

FCC TEST REPORT FCC 47 CFR Part 90 Private Land Mobile Radio Services (PMR)	
Report Reference No.	G0M-1707-6700-TFC90PMR-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	 A2LA Accredited Testing Laboratory, Certificate No.: 1983.01 FCC Test Firm Designation Number: DE0008 IC OATS Filing assigned code: 3470A-2
Applicant's name	Kamstrup A/S
Address	Industrivej 28 8660 Skanderborg DENMARK
Test specification:	
Standard	47 CFR Part 90I
Equipment under test (EUT):	
Product description	Ultrasonic water meter
Model No.	FlowIQ 2250
Additional Model(s)	FlowIQ 3250 HW: 620220101 rev 00 / RF board 55501605 rev D1
Brand Name(s)	Kamstrup
Hardware version	620120101 rev A1 / RF board 55501605 rev D1
Firmware / Software version	50981336 rev E1 / 55141470 rev C1
	FCC-ID: OUY-FLOWX250 IC: N/A
Test result	Passed

Possible test case verdicts:

- neither assessed nor tested : N/N
- required by standard but not appl. to test object : N/A
- required by standard but not tested : N/T
- not required by standard for the test object : N/R
- 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 : 2017-08-21

Date (s) of performance of tests : 2017-08-21 – 2017-08-25

Compiled by : Toralf Jahn

Tested by (+ signature) : Toralf Jahn
(Responsible for Test)

Approved by (+ signature) : Christian Weber
(Head of Lab)

Date of issue : 2017-09-14

Total number of pages : 54



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:

The following models are additional models to the series. They were neither tested nor assessed nor evaluated.

FlowIQ 2250 HW:620120102 rev A1 / RF board 55501605 rev D1

FlowIQ 2250 HW:620120103 rev A1 / RF board 55501605 rev D1

FlowIQ 3250 HW:620220102 rev 00 / RF board 55501605 rev D1

FlowIQ 3250 HW:620220103 rev 00 / RF board 55501605 rev D1

FlowIQ 3250 HW:620220104 rev 00 / RF board 55501605 rev D1

FlowIQ 3250 HW:620220105 rev 00 / RF board 55501605 rev D1

Version History

Version	Issue Date	Remarks	Revised by
01	2017-09-14	Initial Release	

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1 Equipment (Test item) Description

Description	Ultrasonic water meter	
Model	FlowIQ 2250	
Additional Model(s)	FlowIQ 3250 HW: 620220101 rev 00 / RF board 55501605 rev D1	
Brand Name(s)	Kamstrup	
Serial number	None	
Hardware version	620120101 rev A1 / RF board 55501605 rev D1	
Software / Firmware version	50981336 rev E1 / 55141470 rev C1	
PMN	None	
HVIN	None	
FVIN	None	
HMN	None	
FCC-ID	OUY-FLOWX250	
IC	N/A	
Equipment type	End Product	
Radio type	PMR	
Number of Radios	1	
Operating frequency range	450.025 – 469.9875 MHz	
Assigned frequency band	421 – 512 MHz	
Main test frequencies	F _{LOW}	450.025 MHz
	F _{MID}	460.11875 MHz
	F _{HIGH}	469.9875 MHz
Modulations	4-GFSK	
Emission designator	F1D	
Channel bandwidth	12.5 kHz	
Authorized bandwidth	11.25 kHz	
Channel spacing	6.25 kHz	
Number of antennas	3	

Antenna 1	Type	External
	Model	1653094
	Manufacturer	Kamstrup A/S
	Gain	-0.6 dBi
Antenna 2	Type	External
	Model	6699490
	Manufacturer	Kamstrup A/S
	Gain	0.5 dBi
Antenna 3	Type	External
	Model	6697902
	Manufacturer	Kamstrup A/S
	Gain	0.0 dBi
Manufacturer	Kamstrup A/S Industrivej 28 8660 Skanderborg DENMARK	
Power supply	V _{NOM}	3.6 VDC (lithium battery)
	V _{MIN}	3.0
	V _{MAX}	3.6
AC/DC-Adaptor	Model	none
	Vendor	none
	Input	none
	Output	none
Temperature	T _{NOM}	20°C
	T _{MIN}	-30°C
	T _{MAX}	65°C

Additional information:

