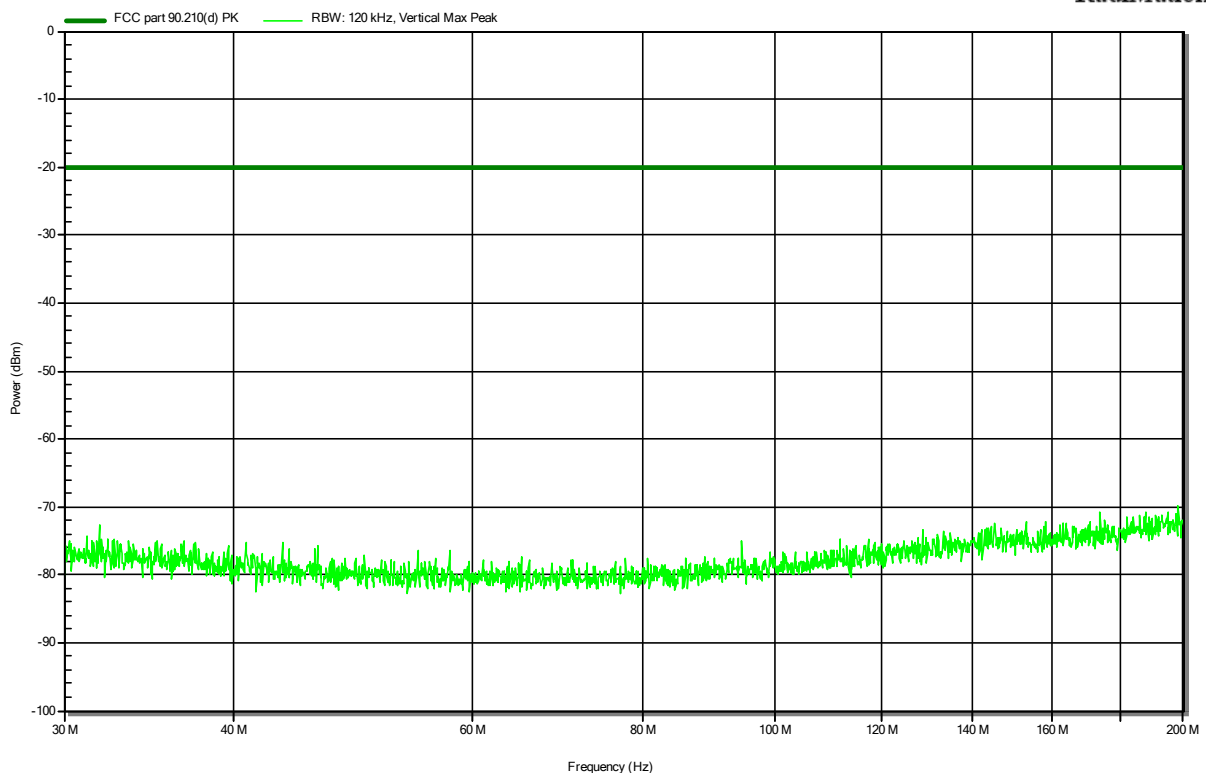


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 450.250 MHz
 Test Date: 2022-03-22
 Note:

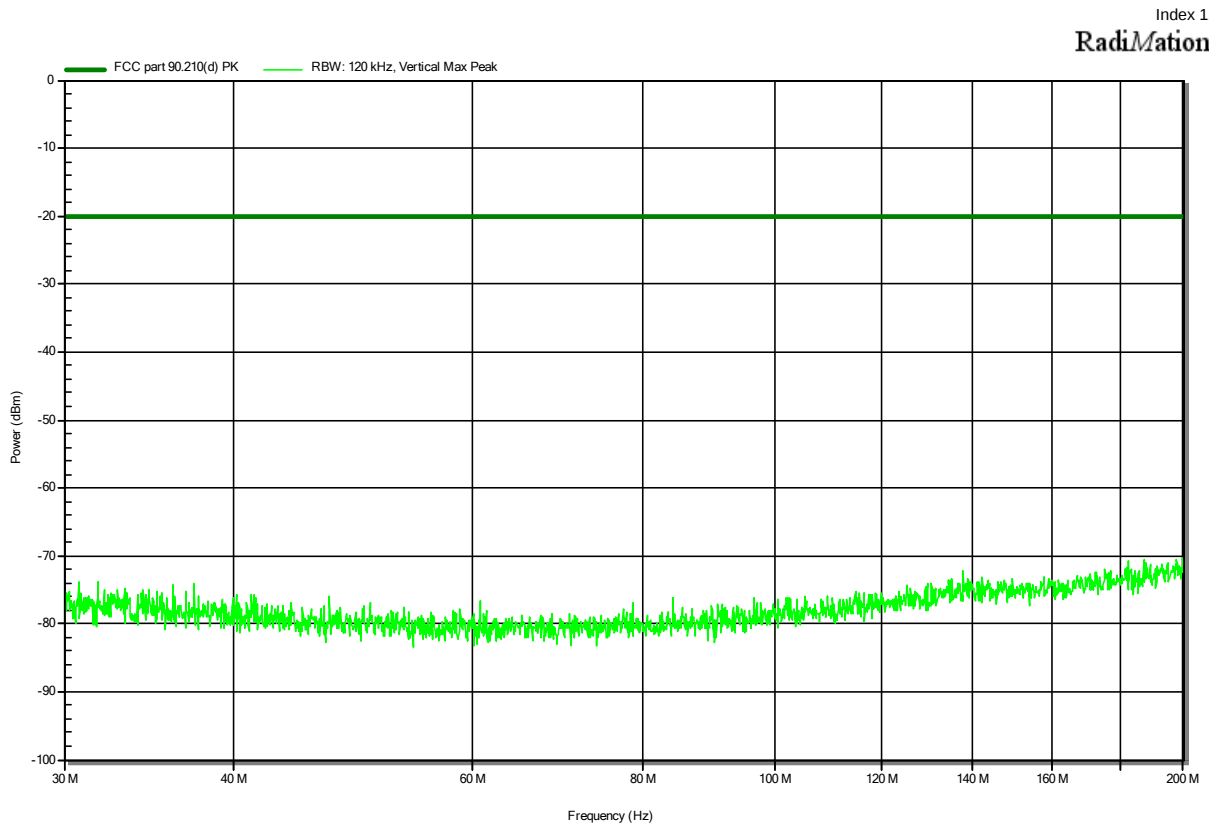
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RadiMation



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

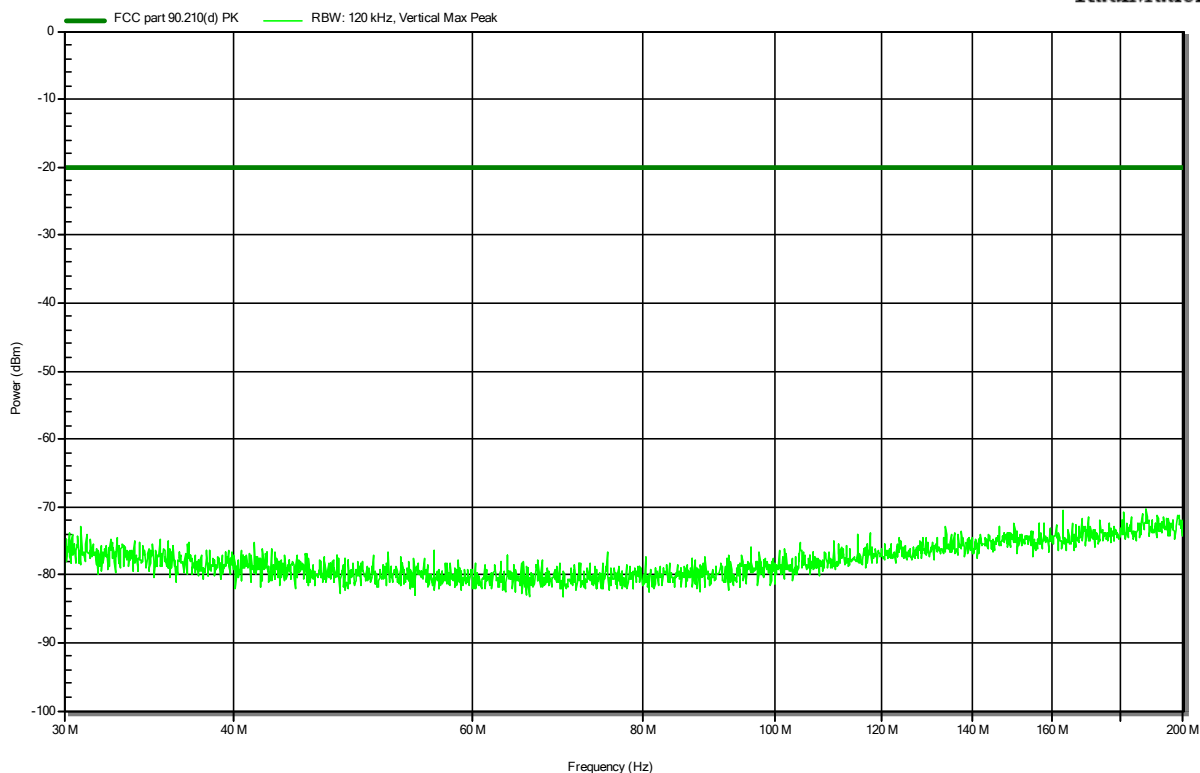


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

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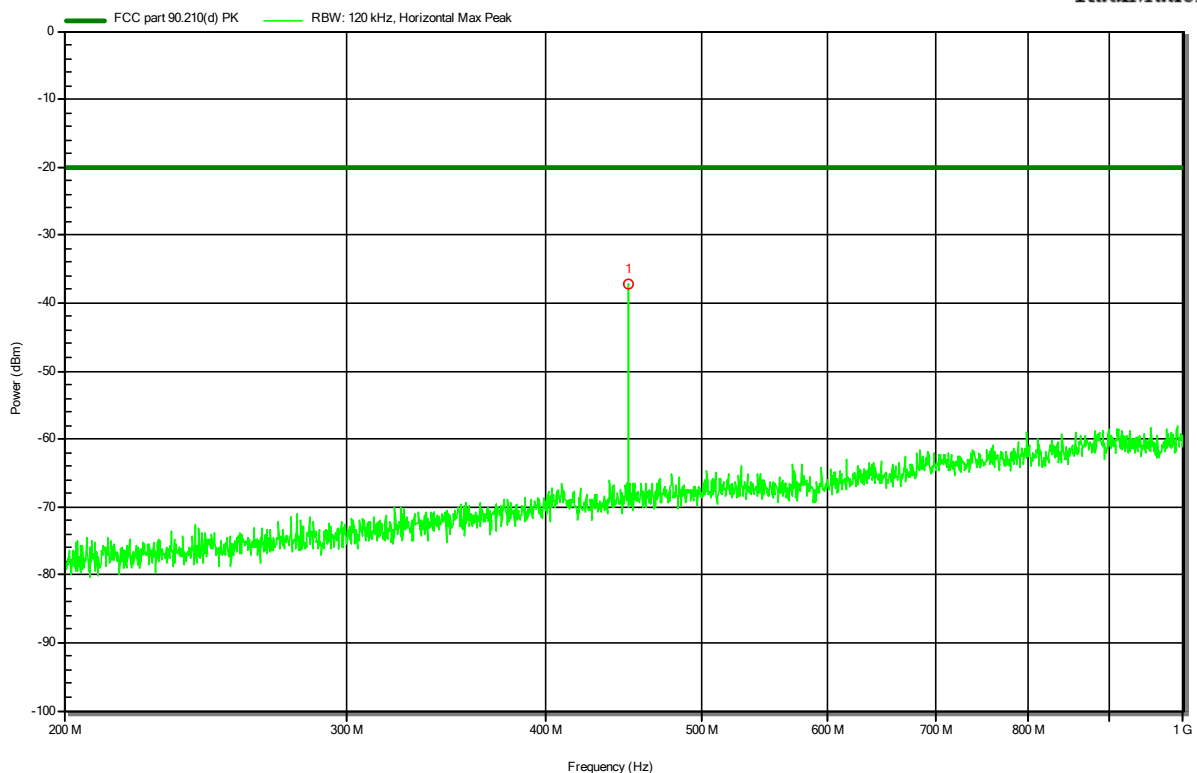


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 450.25 MHz
 Test Date: 2022-03-22
 Note:

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RadiMation



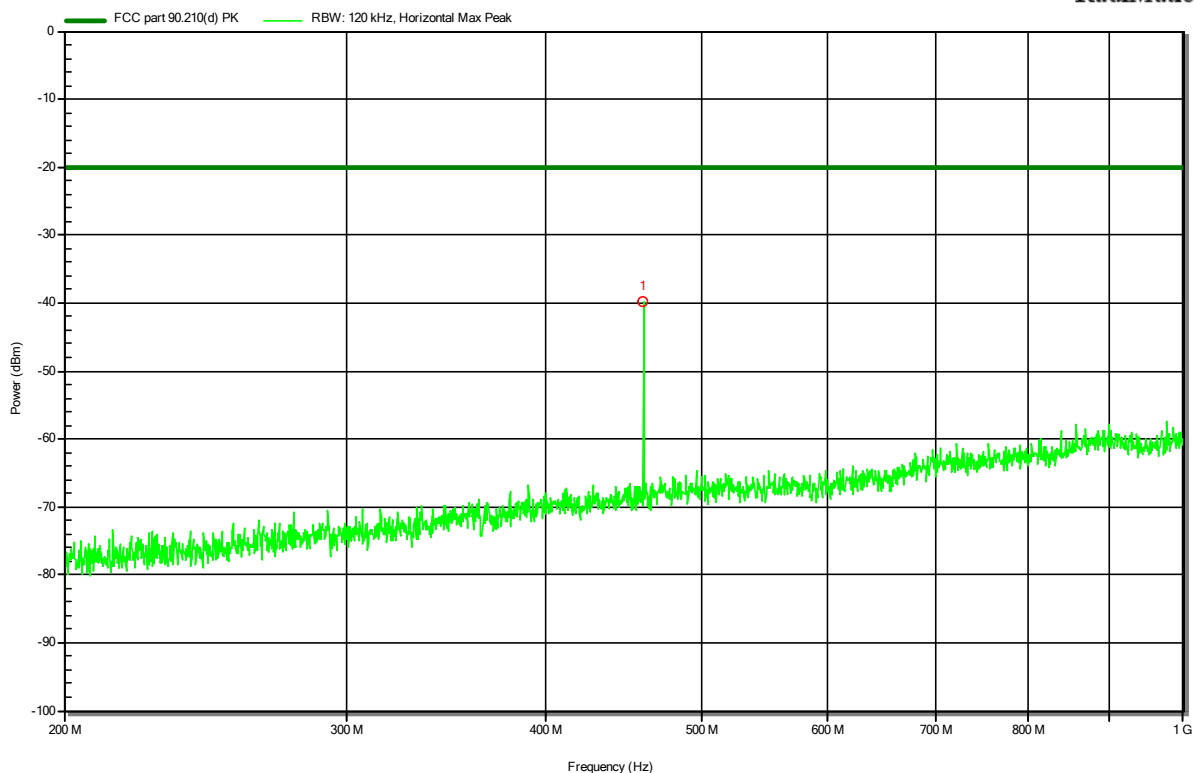
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.24 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

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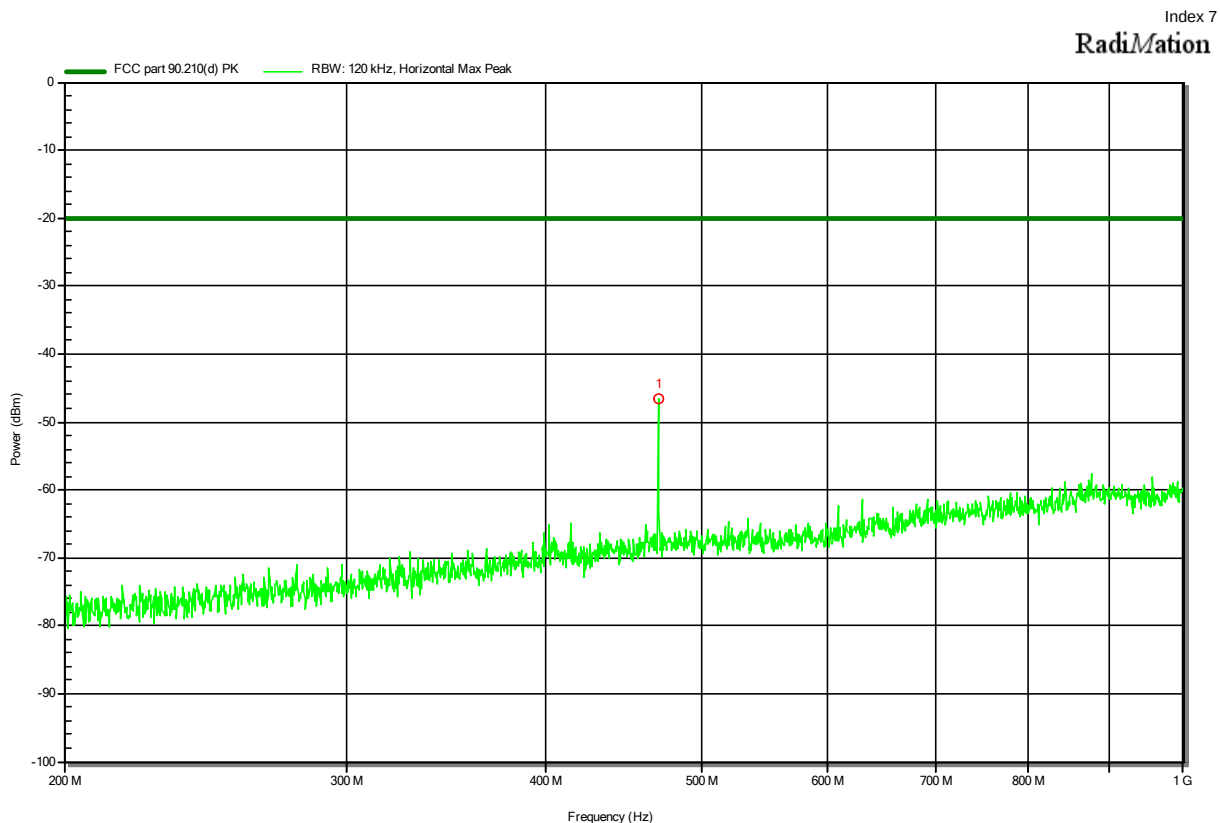
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.12 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

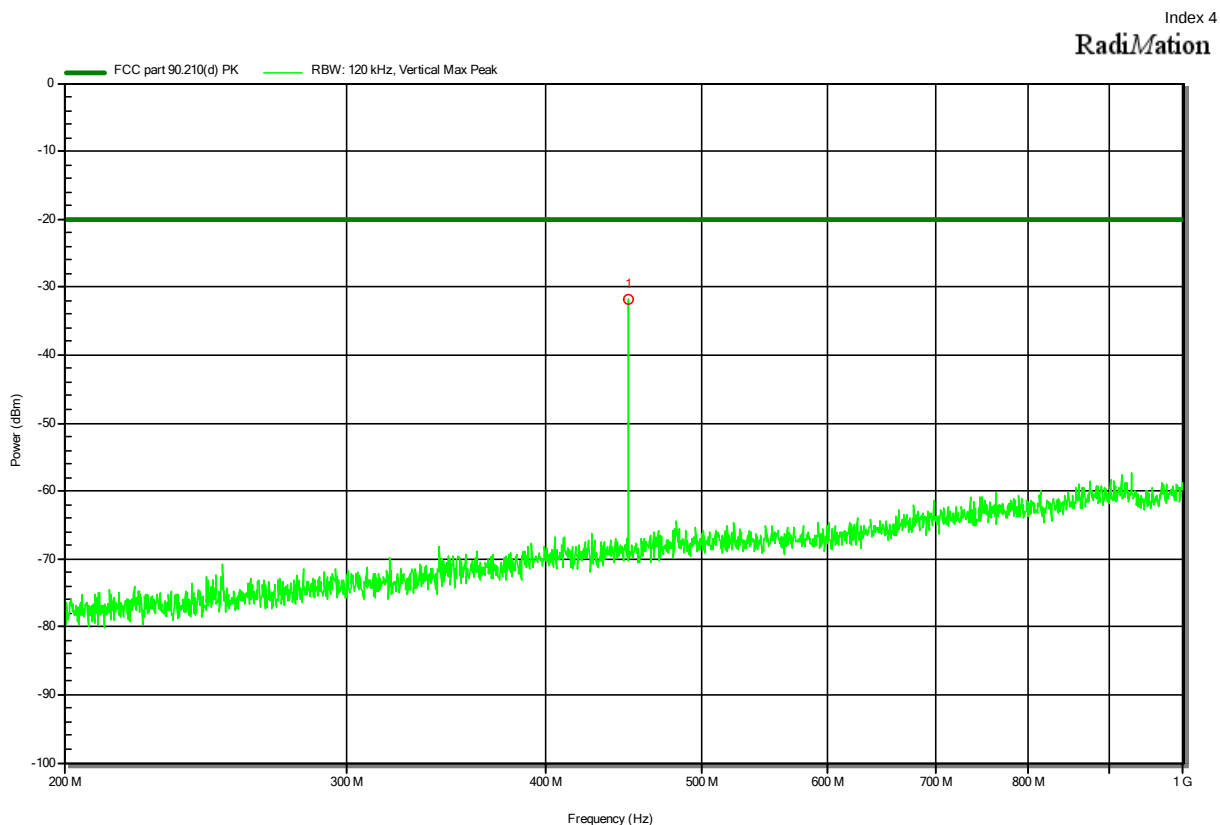
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 469.9875 MHz
 Test Date: 2022-03-22
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
469.98 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 450.25 MHz
 Test Date: 2022-03-22
 Note:



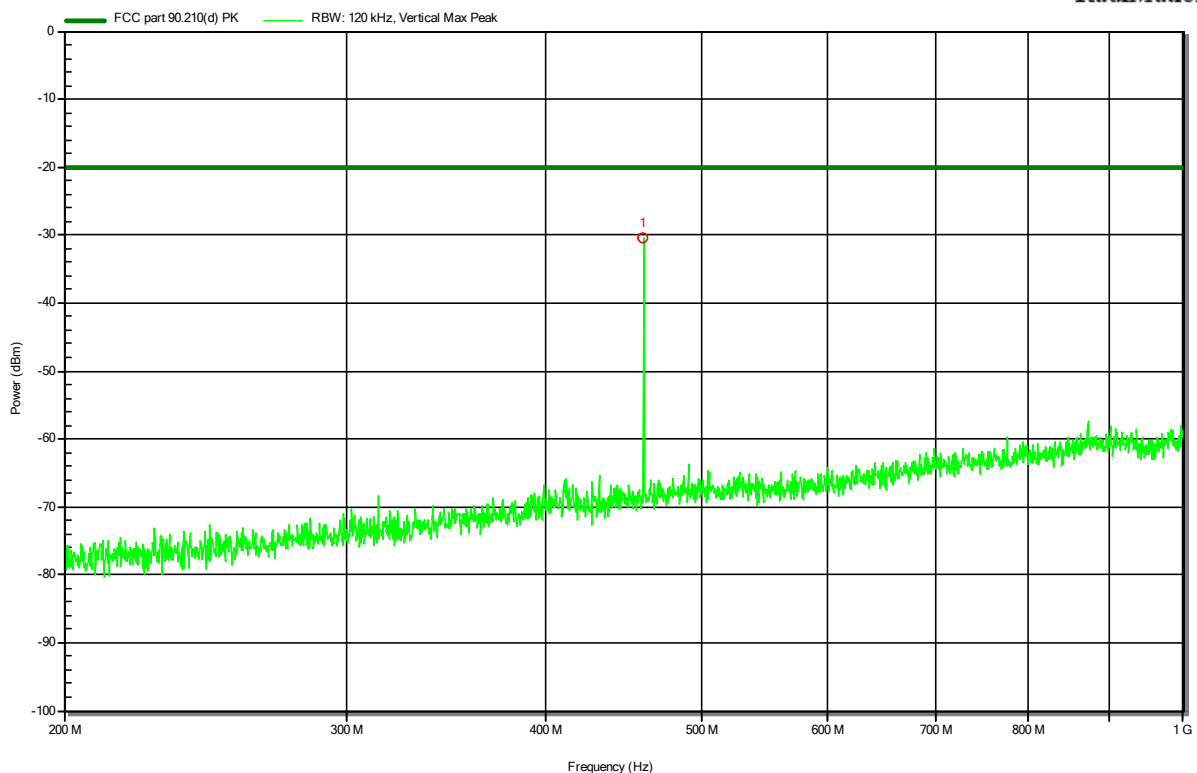
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.24 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

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RadiMation



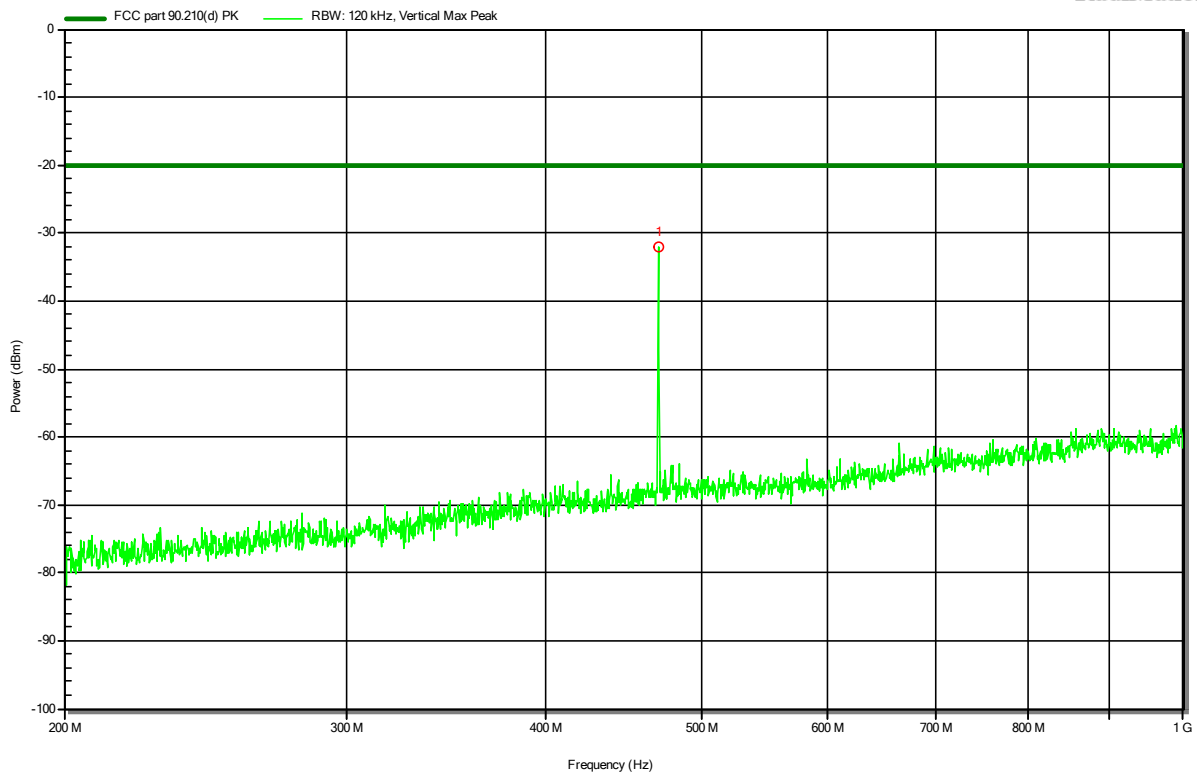
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.12 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

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RadiMation



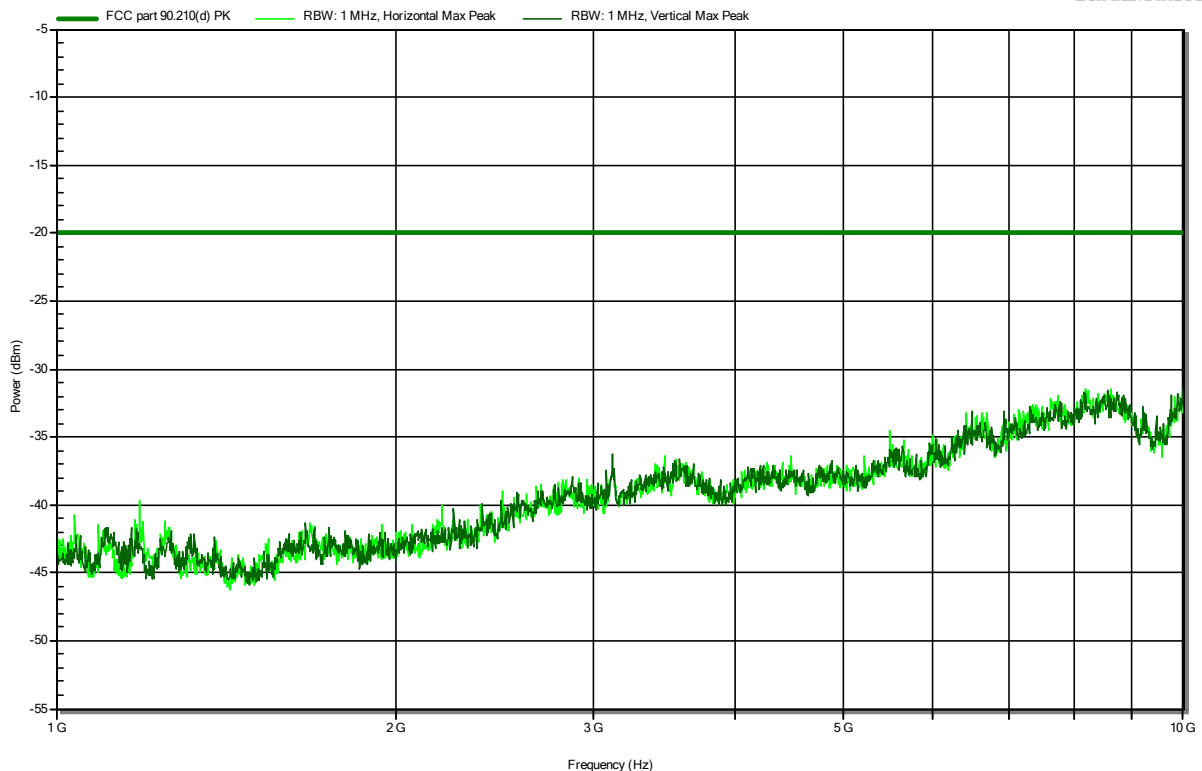
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
469.98 MHz				Carrier

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 450.250 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation

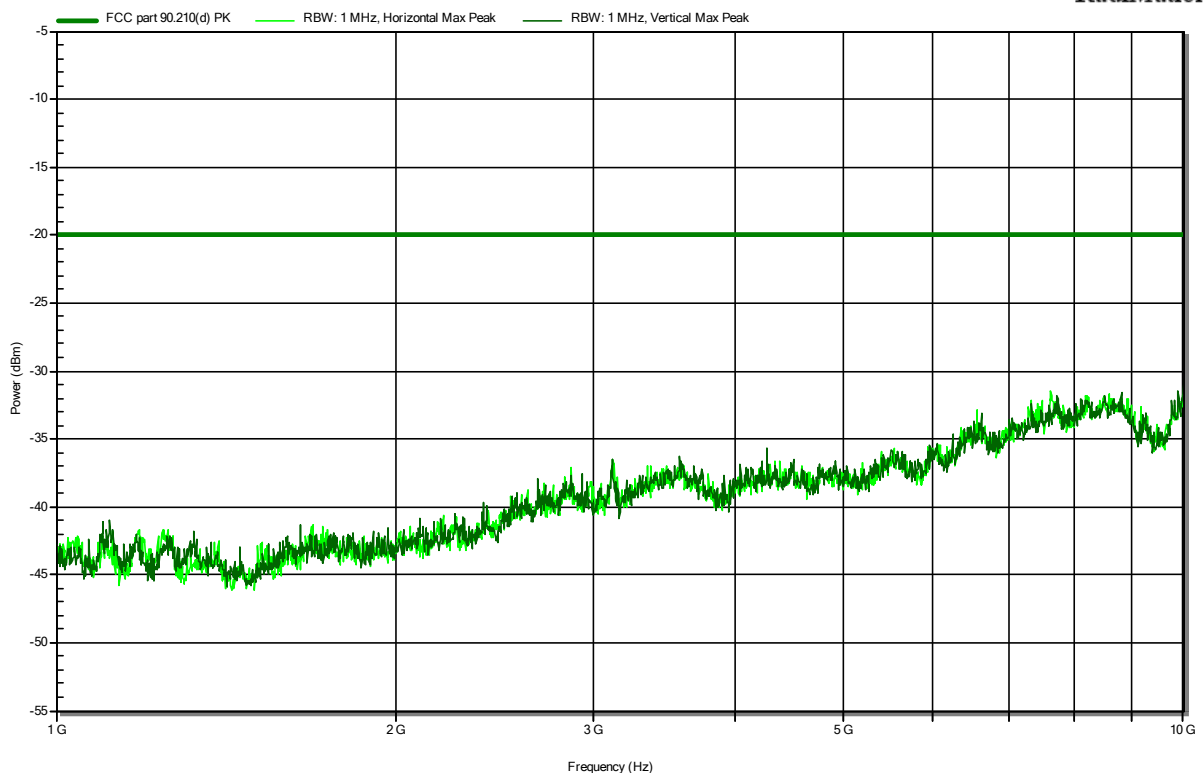


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 460.11875 MHz
 Test Date: 2022-03-25
 Note:

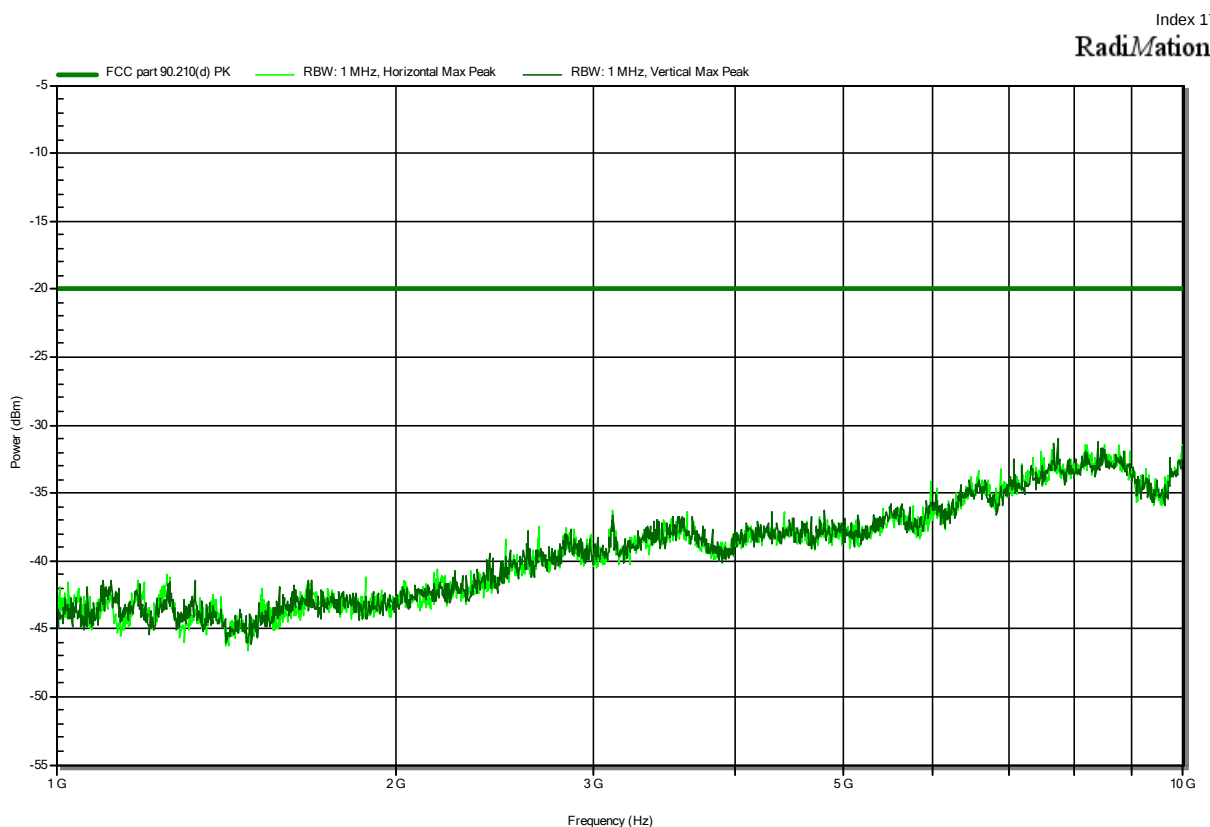
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RadiMation



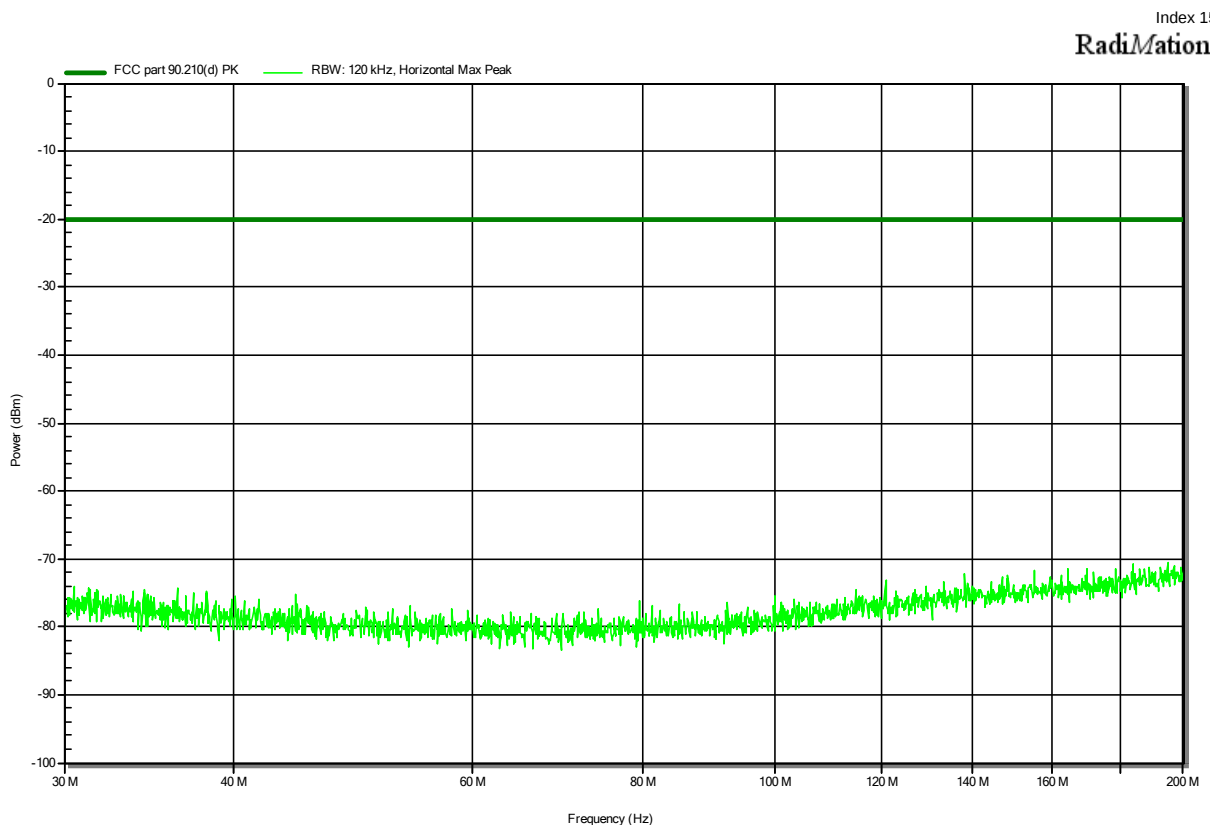
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38837
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; 50 Ohm Load, 469.9875 MHz
 Test Date: 2022-03-25
 Note:



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 450.250 MHz
 Test Date: 2022-03-22
 Note:

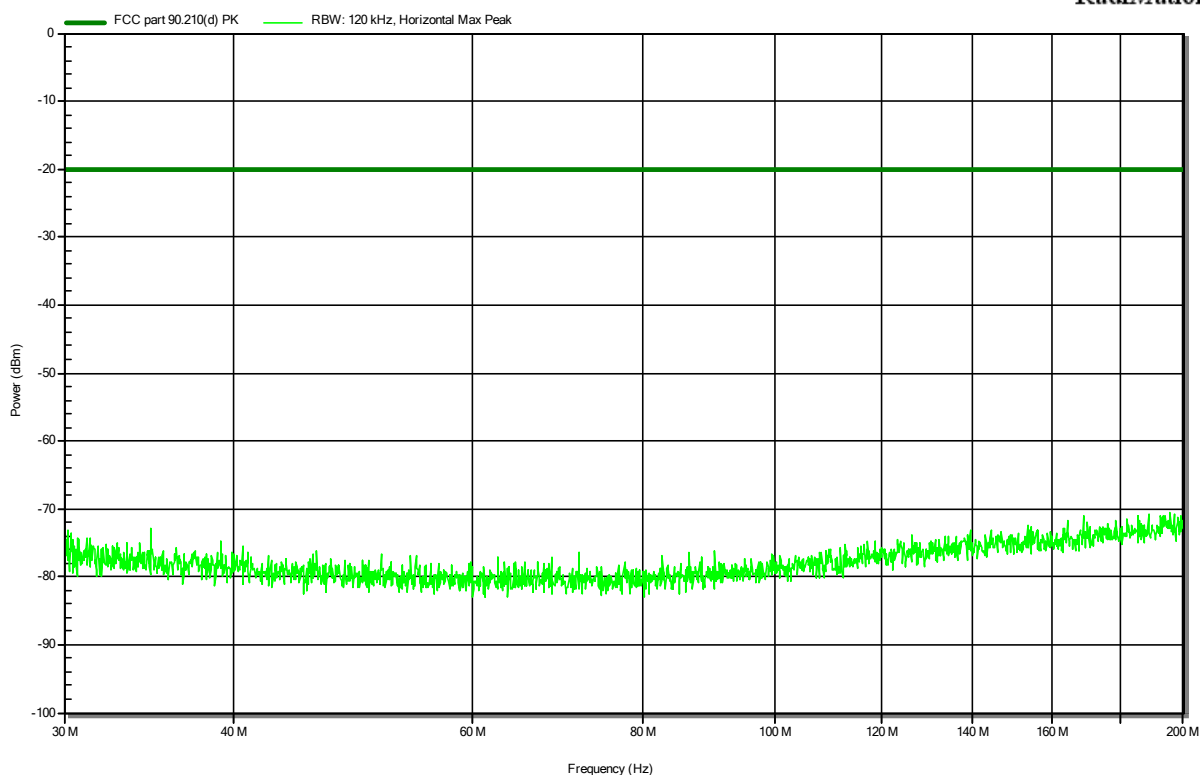


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

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RadiMation

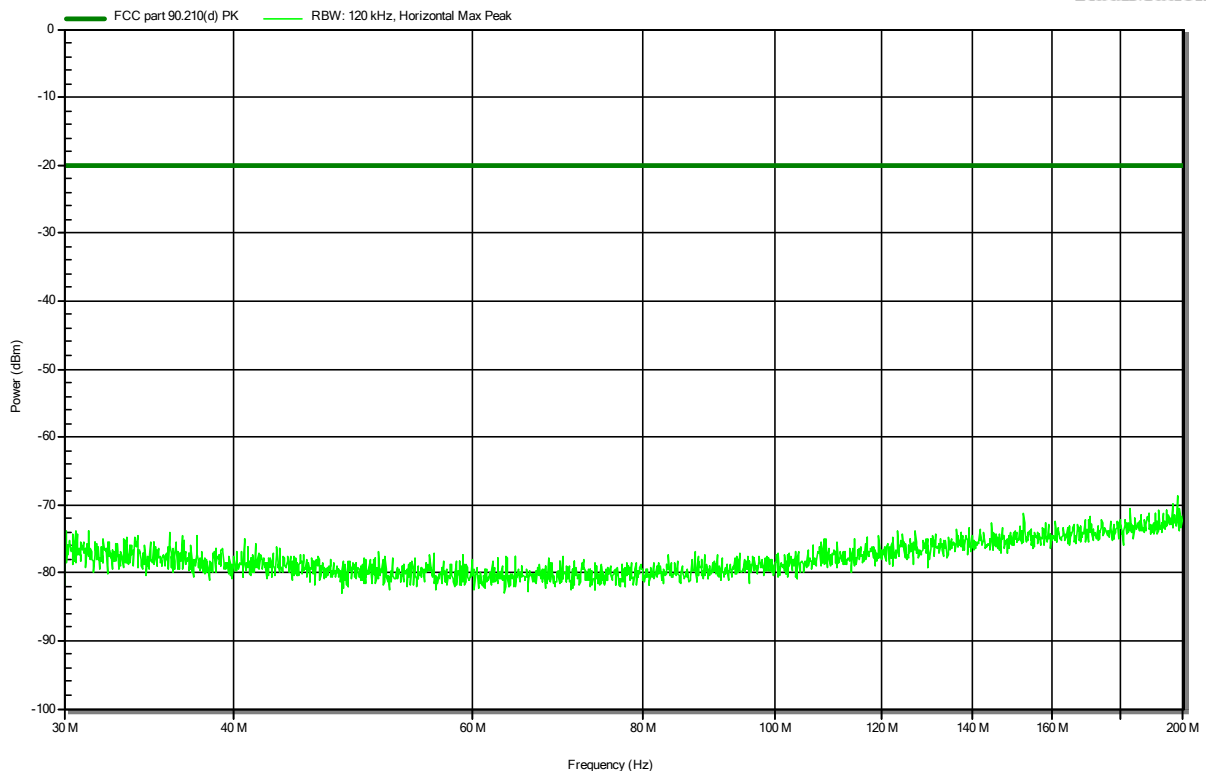


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

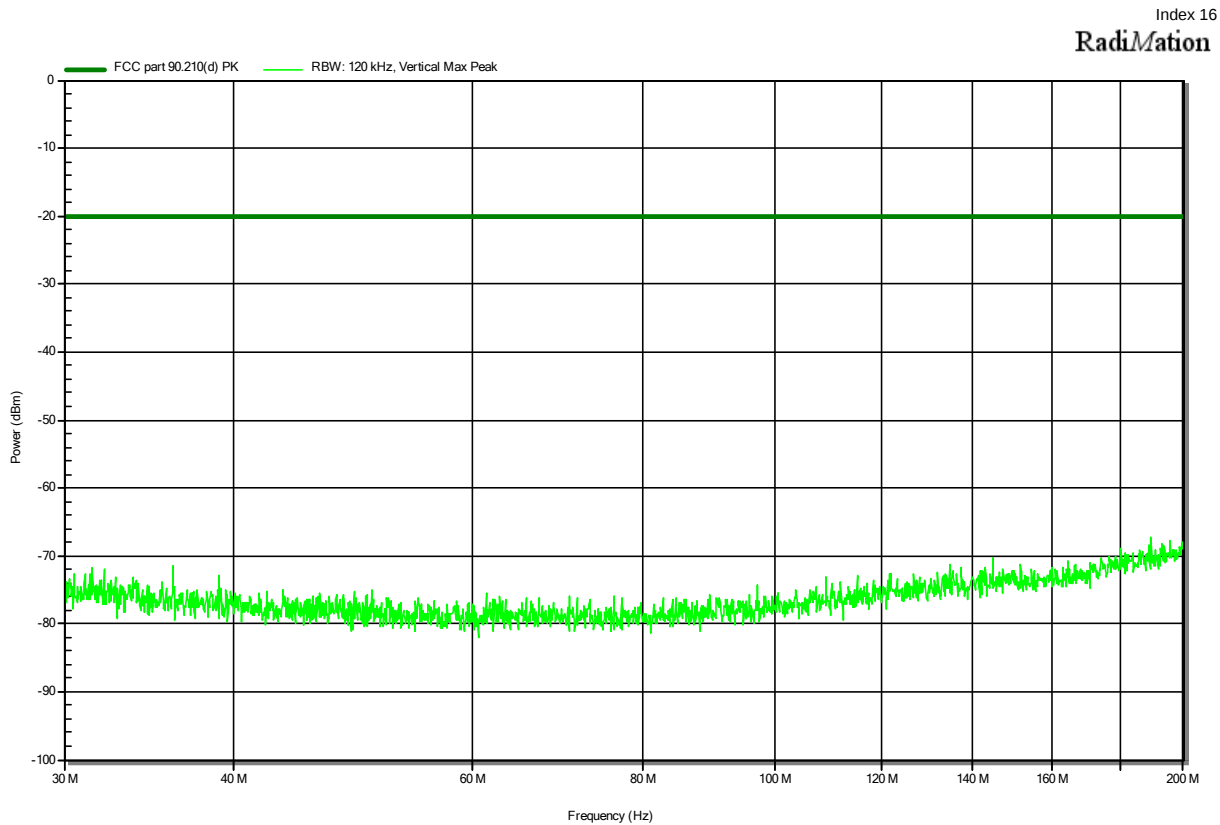
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RadiMation