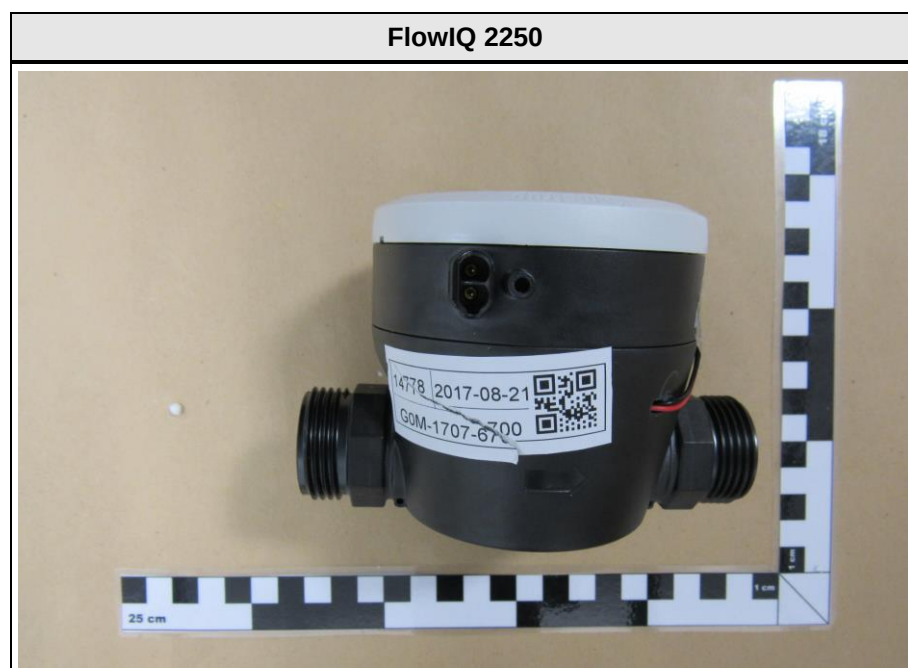
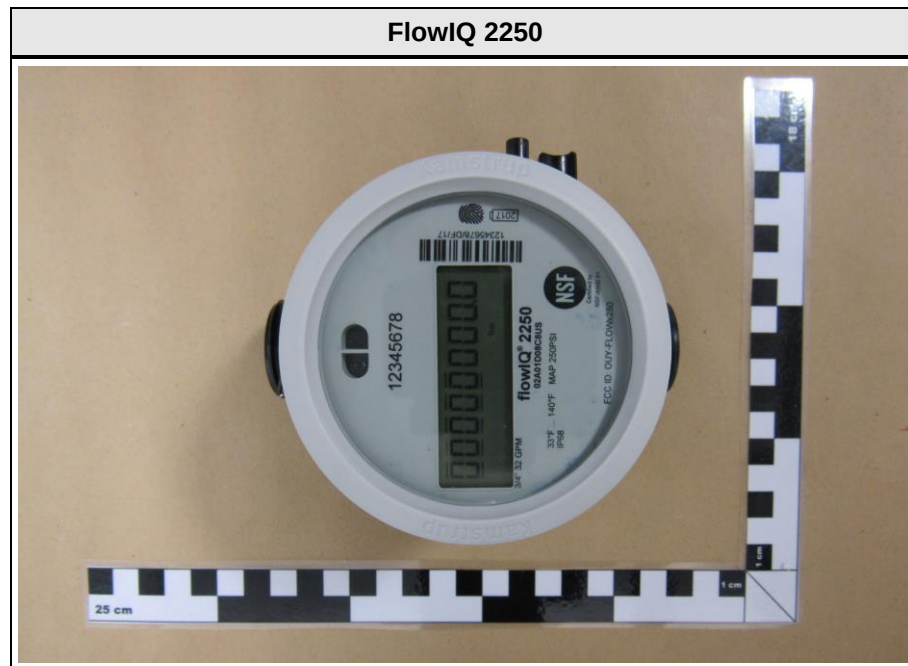
Antenna 2 and 3 each come in two versions. The difference between the two version are the length of the cable.

The data listed above belongs to the versions with the shortest cables and hence highest gain.

For Antenna 2 the data is presented for the wall mounted antenna version 6699490 which has a 2 meter long cable. The second version is called 6699491. This version features the same antenna as 6699490, but it has a cable up to 20 meters.