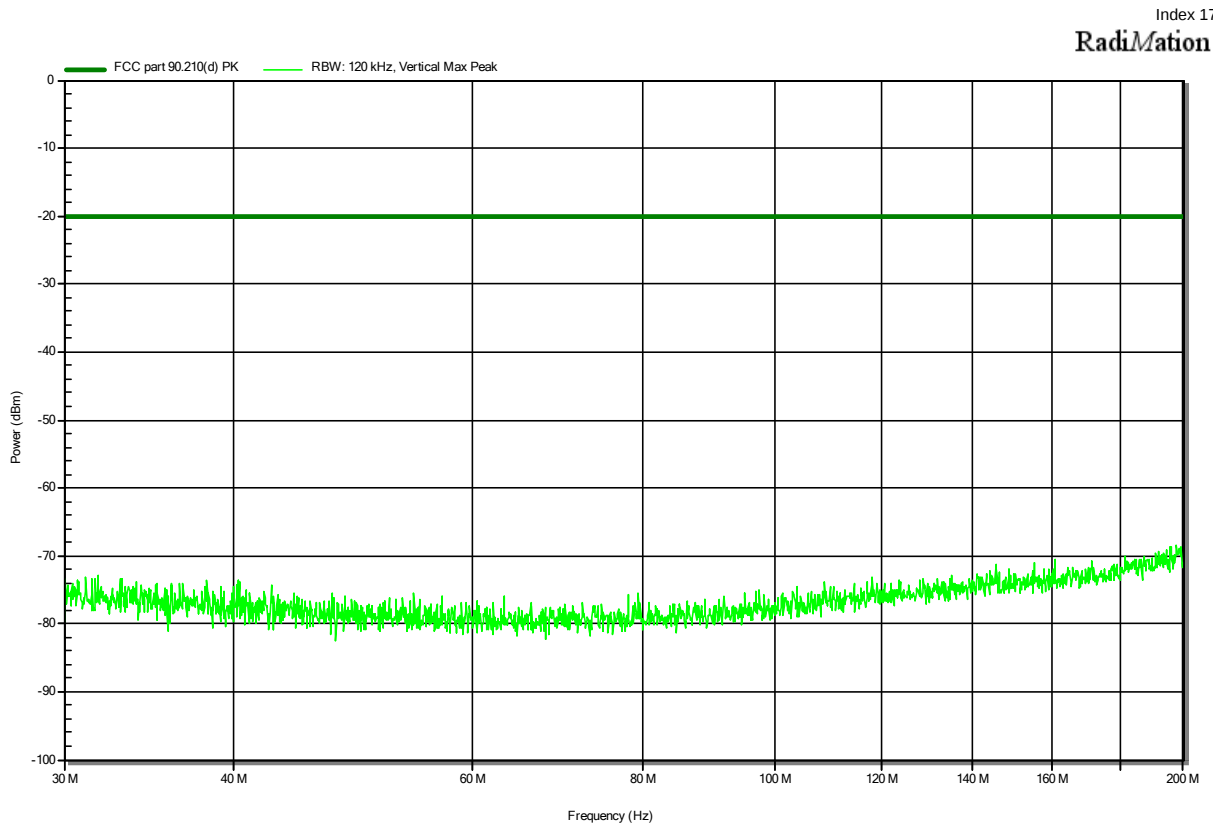
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 450.250 MHz
 Test Date: 2022-03-22
 Note:



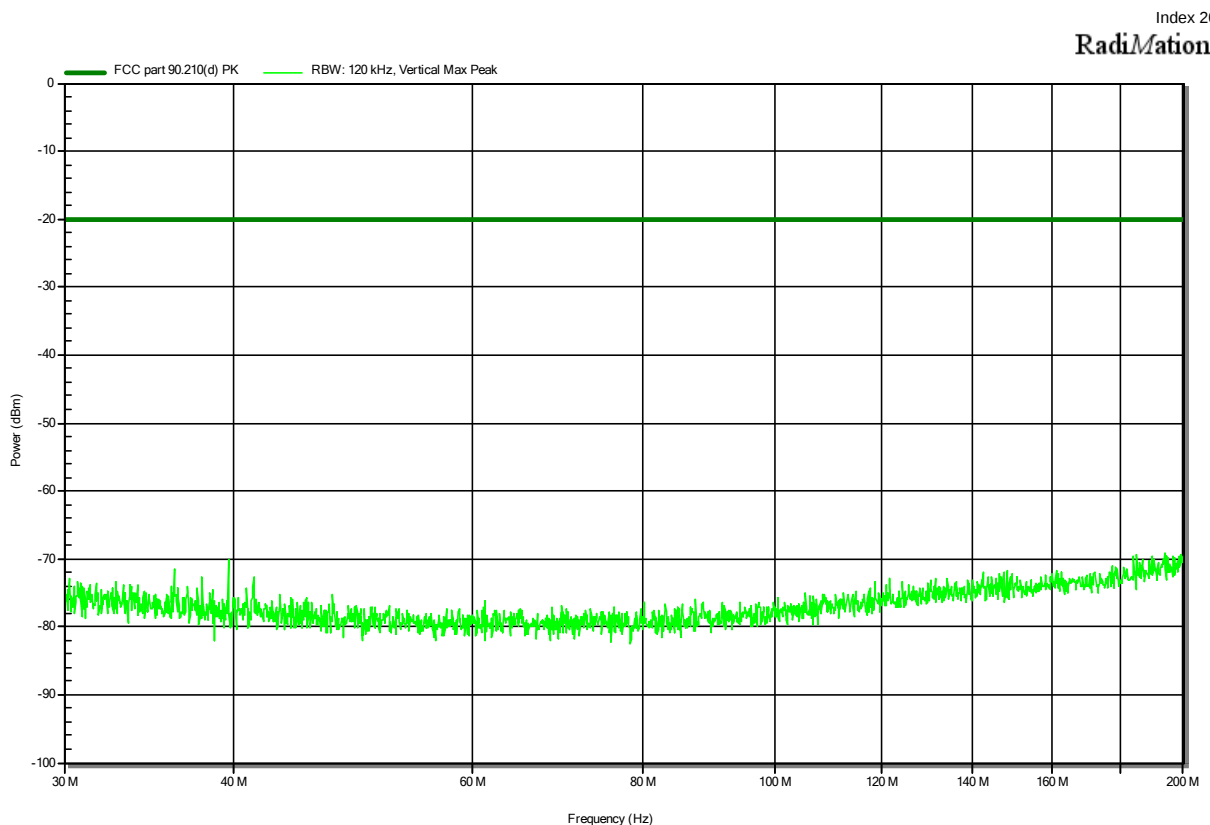
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

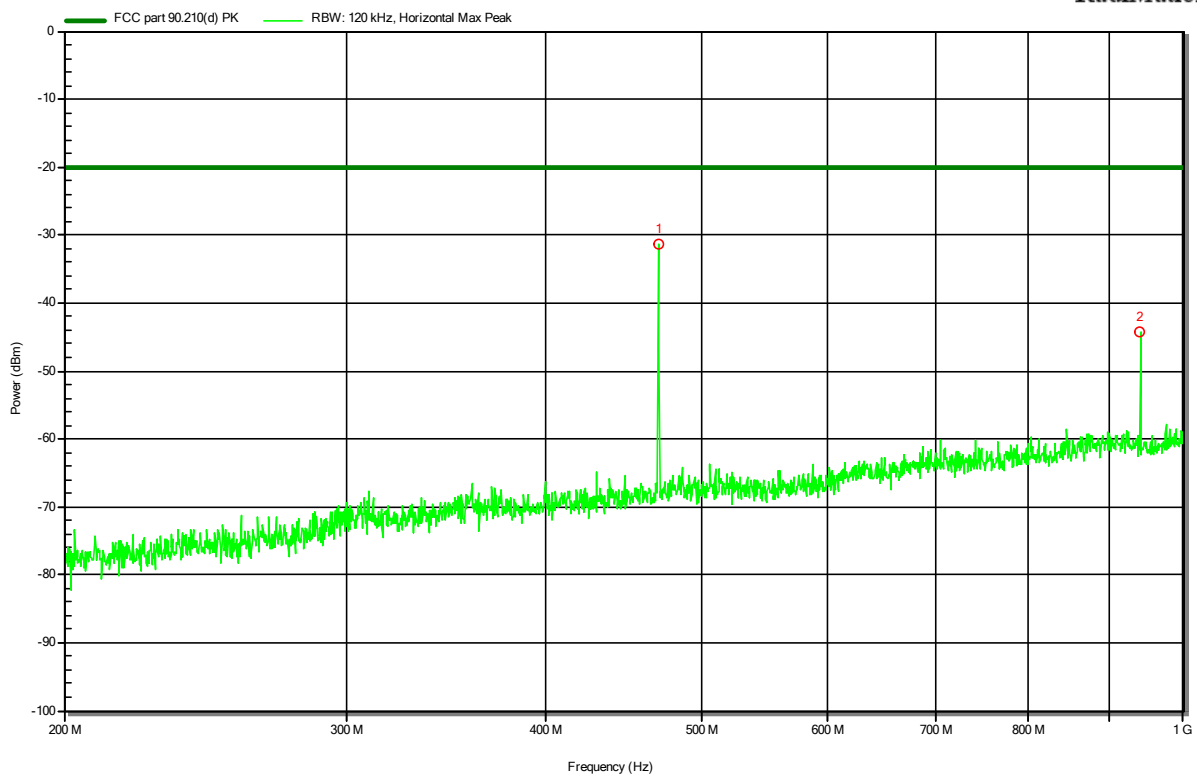


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 469.9875 MHz
 Test Date: 2022-03-22
 Note: with notch filter

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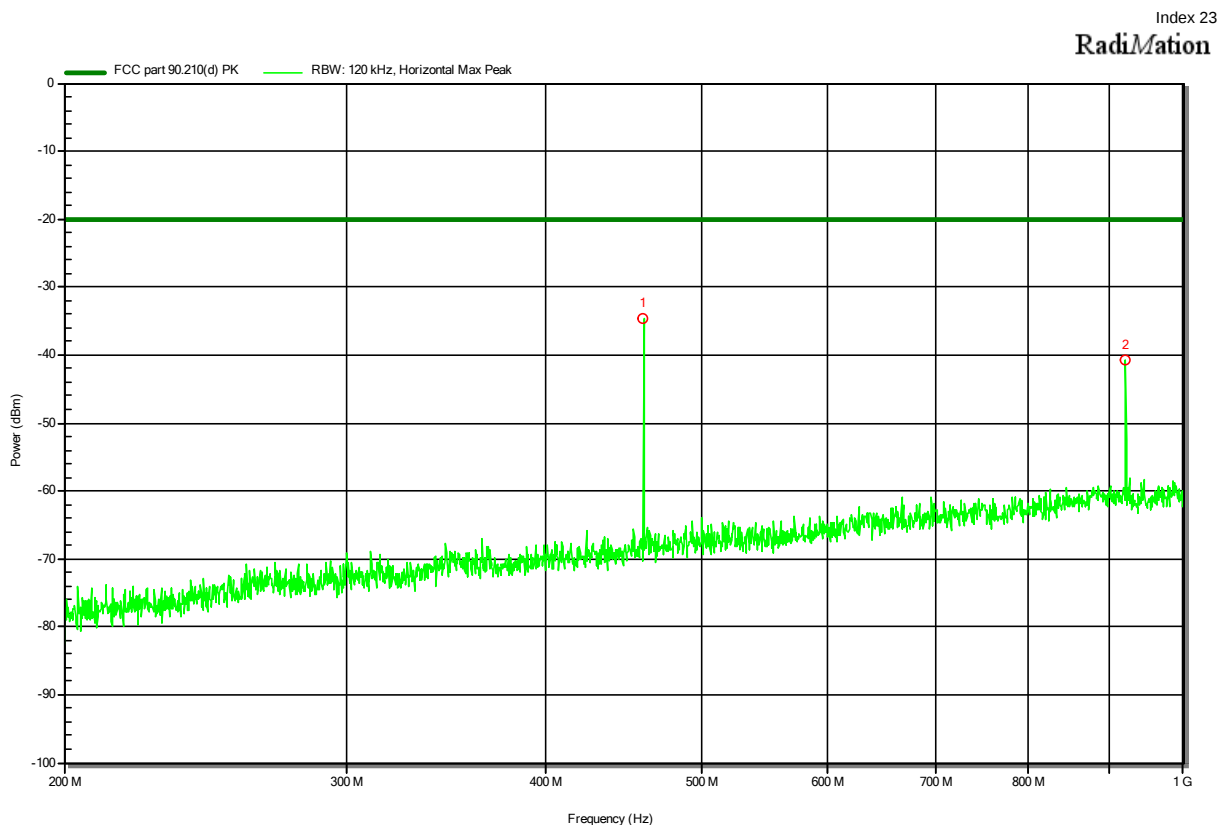
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
469.98 MHz	-	-	-	Carrier
939.98 MHz	-44.2 dBm	-20 dBm	-24.16 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note: with notch filter



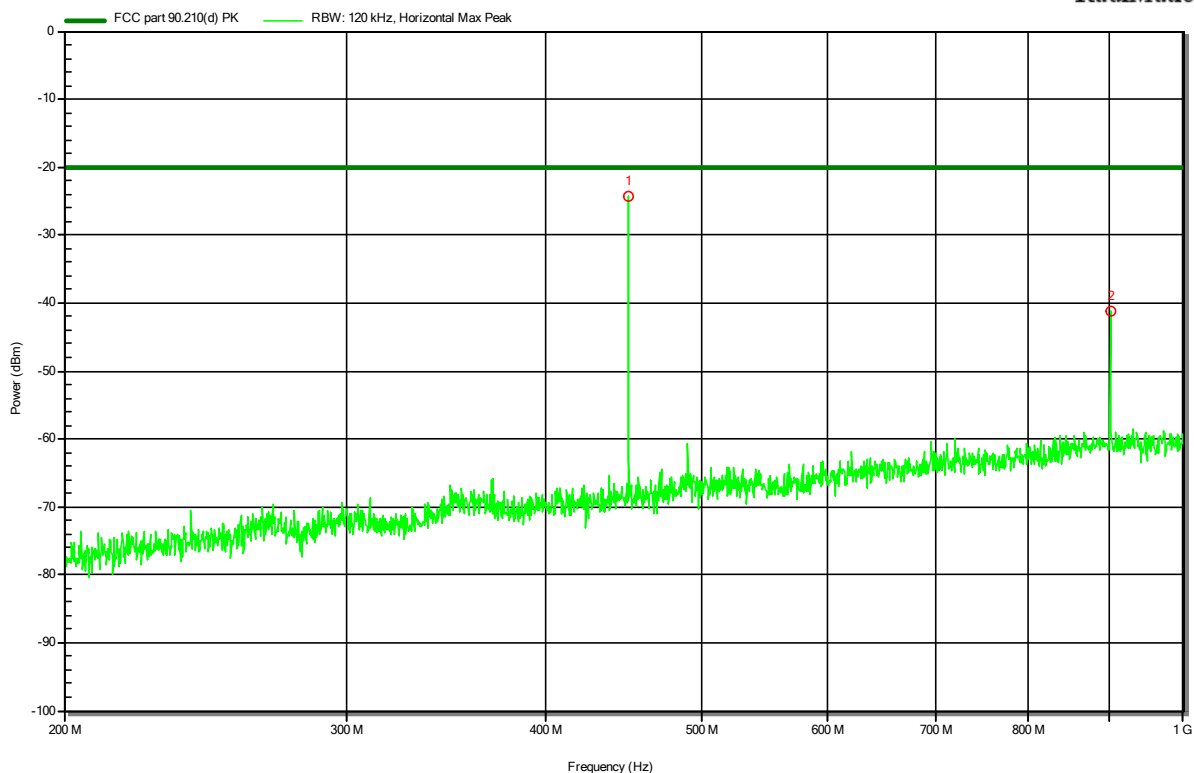
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.12 MHz	-	-	-	Carrier
920.24 MHz	-40.7 dBm	-20 dBm	-20.68 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 450.250 MHz
 Test Date: 2022-03-22
 Note: with notch filter

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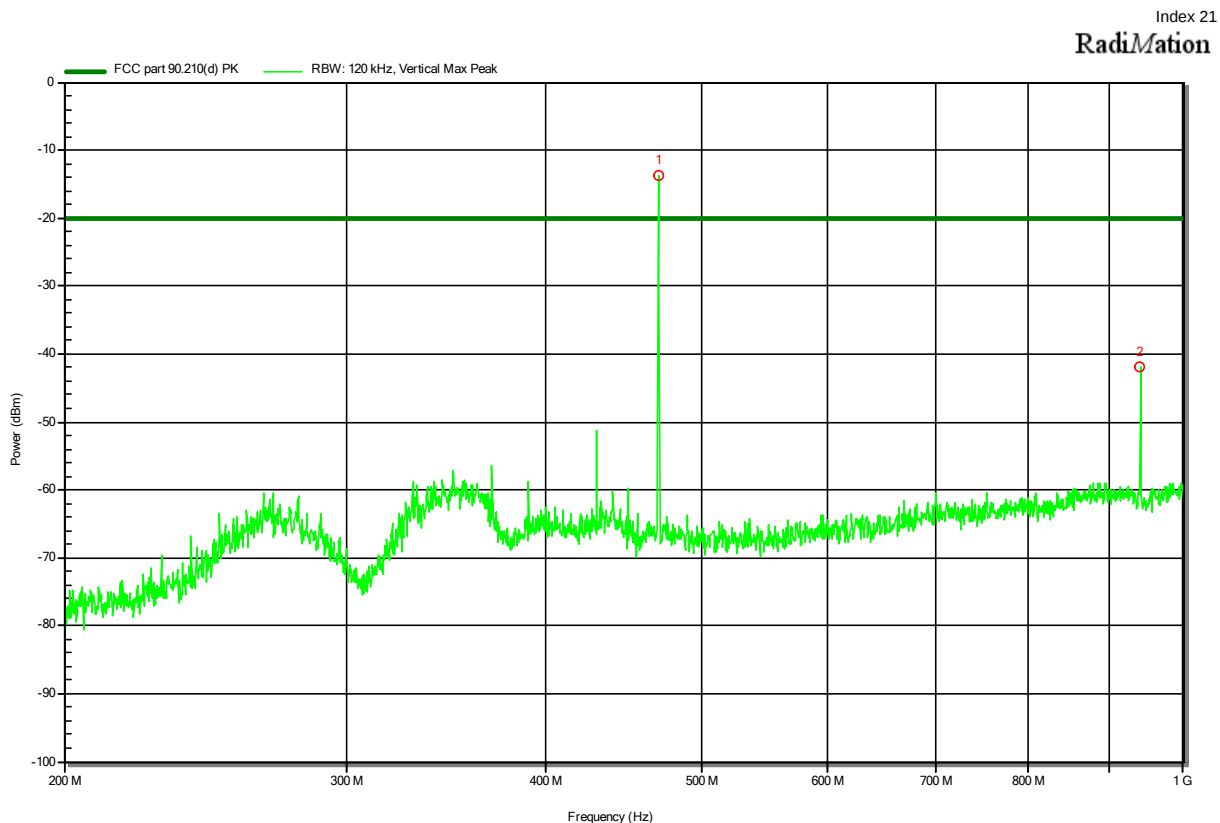
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.26 MHz	-	-	-	Carrier
900.5 MHz	-41.2 dBm	-20 dBm	-21.19 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

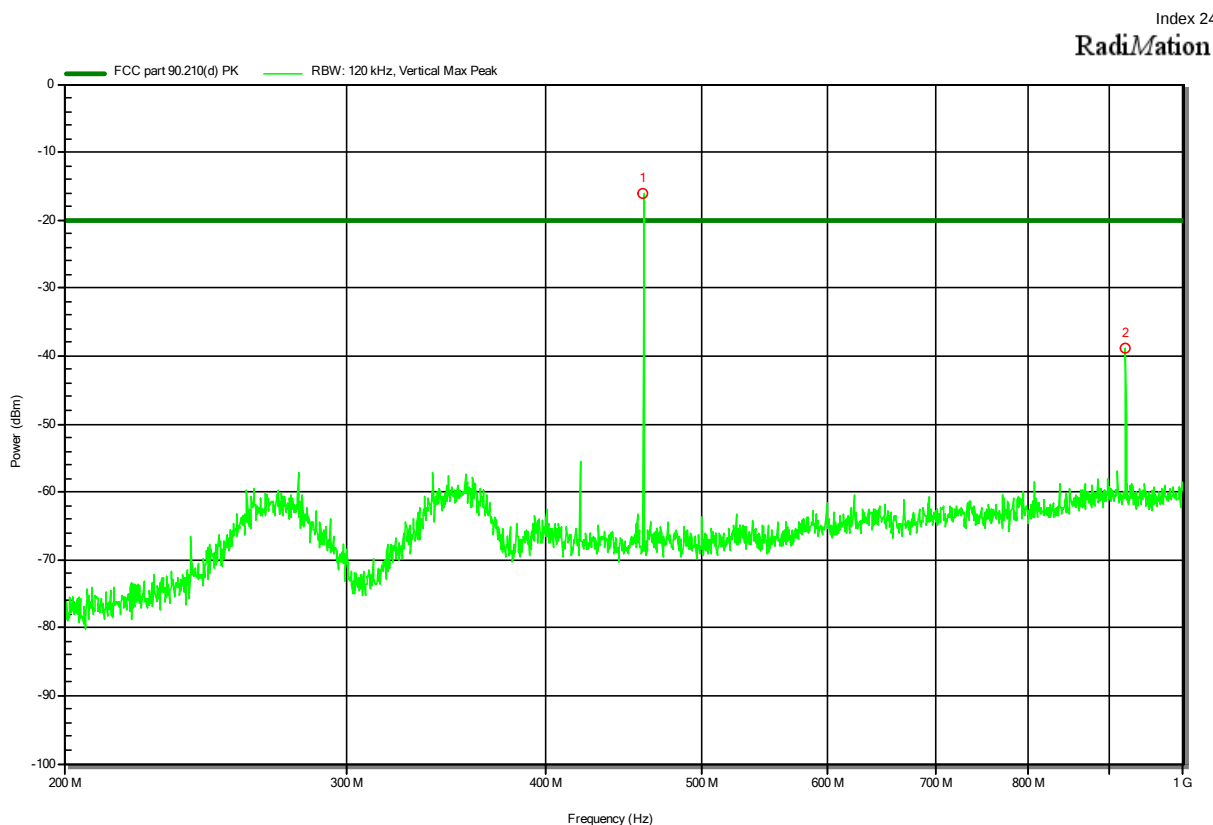
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 469.9875 MHz
 Test Date: 2022-03-22
 Note: with notch filter



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
469.98 MHz	-	-	-	Carrier
939.98 MHz	-42 dBm	-20 dBm	-21.95 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

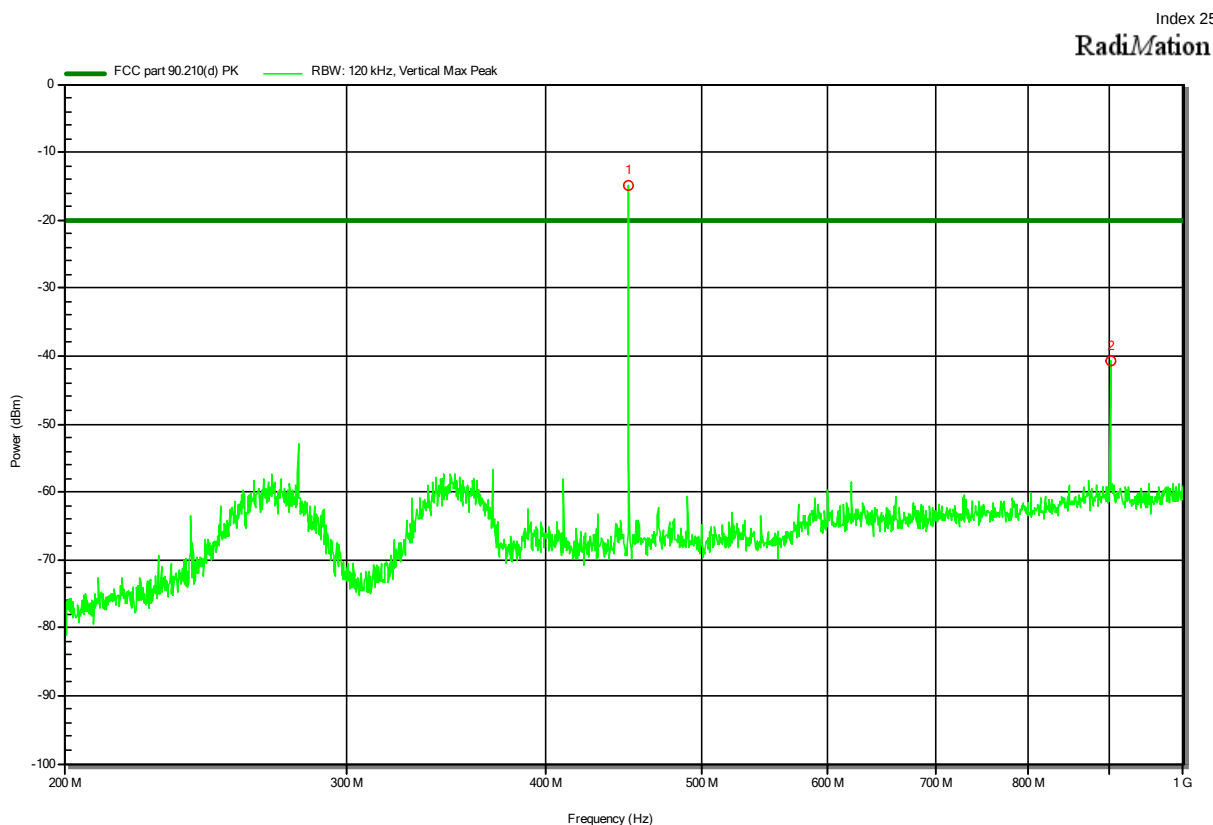
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note: with notch filter



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.12 MHz	-	-	-	Carrier
920.24 MHz	-38.9 dBm	-20 dBm	-18.95 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

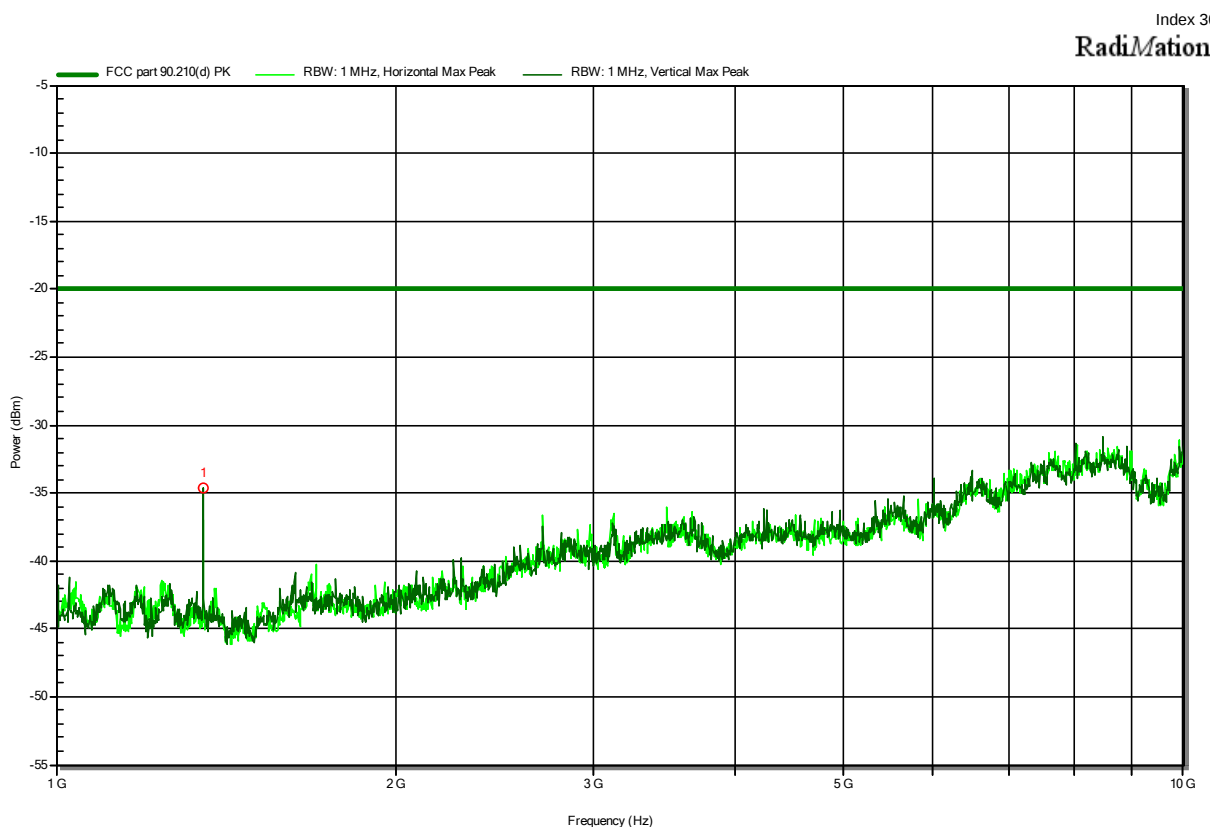
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 450.250 MHz
 Test Date: 2022-03-22
 Note: with notch filter



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.26 MHz	-	-	-	Carrier
900.5 MHz	-40.7 dBm	-20 dBm	-20.65 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

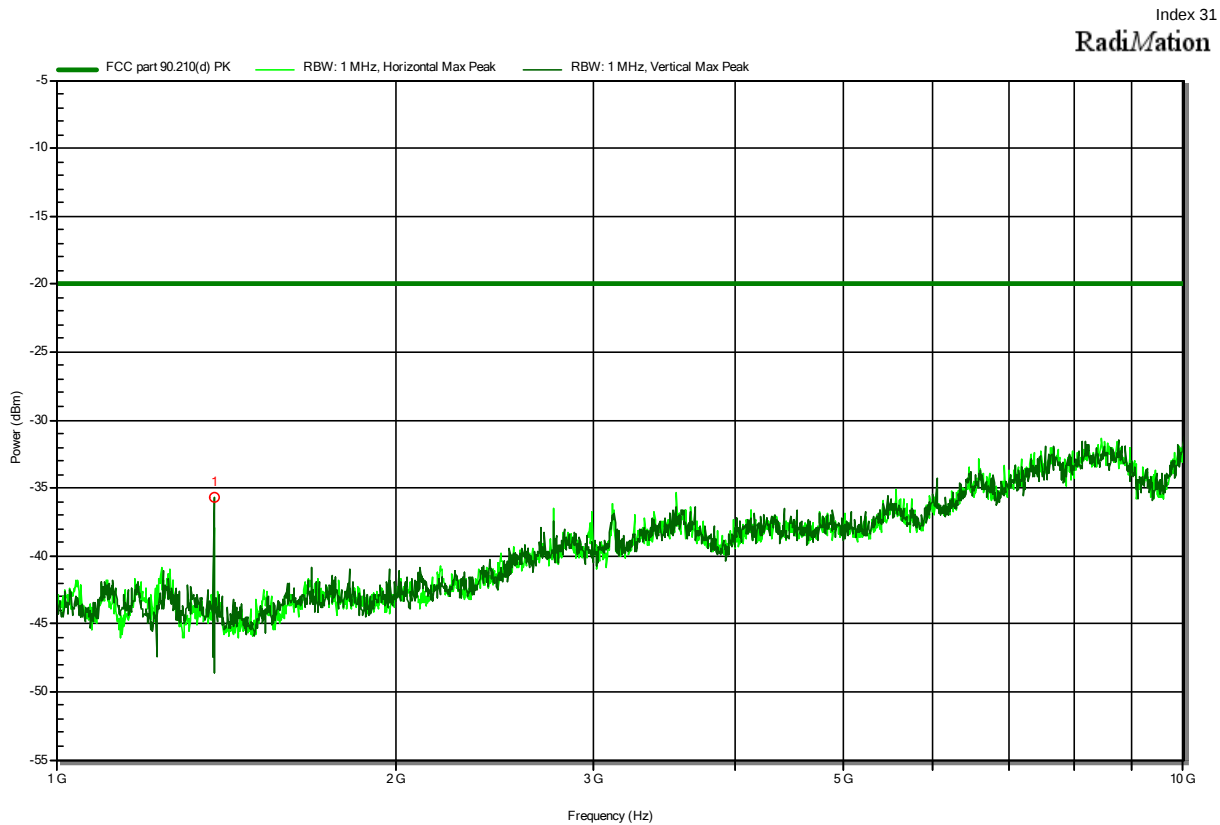
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 450.25 MHz
 Test Date: 2022-03-25
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.351 GHz	-34.6 dBm	-20 dBm	-14.63 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-25
 Note:

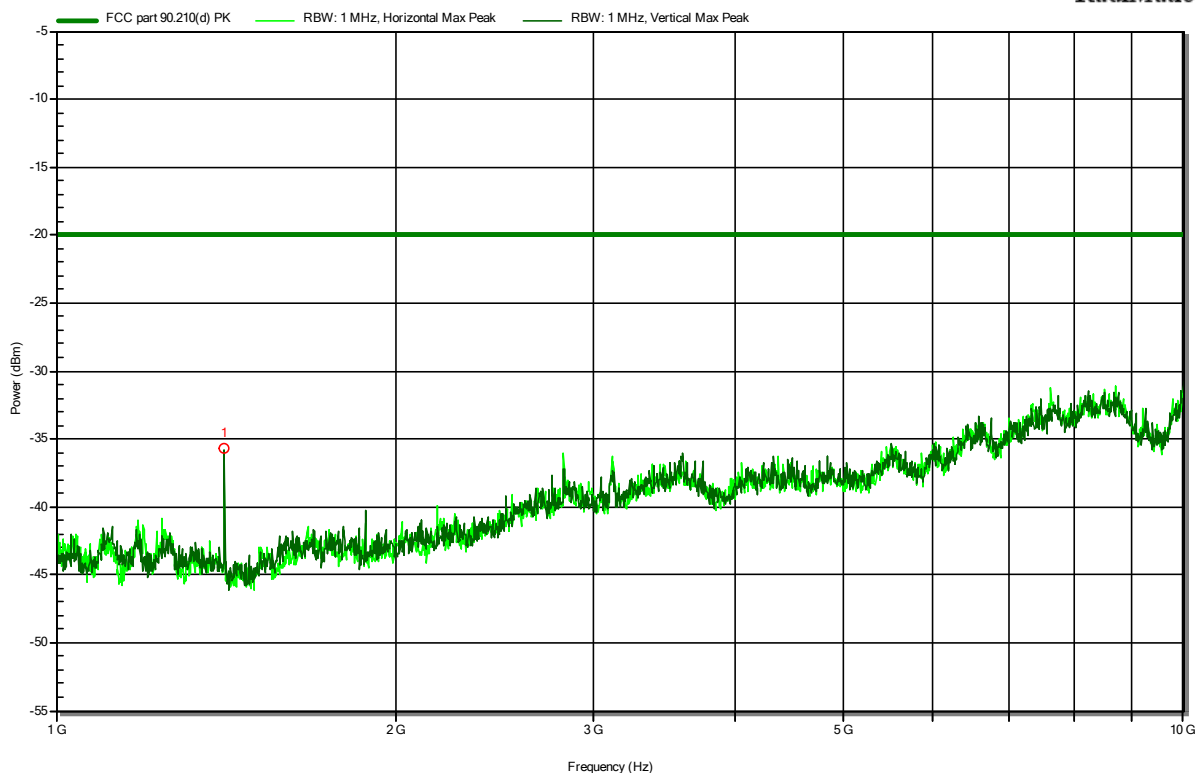


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Helix Antenna 30261216, 469.9875 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation



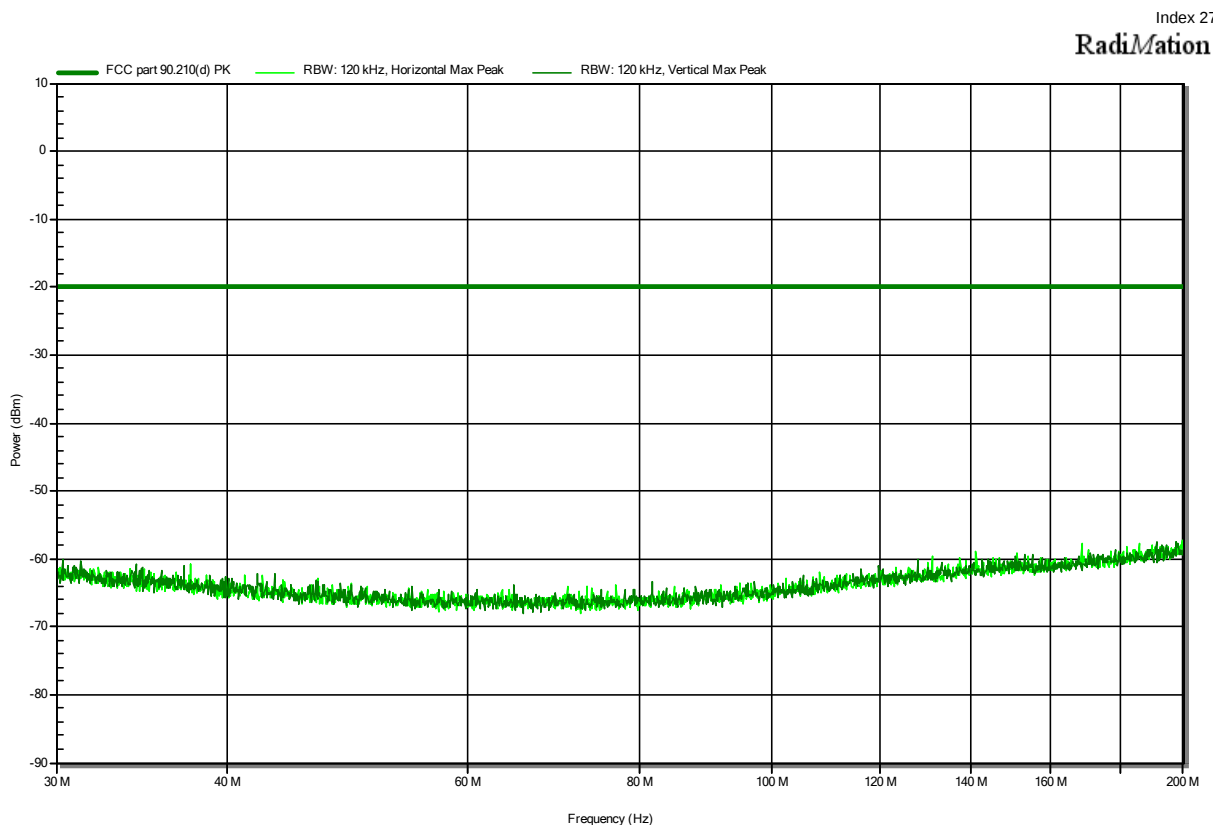
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.41 GHz	-35.7 dBm	-20 dBm	-15.74 dB	Pass	Vertical

Test Report No.: G0M-2201-1256-TFC090PMR-V01

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

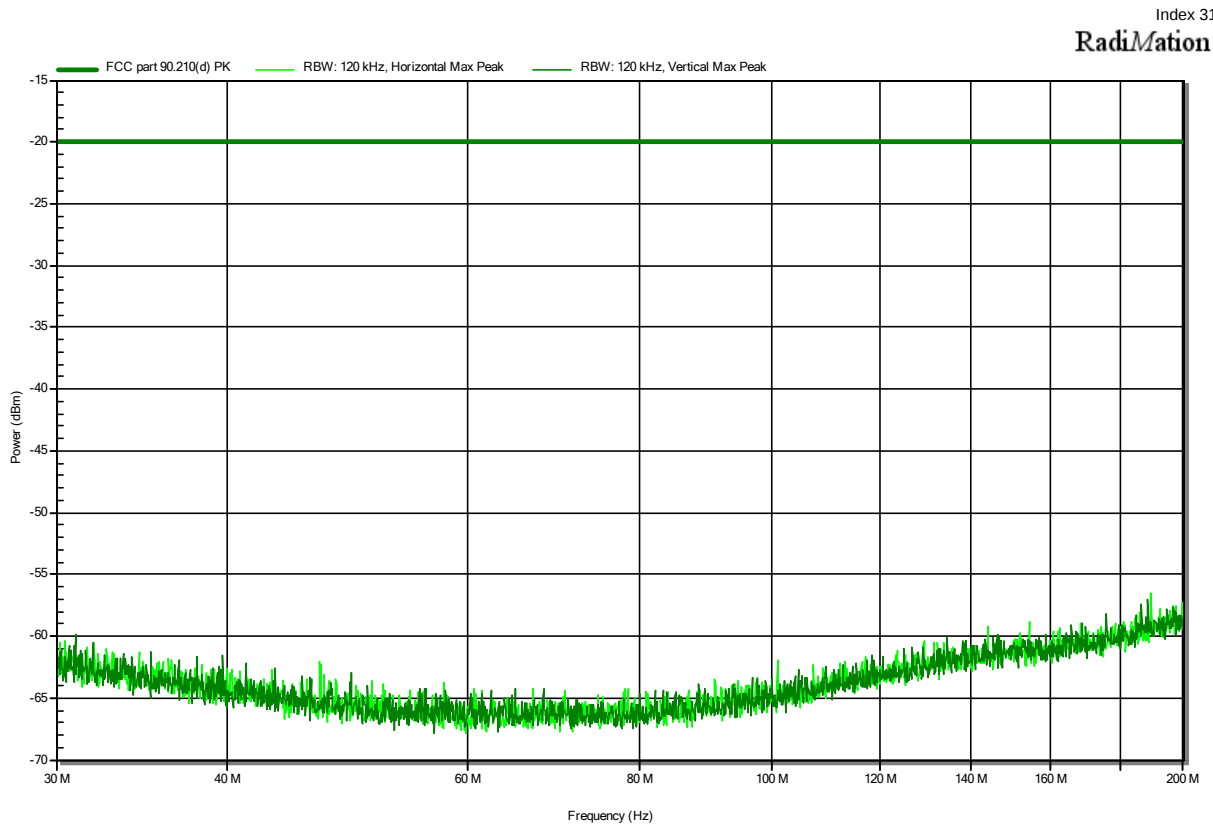
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 450.250 MHz
 Test Date: 2022-03-22
 Note:



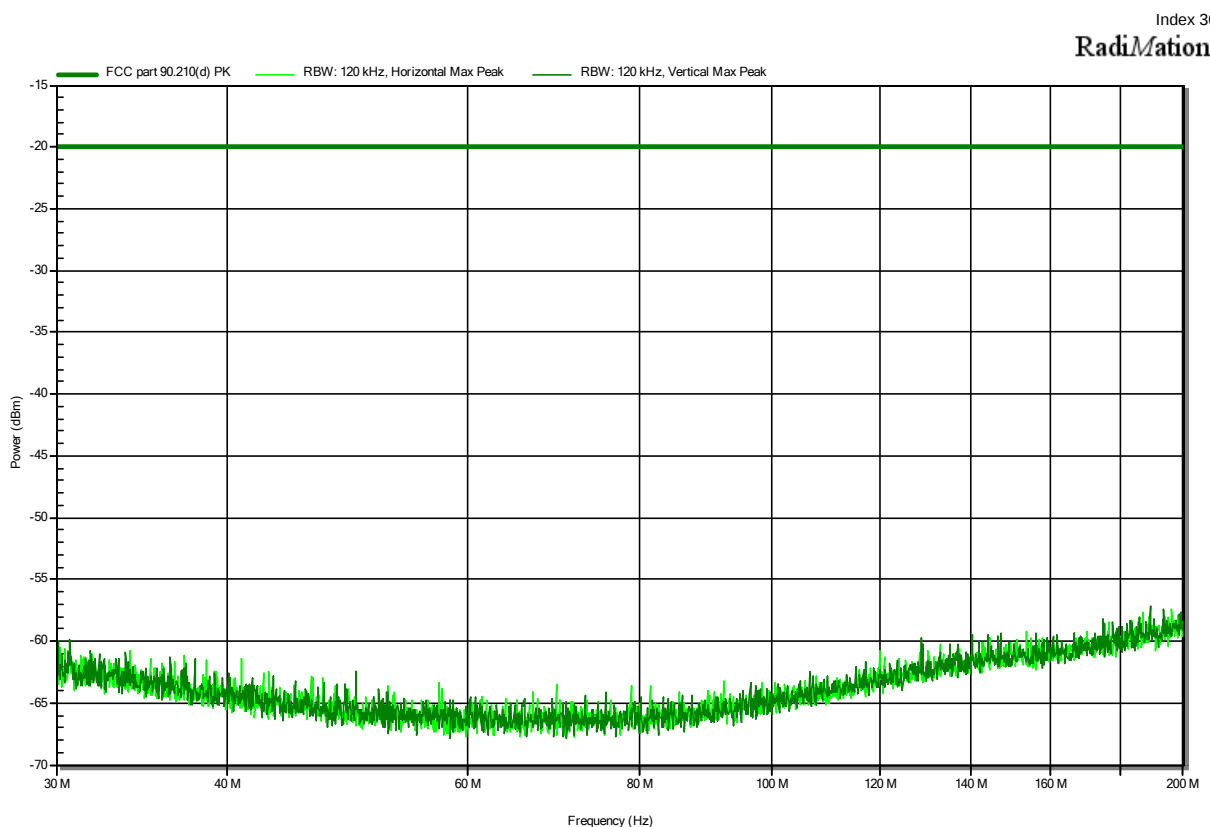
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 469.9875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916,, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

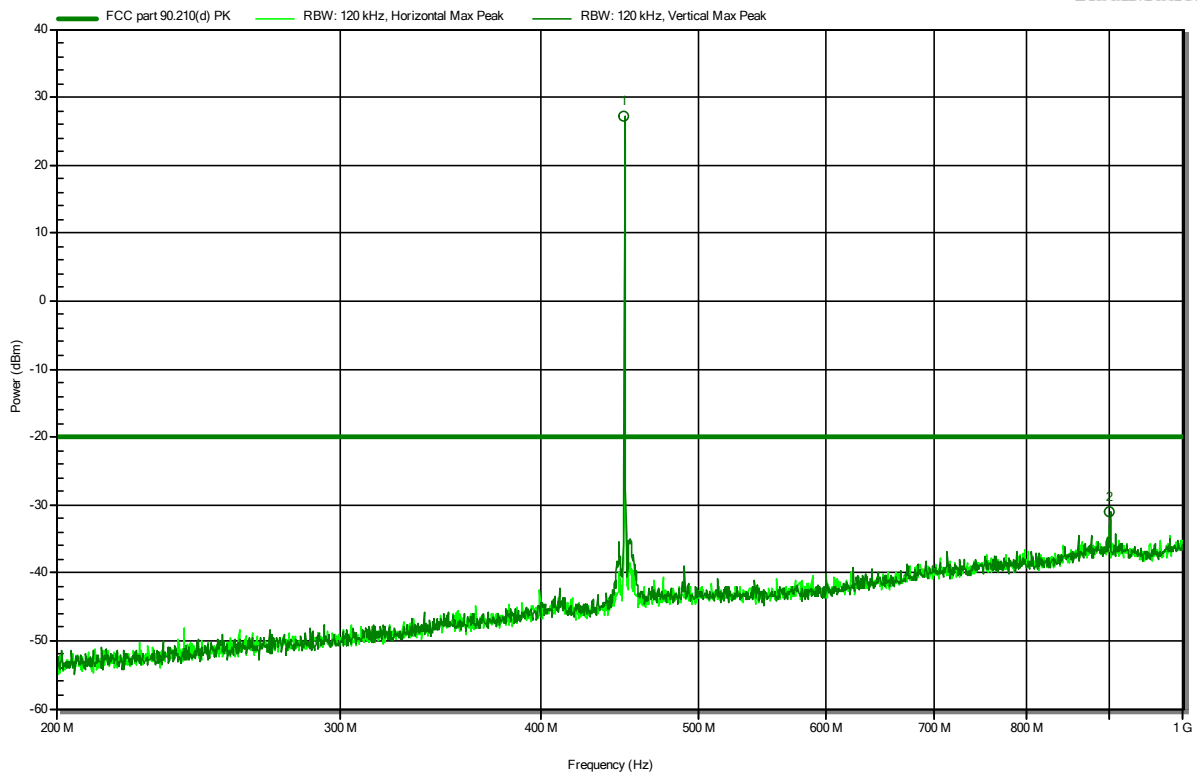


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 450.250 MHz
 Test Date: 2022-03-22
 Note: Marker1 is TX carrier

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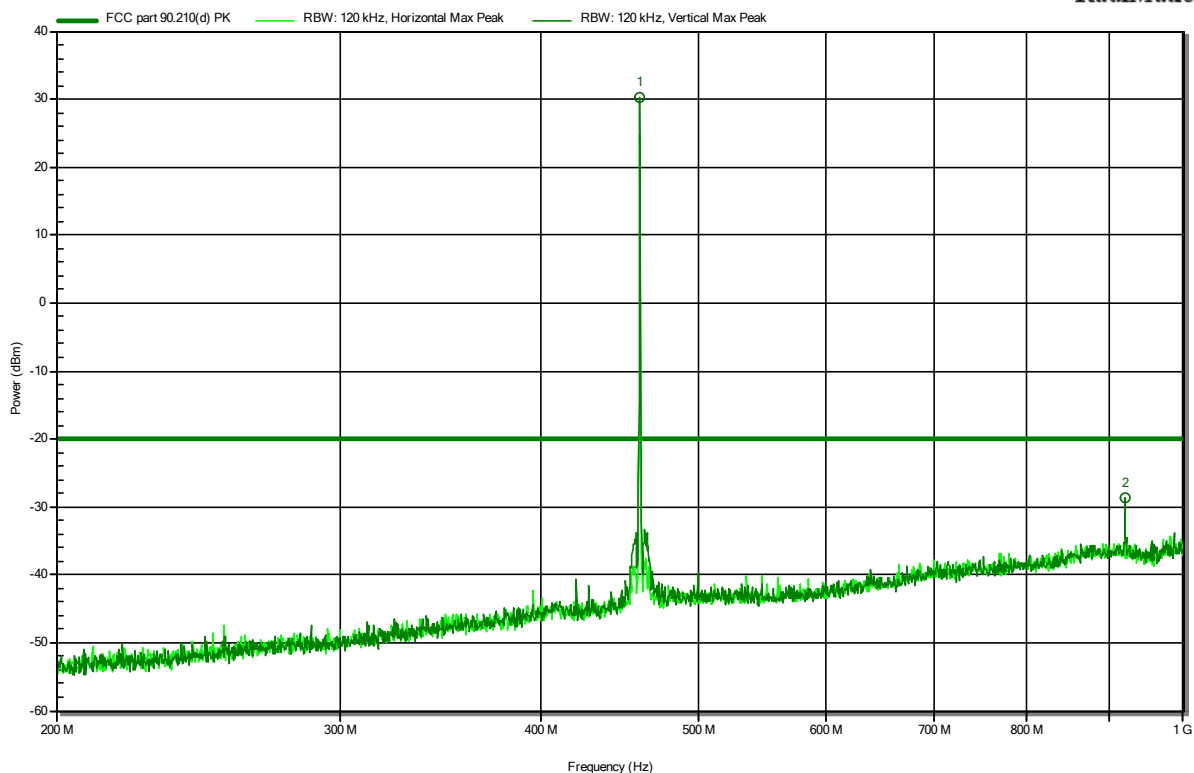
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.24 MHz	-	-	-	Carrier
900.5 MHz	-31.1 dBm	-20 dBm	-11.09 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note: Marler1 is TX carrier

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RadiMation



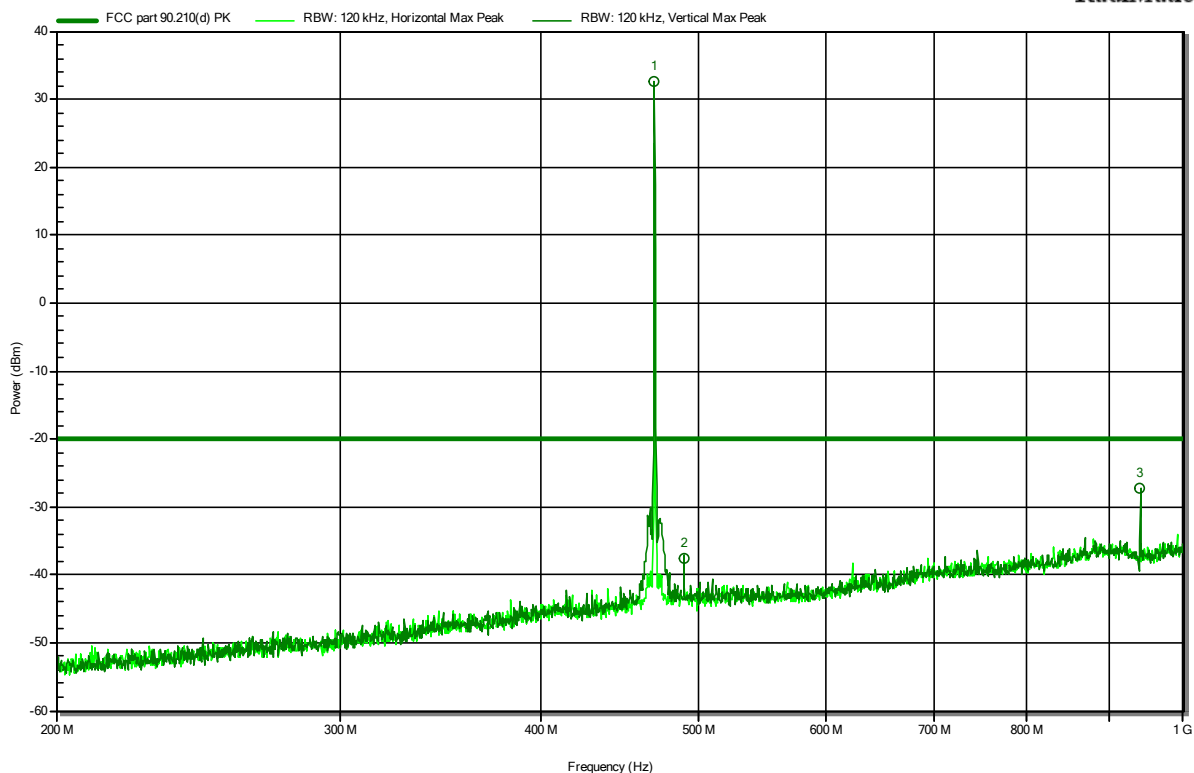
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
460.12 MHz	-	-	-	Carrier
920.24 MHz	-28.6 dBm	-20 dBm	-8.61 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 469.9875 MHz
 Test Date: 2022-03-22
 Note: Marker1 is TX carrier

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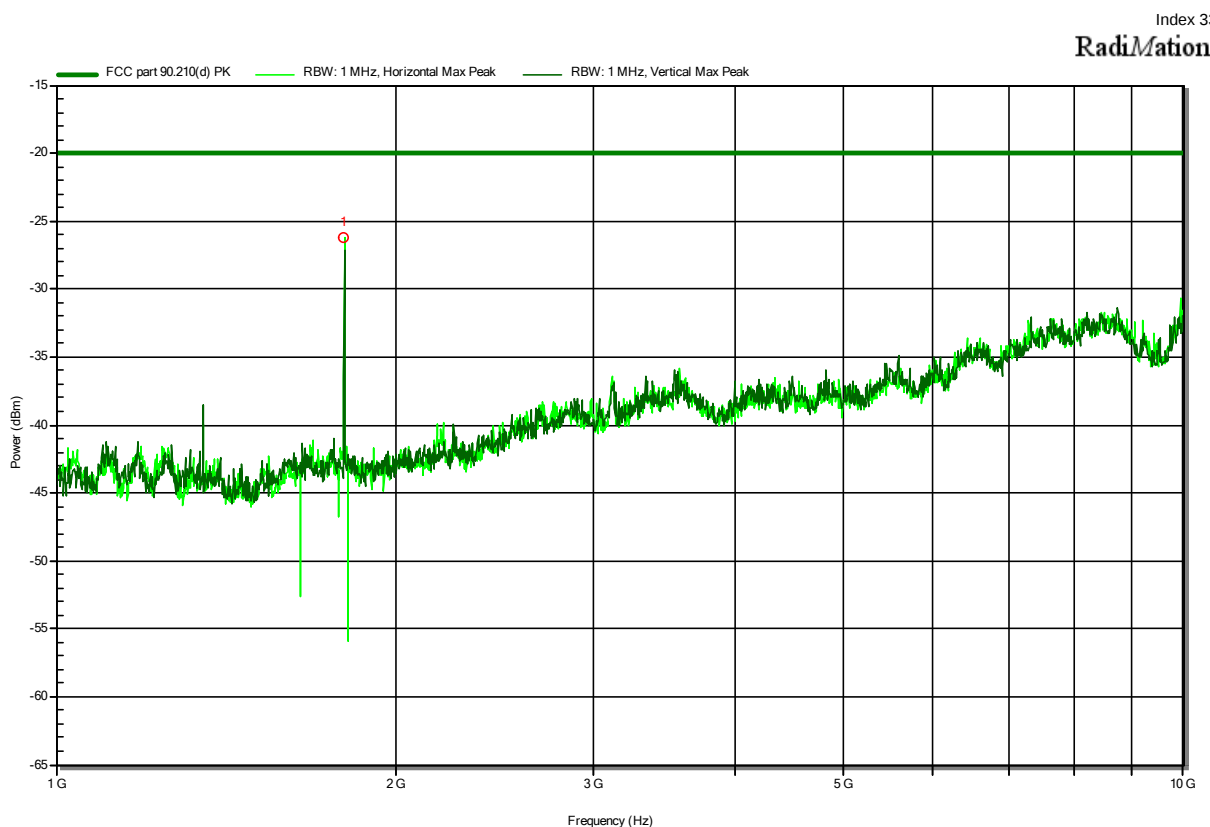
RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
469.98 MHz	-	-	-	Carrier
490 MHz	-37.5 dBm	-20 dBm	-17.49 dB	Pass
939.989 MHz	-27.2 dBm	-20 dBm	-7.21 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 450.25 MHz
 Test Date: 2022-03-25
 Note:



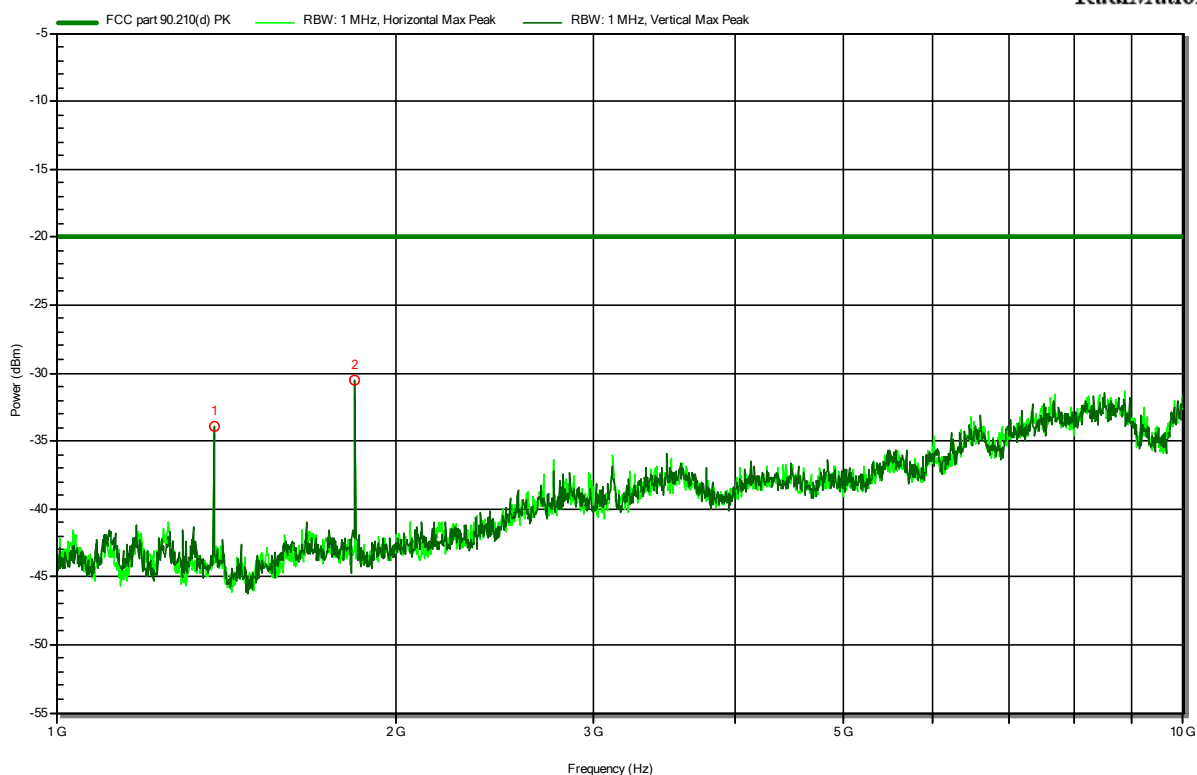
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.801 GHz	-26.2 dBm	-20 dBm	-6.23 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation



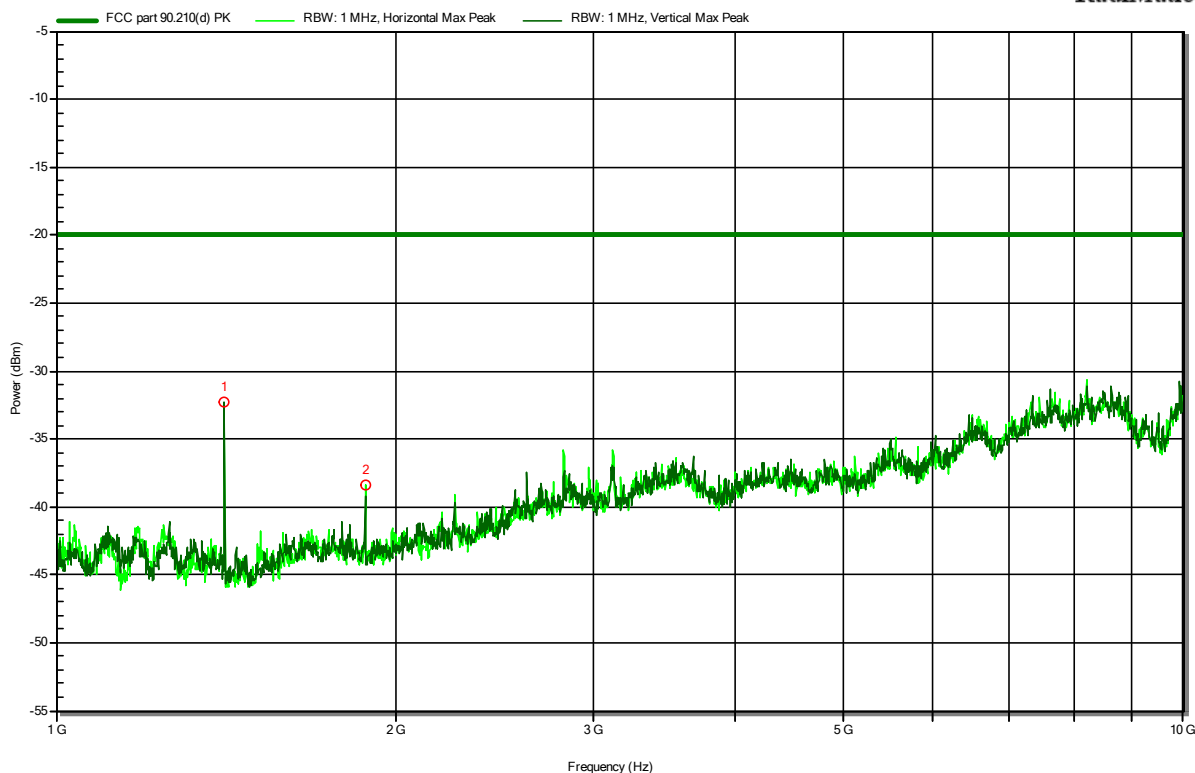
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.38 GHz	-34 dBm	-20 dBm	-13.96 dB	Pass	Vertical
1.84 GHz	-30.6 dBm	-20 dBm	-10.59 dB	Pass	Vertical

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Pit Antenna 6697916, 469.9875 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.41 GHz	-32.2 dBm	-20 dBm	-12.25 dB	Pass	Vertical
1.88 GHz	-38.4 dBm	-20 dBm	-18.36 dB	Pass	Horizontal

Test Report No.: G0M-2201-1256-TFC090PMR-V01

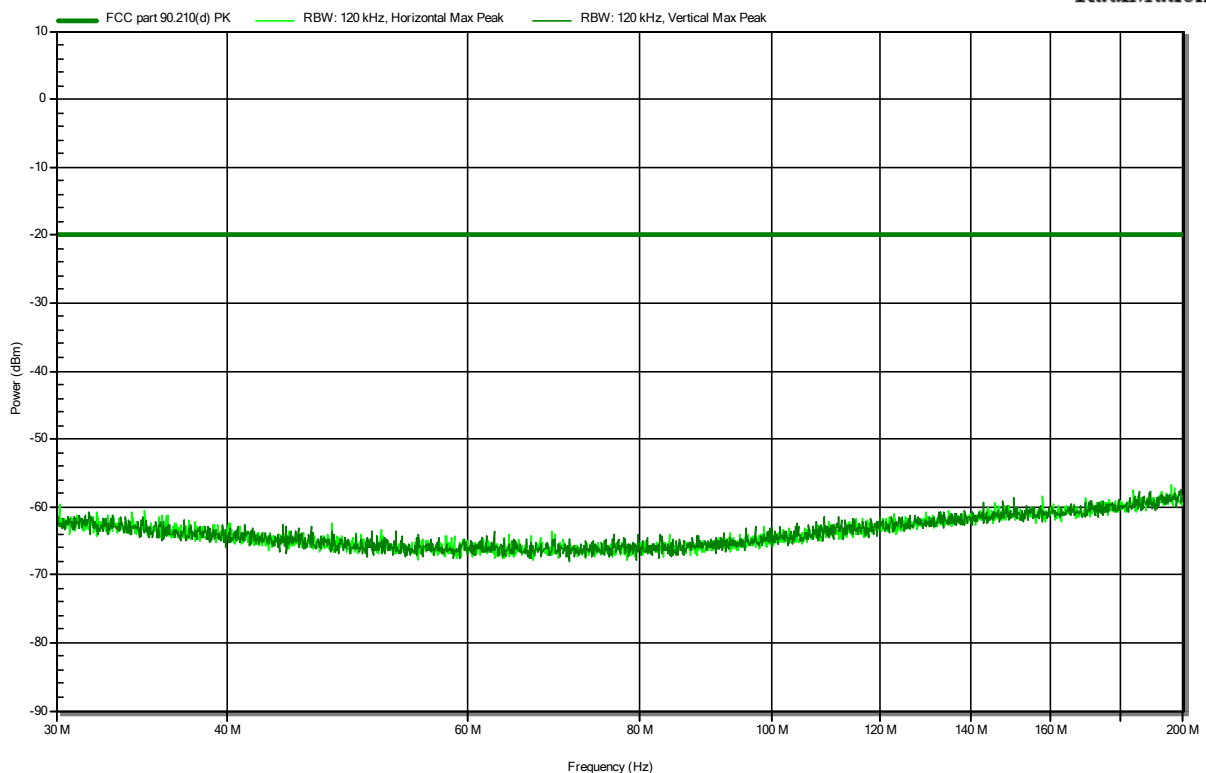
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 450.25 MHz
 Test Date: 2022-03-22
 Note:

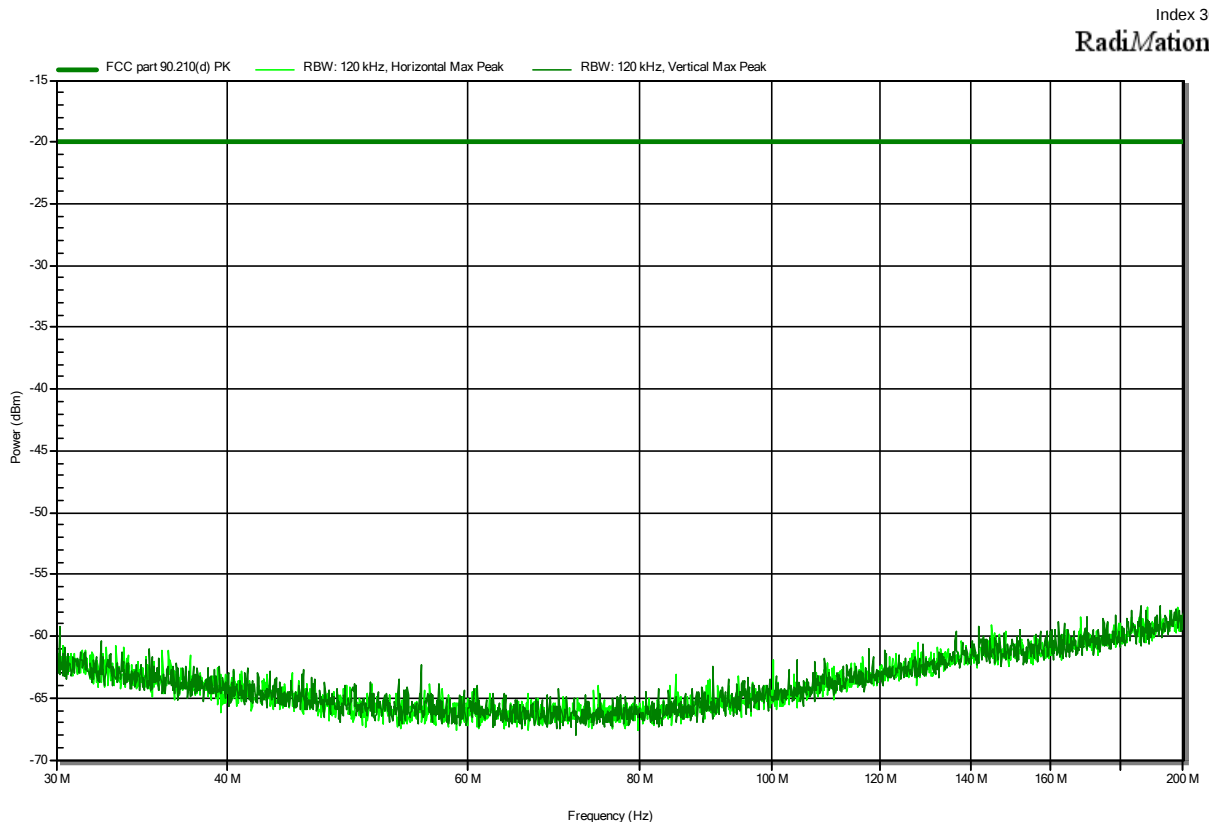
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RadiMation



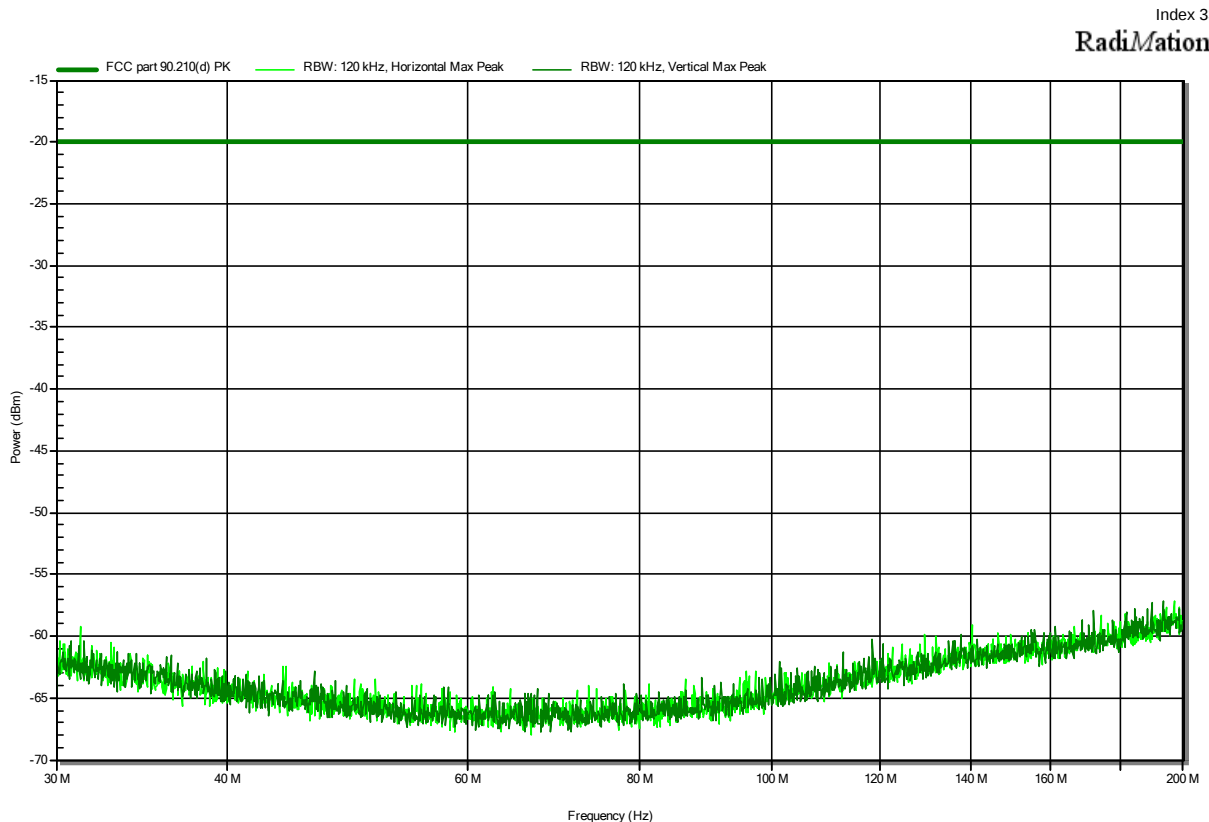
Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 469.9875 MHz
 Test Date: 2022-03-22
 Note:

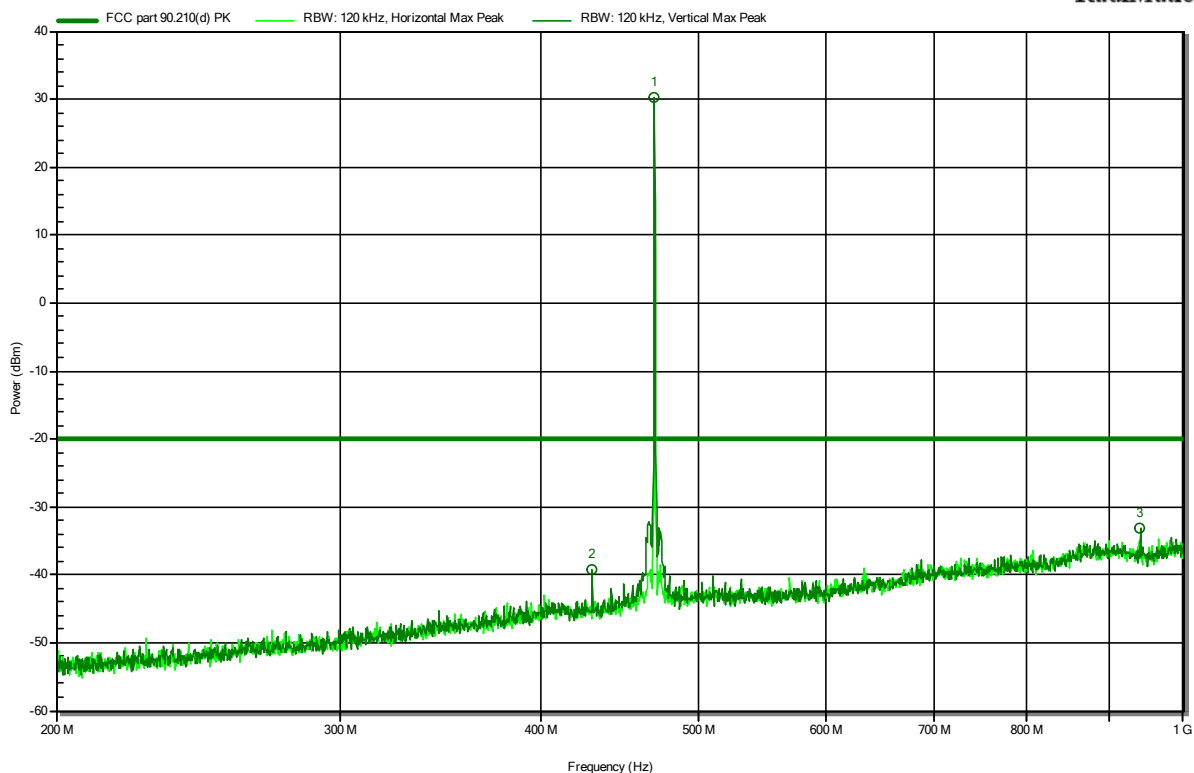


Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 469.9875 MHz
 Test Date: 2022-03-22
 Note: Marker1 is TX carrier

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RadiMation



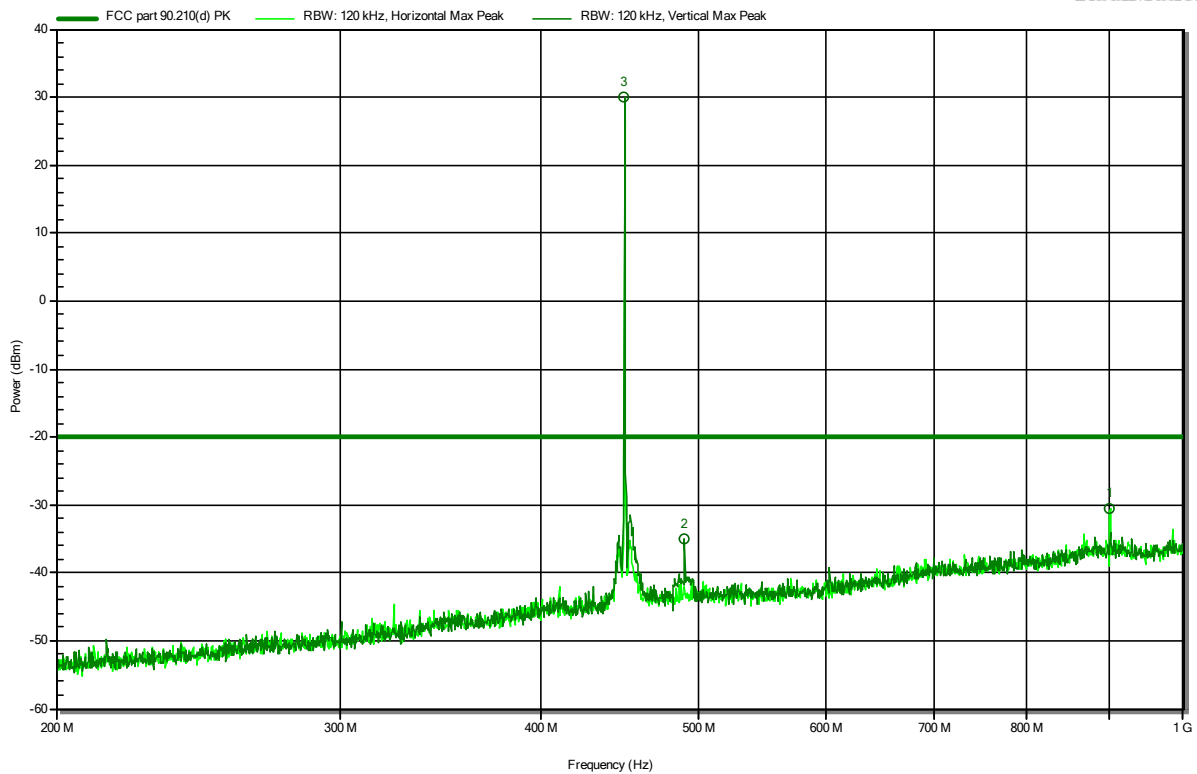
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
429.98 MHz	-39.1 dBm	-20 dBm	-19.12 dB	Pass
469.98 MHz	-	-	-	Carrier
939.98 MHz	-33.2 dBm	-20 dBm	-13.17 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 450.25 MHz
 Test Date: 2022-03-22
 Note: Marker3 is TX carrier

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RadiMation



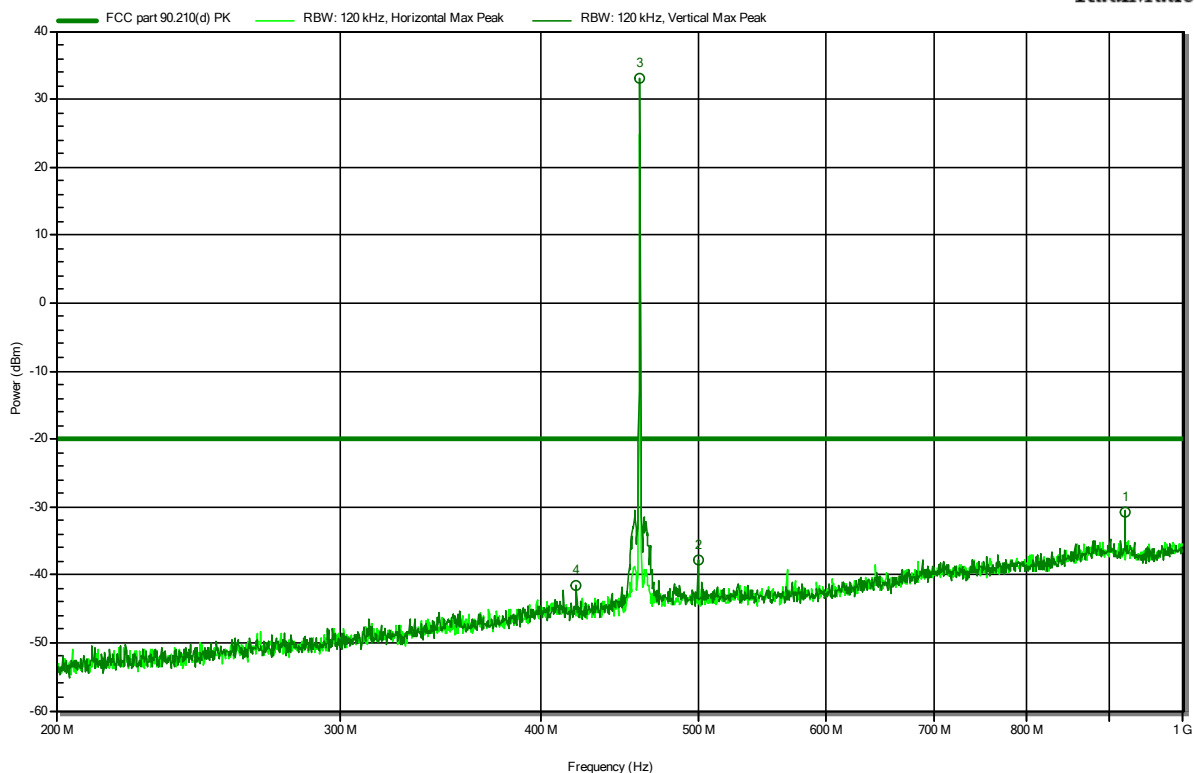
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
450.26 MHz	-	-	-	Carrier
490.267 MHz	-35 dBm	-20 dBm	-15.01 dB	Pass
900.495 MHz	-30.5 dBm	-20 dBm	-10.46 dB	Pass

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note: Marker3 is TX carrier

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Frequency	Peak	Peak Limit	Peak Difference	Peak Status
420.12 MHz	-41.5 dBm	-20 dBm	-21.46 dB	Pass
460.12 MHz	-	-	-	Carrier
500.12 MHz	-37.9 dBm	-20 dBm	-17.93 dB	Pass
920.24 MHz	-30.7 dBm	-20 dBm	-10.68 dB	Pass

Test Report No.: G0M-2201-1256-TFC090PMR-V01

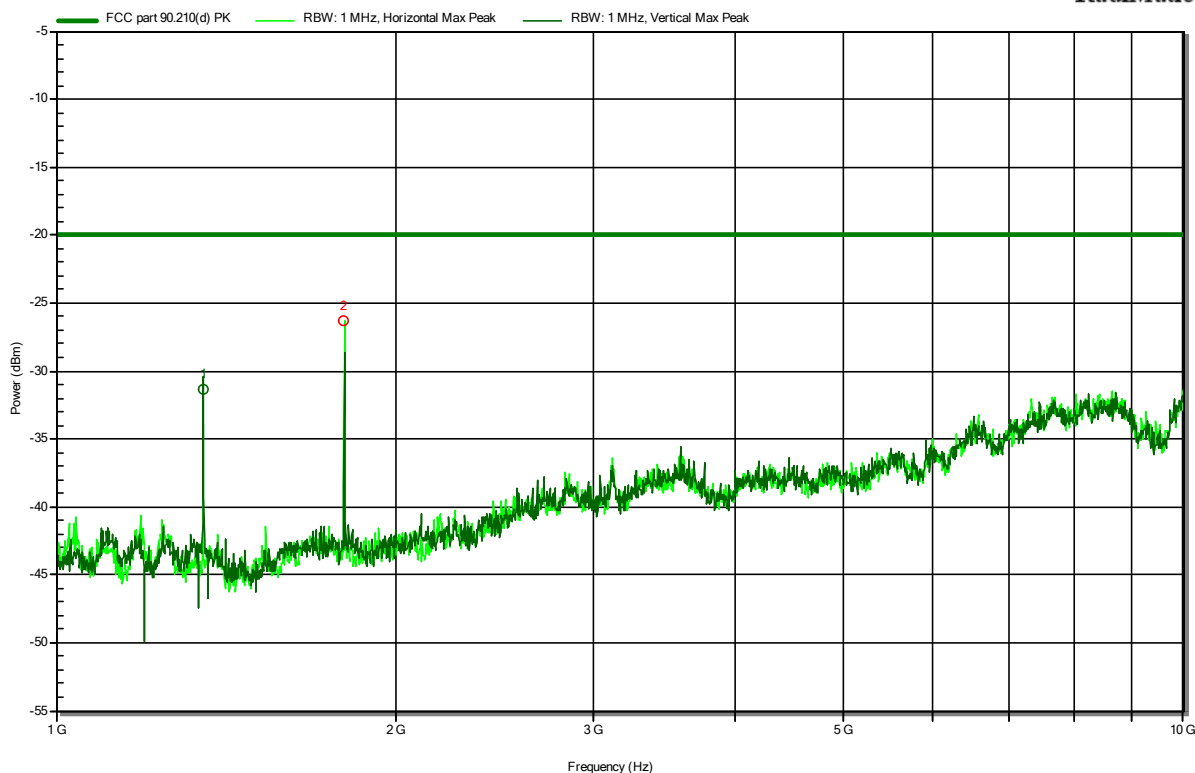
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 450.25 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.351 GHz	-31.3 dBm	-20 dBm	-11.31 dB	Pass	Vertical
1.801 GHz	-26.3 dBm	-20 dBm	-6.32 dB	Pass	Horizontal

Test Report No.: G0M-2201-1256-TFC090PMR-V01

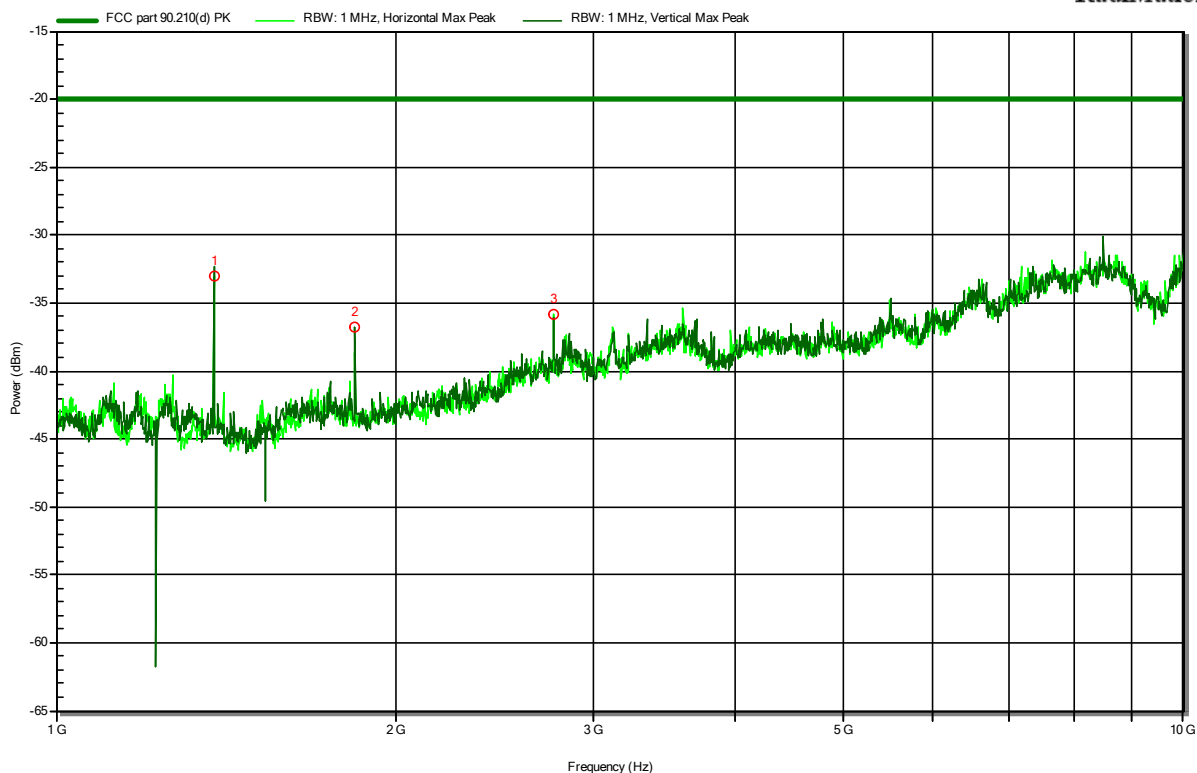
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation



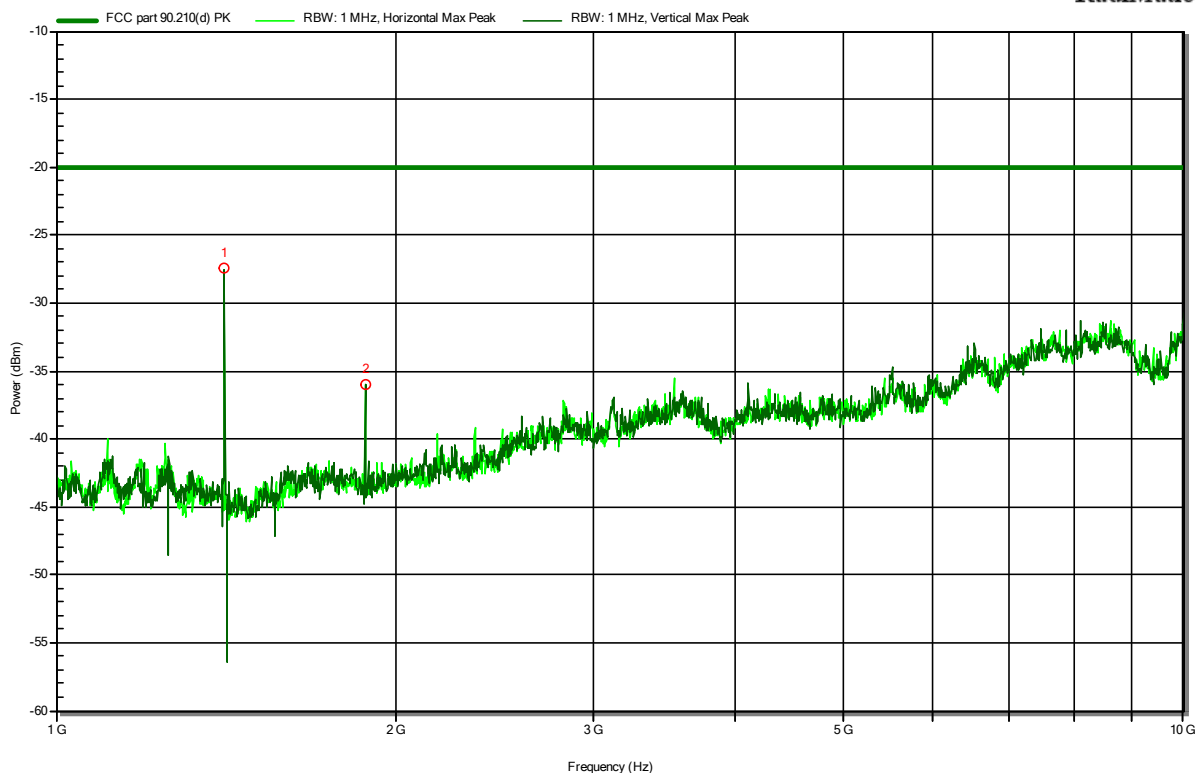
Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.38 GHz	-33 dBm	-20 dBm	-13 dB	Pass	Vertical
1.84 GHz	-36.7 dBm	-20 dBm	-16.74 dB	Pass	Vertical
2.761 GHz	-35.8 dBm	-20 dBm	-15.82 dB	Pass	Horizontal

Radiated Spurious Emissions according to FCC Part 90I

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120B
 Measurement distance: 3 m
 Mode: Tx; Wall Antenna 6699490, 469.9875 MHz
 Test Date: 2022-03-25
 Note:

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RadiMation

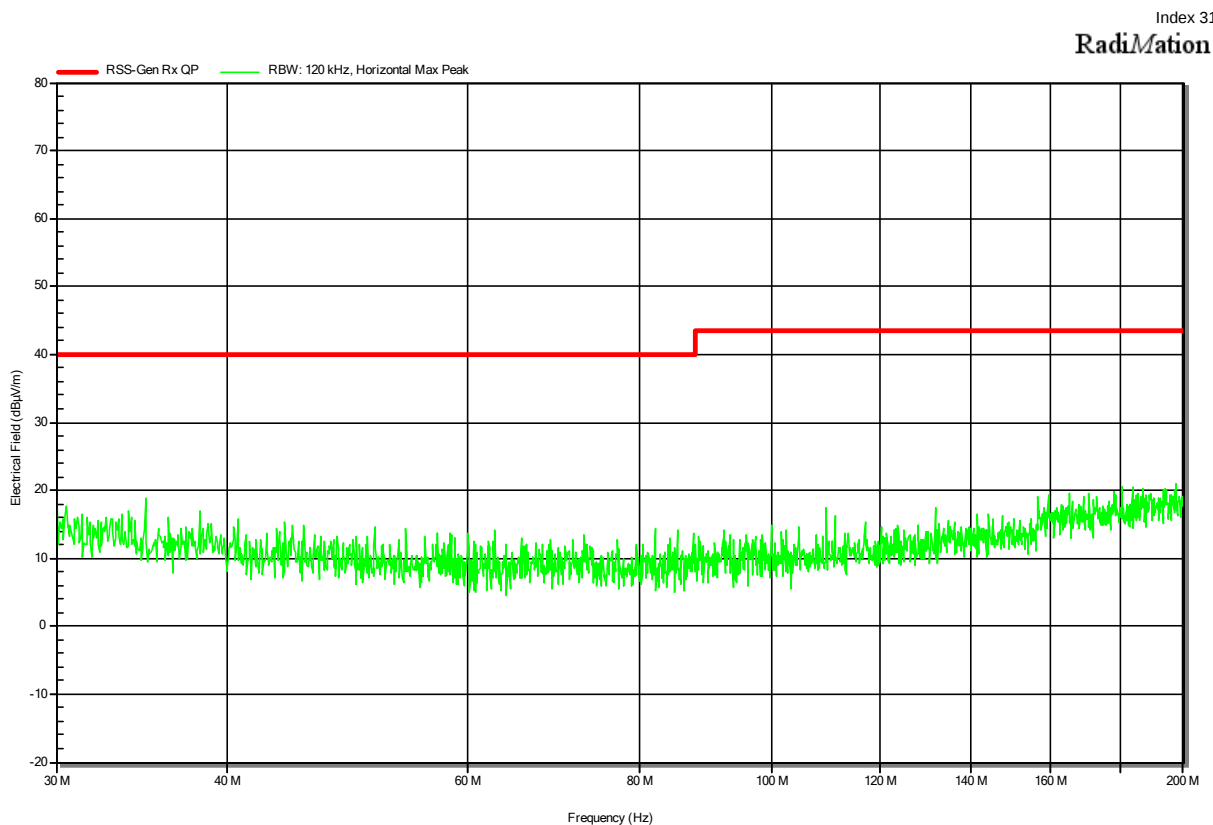


Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
1.41 GHz	-27.5 dBm	-20 dBm	-7.48 dB	Pass	Vertical
1.88 GHz	-36 dBm	-20 dBm	-16.02 dB	Pass	Horizontal

ANNEX B Receiver radiated emissions

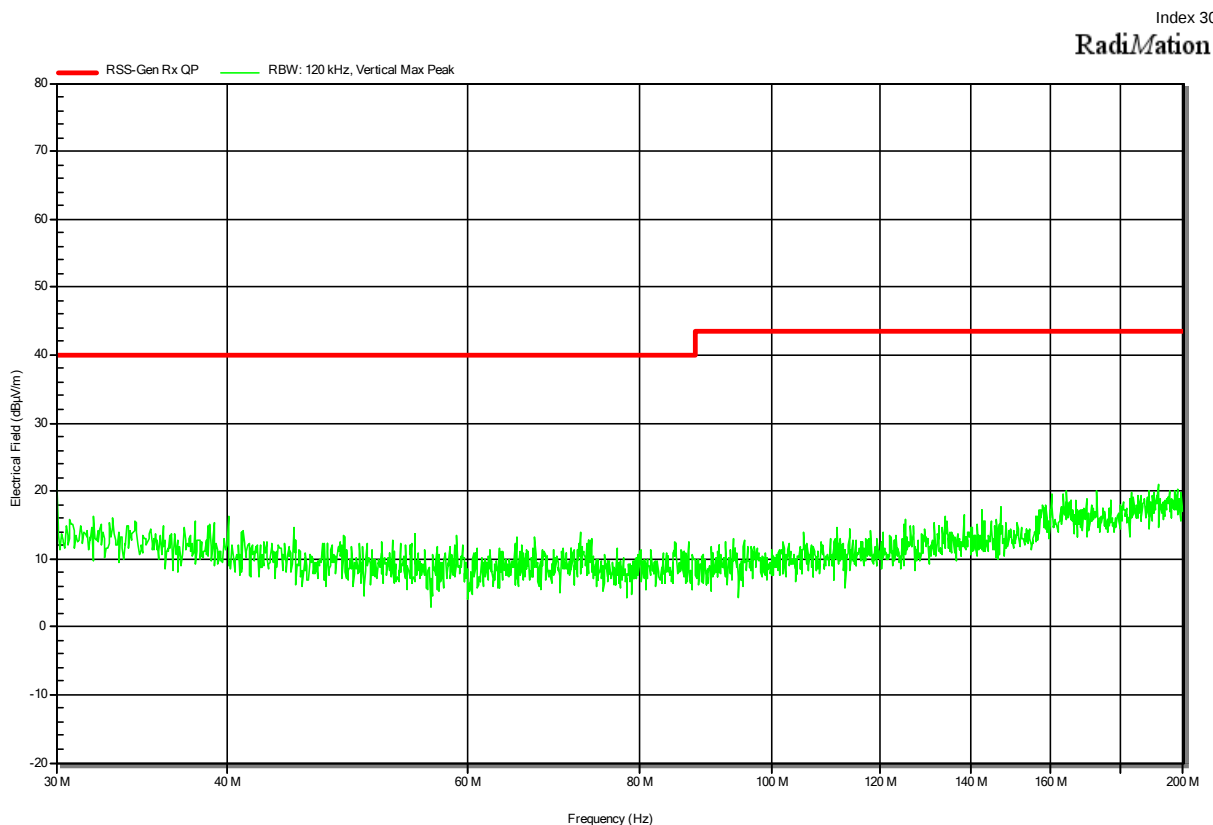
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



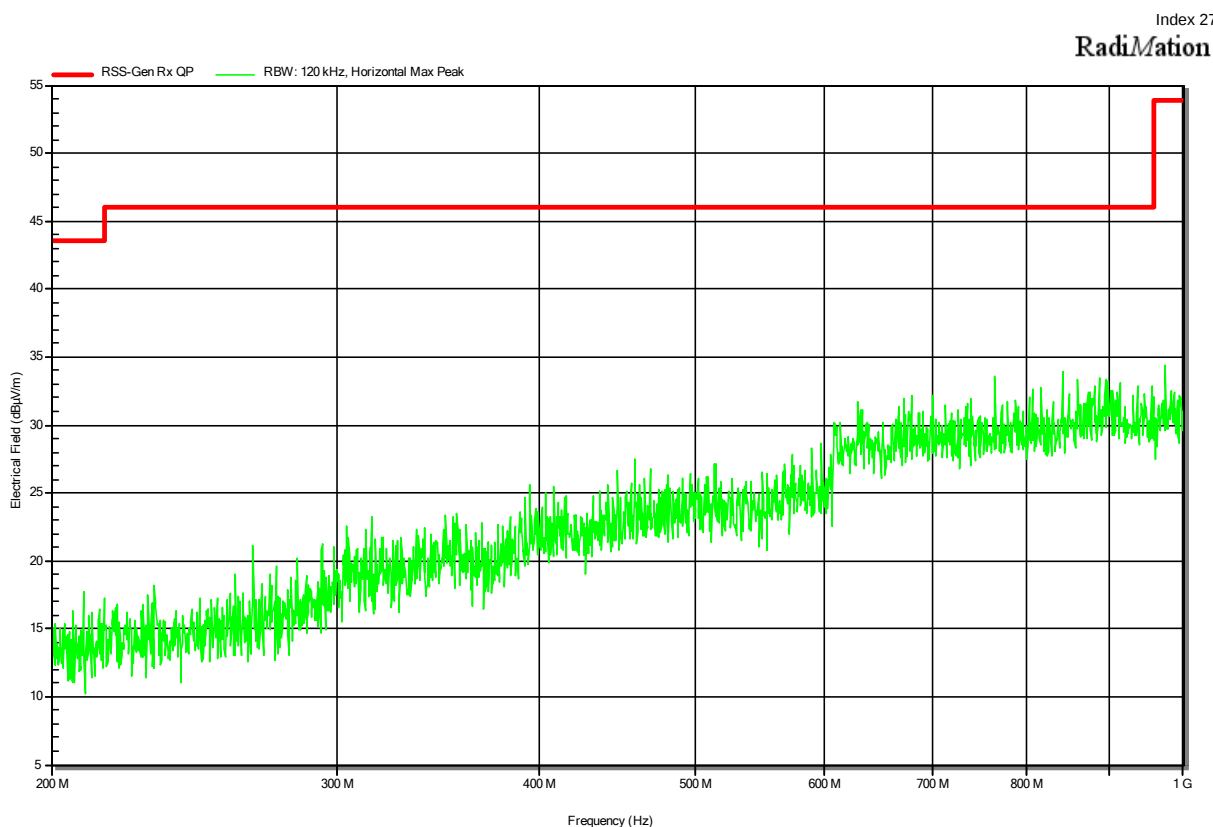
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Rx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



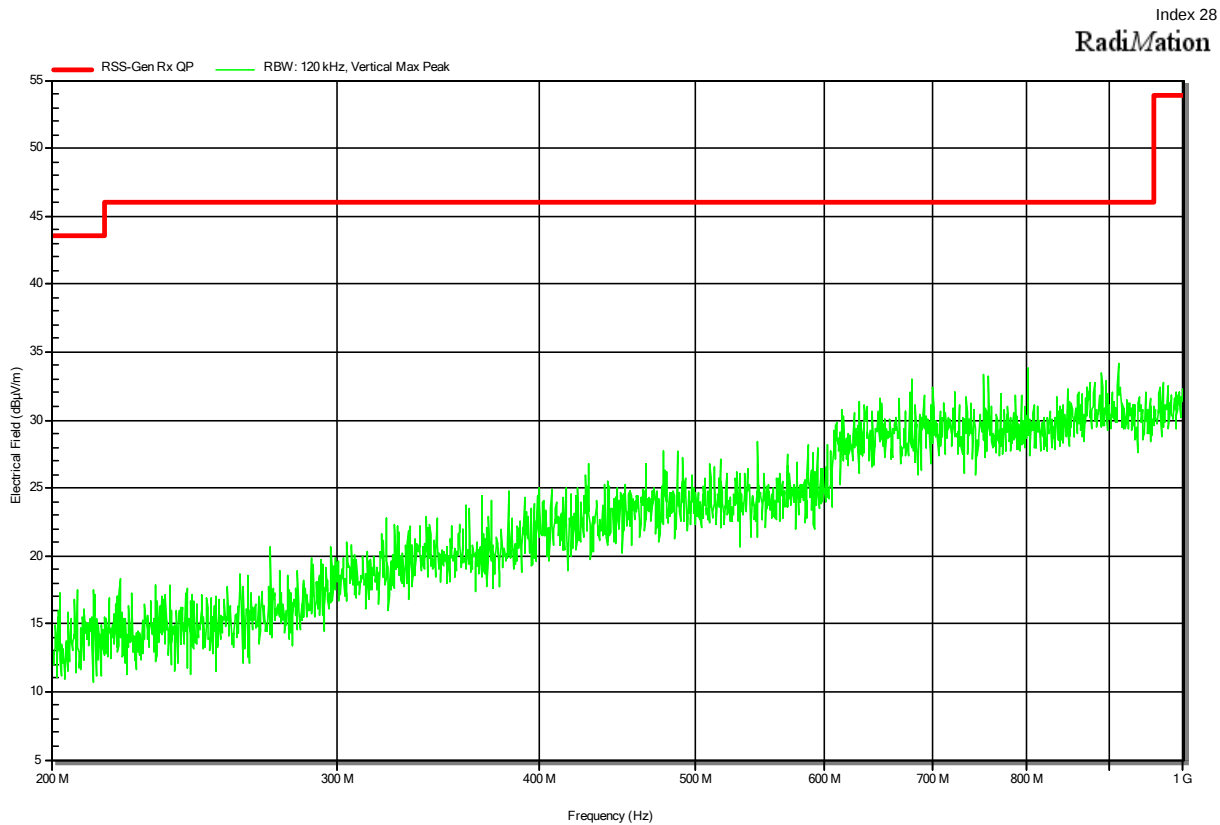
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Jahn
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Rx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

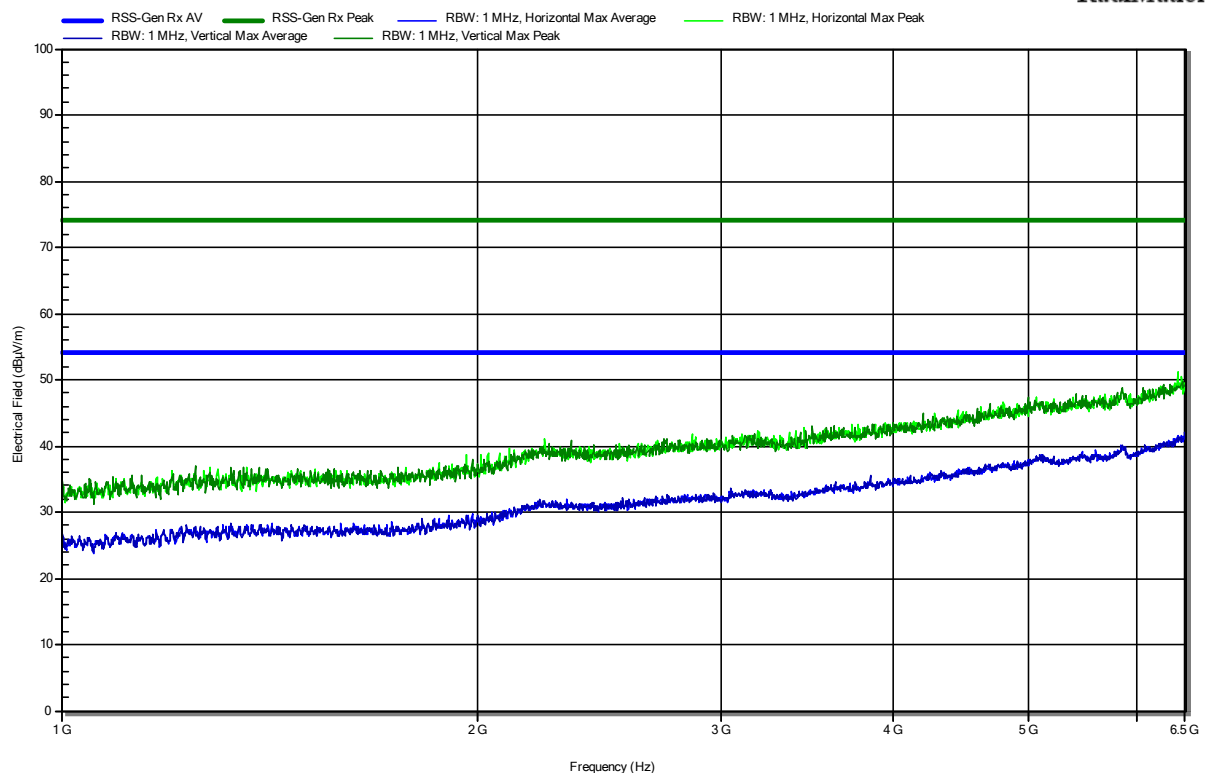


Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Rx; Helix Antenna 30261216, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

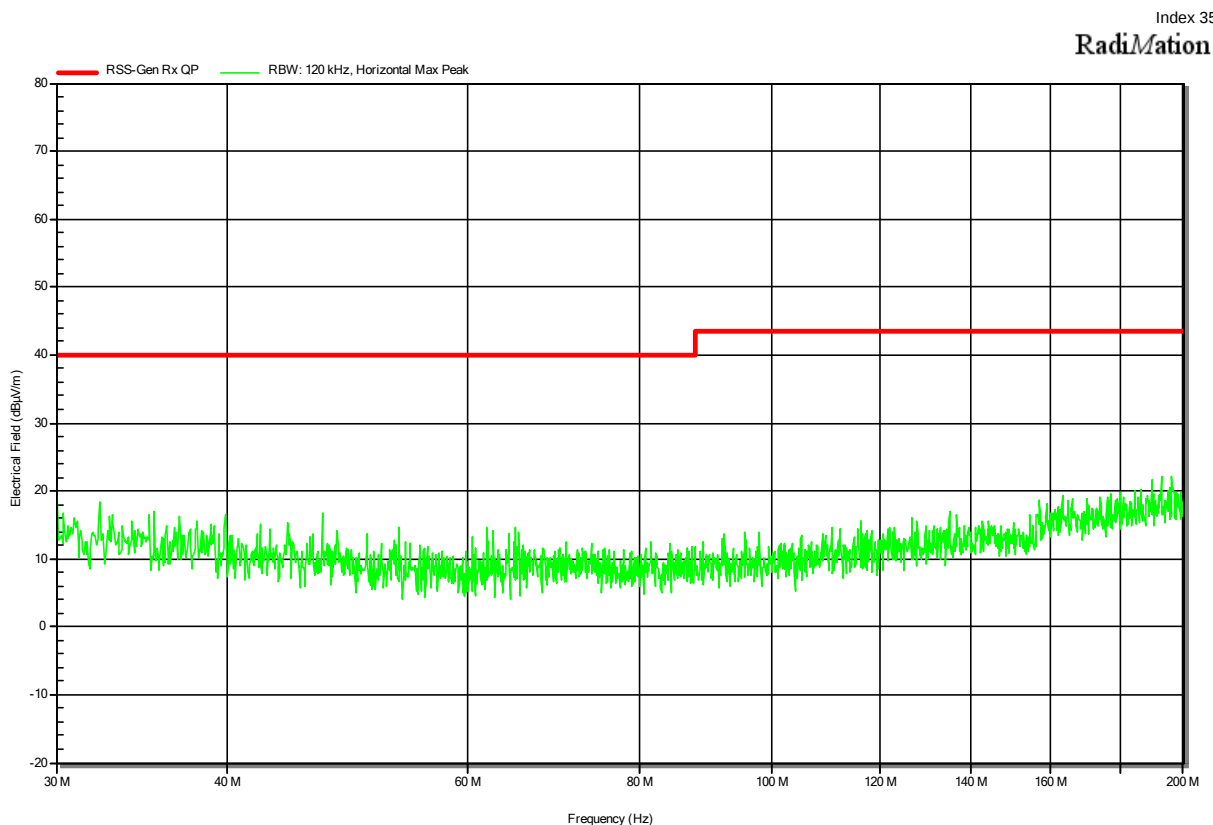
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RadiMation



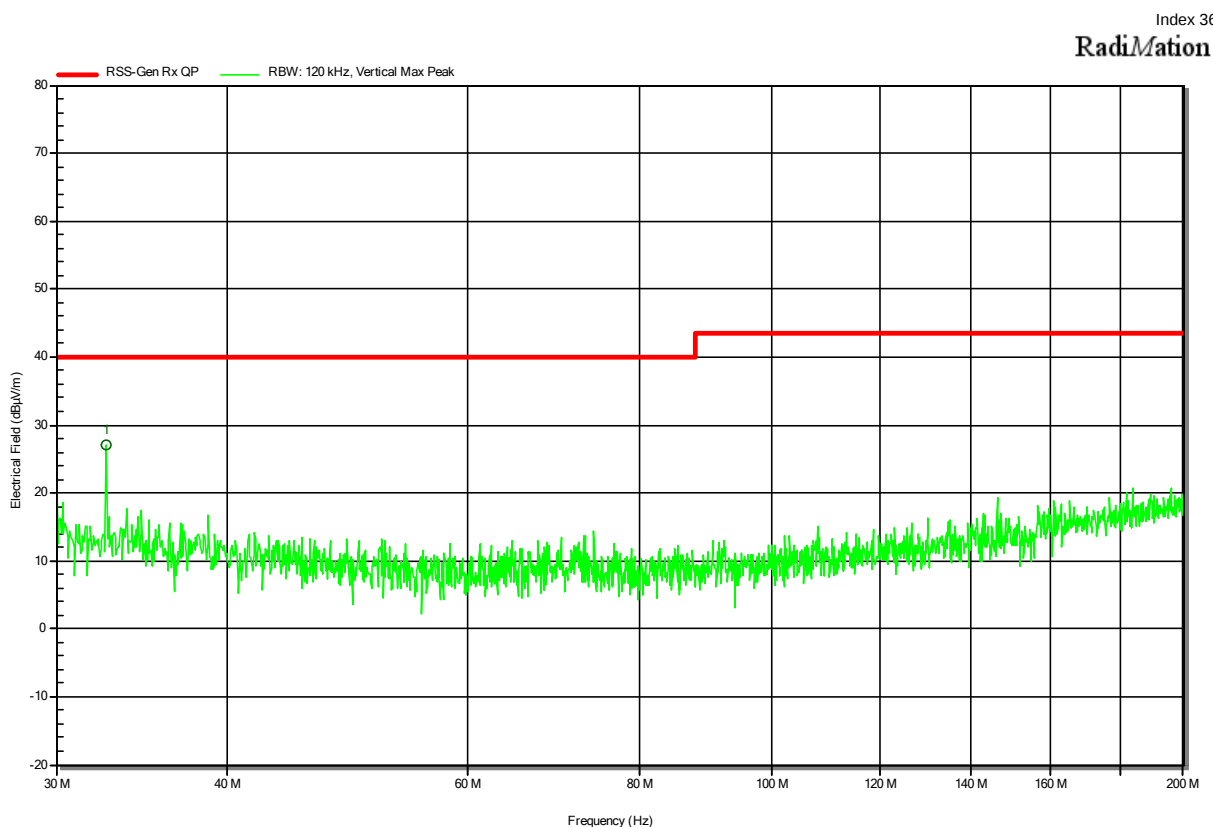
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to RSS-Gen Issue 5

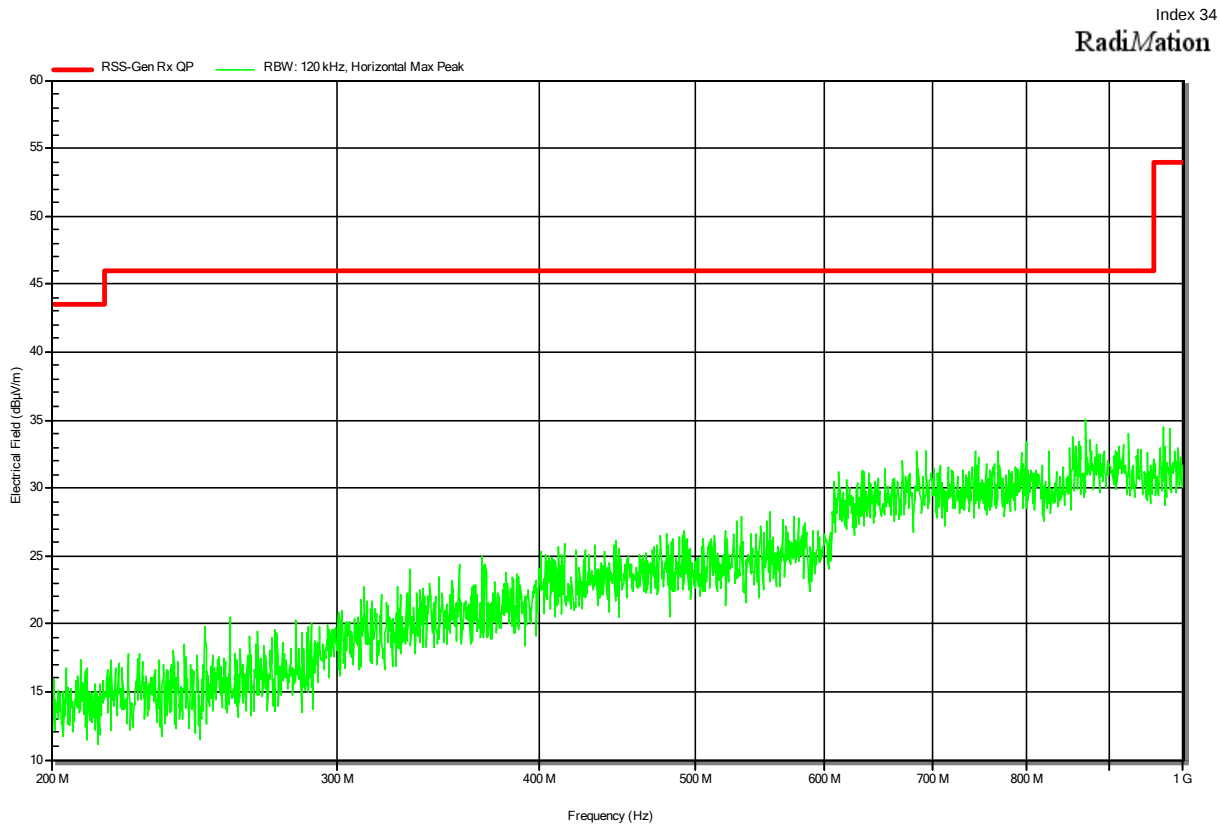
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Rx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
32.6403 MHz	27.1 dBµV/m	40 dBµV/m	-12.91 dB	Pass

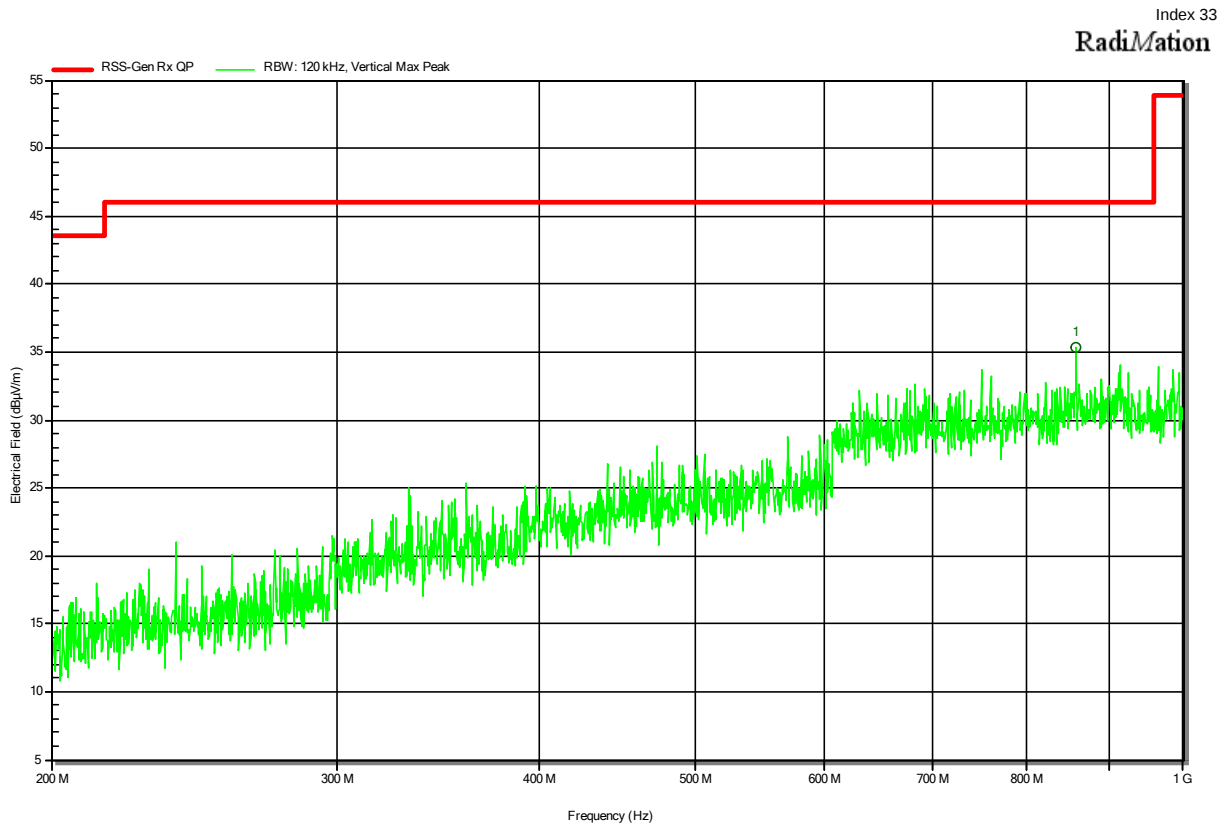
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Rx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



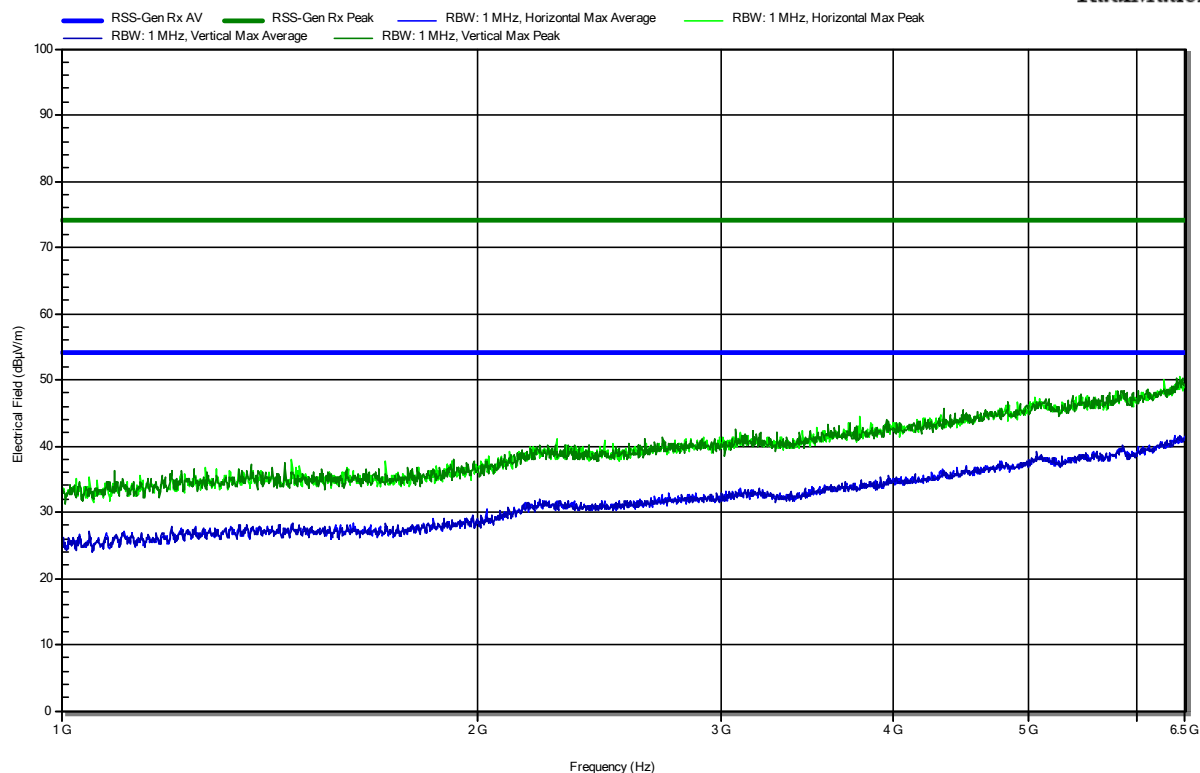
Frequency	Peak	Peak Limit	Peak Difference	Peak Status
858.5765 MHz	35.4 dBµV/m	46 dBµV/m	-10.64 dB	Pass

Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 24 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Rx; Pit Antenna 6697916, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

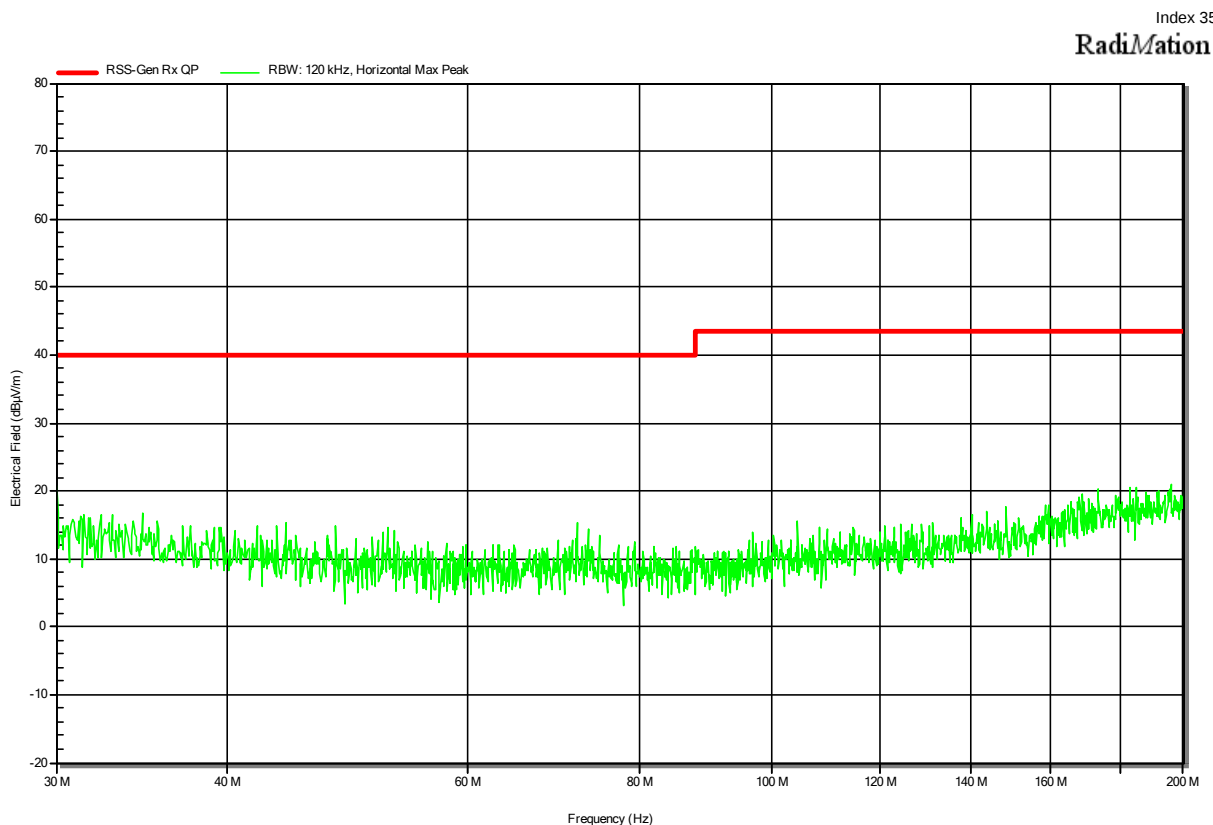
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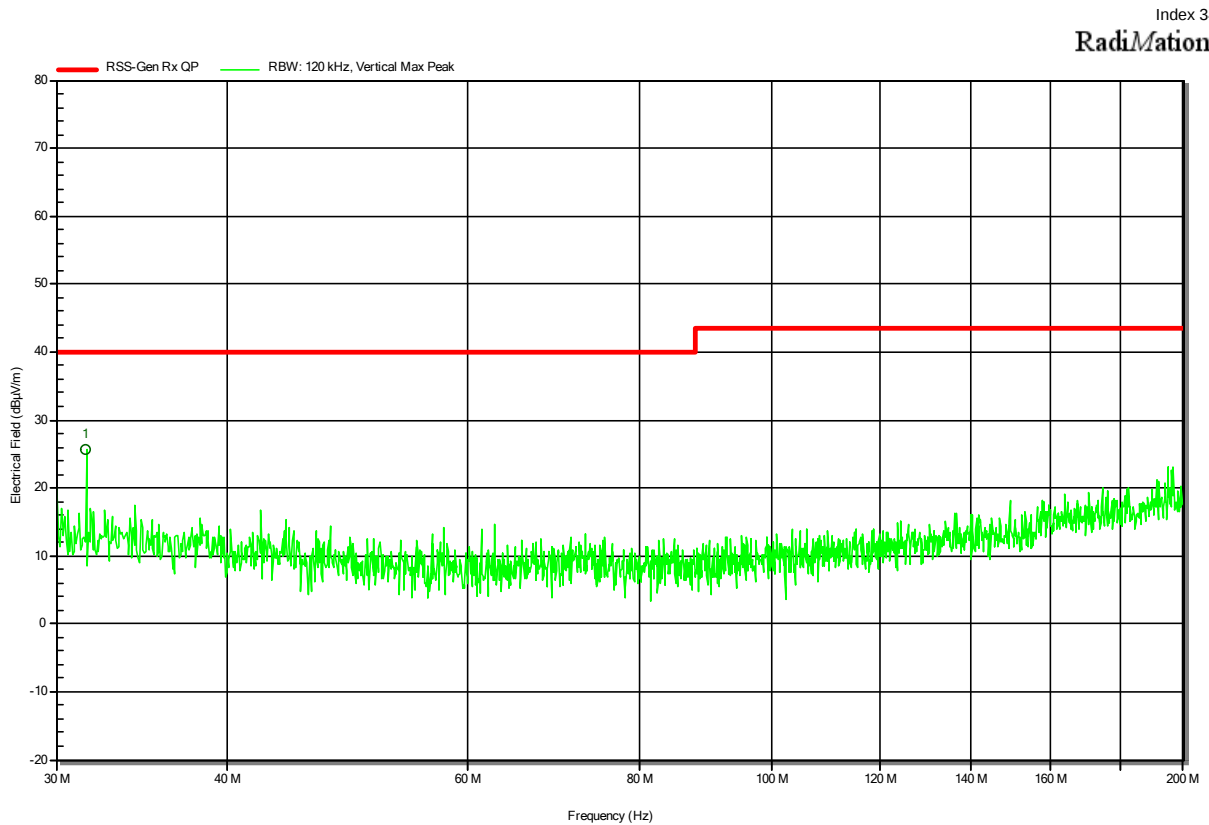
Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Radiated Spurious Emissions according to RSS-Gen Issue 5

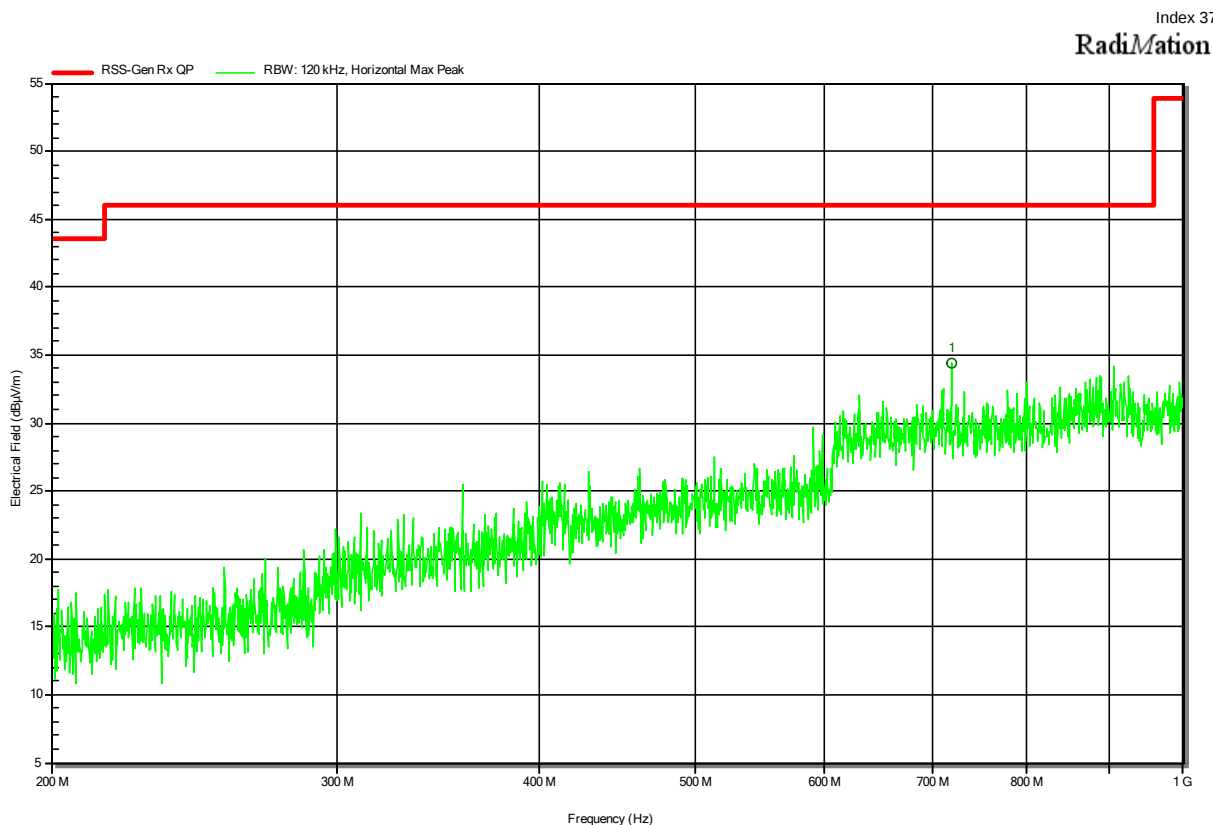
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HK 116, Vertical
 Measurement distance: 3 m
 Mode: Rx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
31.5602 MHz	25.6 dBµV/m	40 dBµV/m	-14.41 dB	Pass

Radiated Spurious Emissions according to RSS-Gen Issue 5

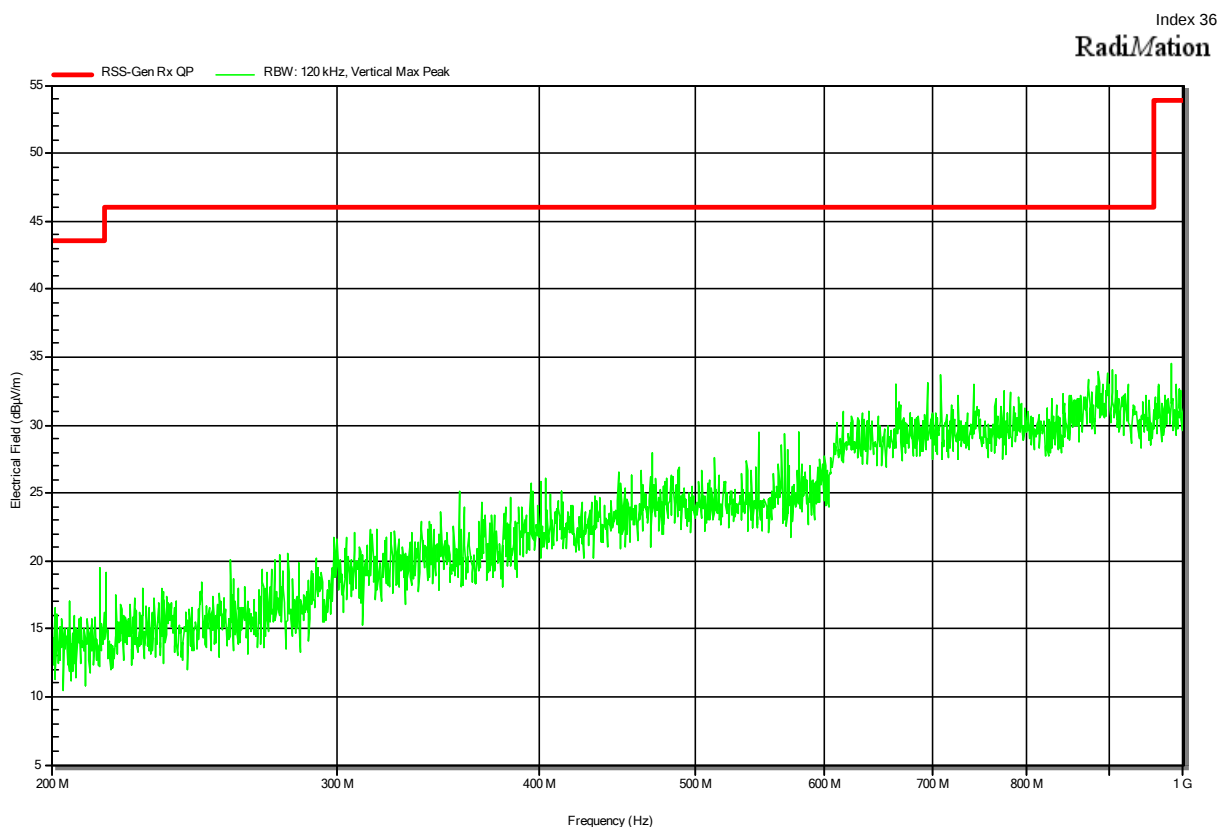
Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3 m
 Mode: Rx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:



Frequency	Peak	Peak Limit	Peak Difference	Peak Status
718.953 MHz	34.4 dBµV/m	46 dBµV/m	-11.61 dB	Pass

Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Rohde & Schwarz HL 223, Vertical
 Measurement distance: 3 m
 Mode: Rx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

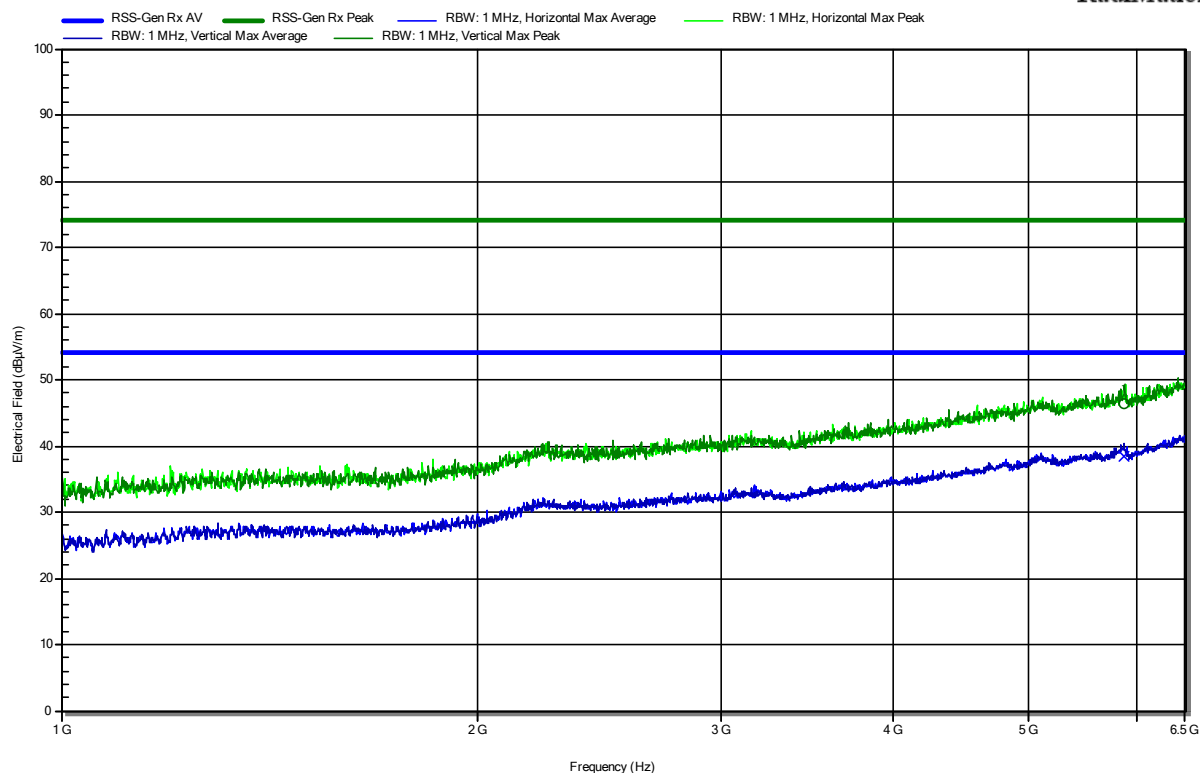


Radiated Spurious Emissions according to RSS-Gen Issue 5

Project Number: G0M-2201-1256
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: KWM4220
 Test Sample ID: 38836
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Voigt
 Measurement software: RadiMation, version 2020.1.8
 Test Conditions: Tnom: 23 °Celsius, Vnom: 3.66 VDC
 Antenna: Schwarzbeck BBHA 9120D
 Measurement distance: 3 m
 Mode: Rx; Wall Antenna 6699490, 460.11875 MHz
 Test Date: 2022-03-22
 Note:

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RadiMation



Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Polarization
5.869 GHz	46.31 dBμV/m	74 dBμV/m	-27.69 dB	Pass	Vertical
Frequency	Average	Average Limit	Average Difference	Average Status	Polarization
5.869 GHz	38.55 dBμV/m	53.98 dBμV/m	-15.43 dB	Pass	Vertical

--- END OF REPORT ---

Test Report No.: G0M-2201-1256-TFC090PMR-V01

Eurofins Product Service GmbH
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