For Antenna 3 the data is presented for the pit antenna version 6697902, which has a 2 meter cable. The second version is called 6697903. This features the same antenna as 6697902, but it has a cable up to 7.5 meters.

1.1 Photos - Equipment external



FlowIQ 2250



FlowIQ 3250





Antenna 1



Antenna 3



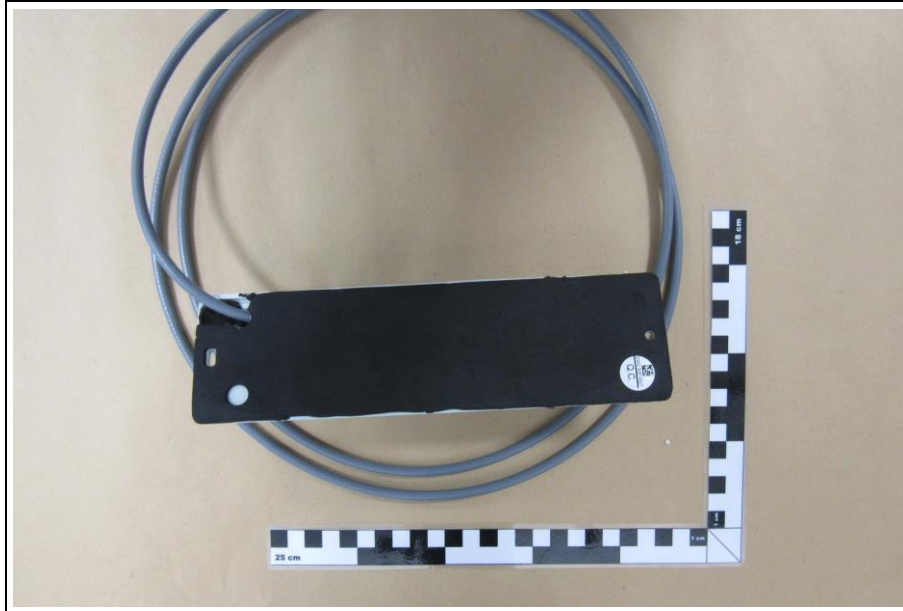
Antenna 3



Antenna 2



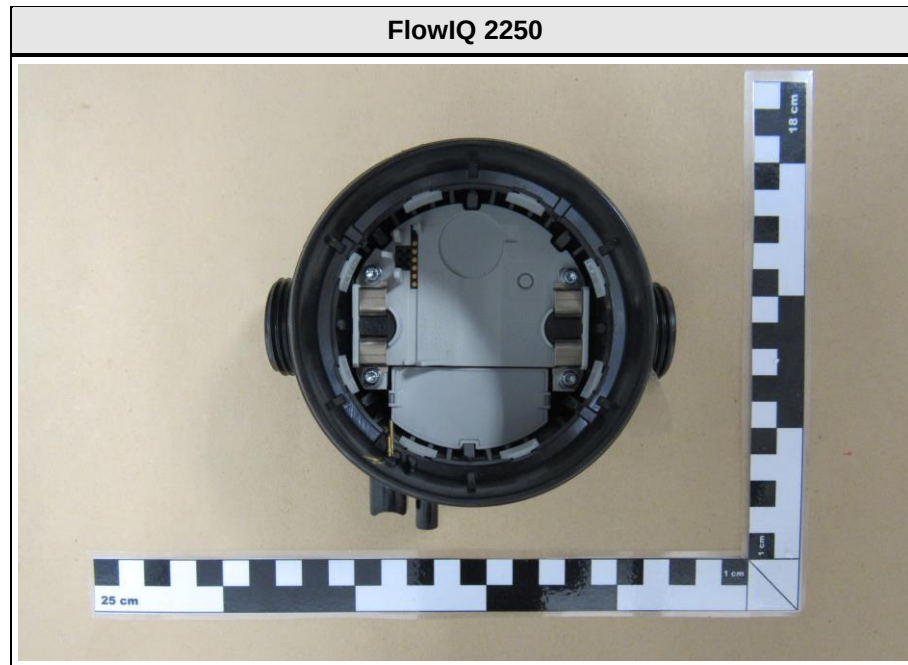
Antenna 2



Antenna 2



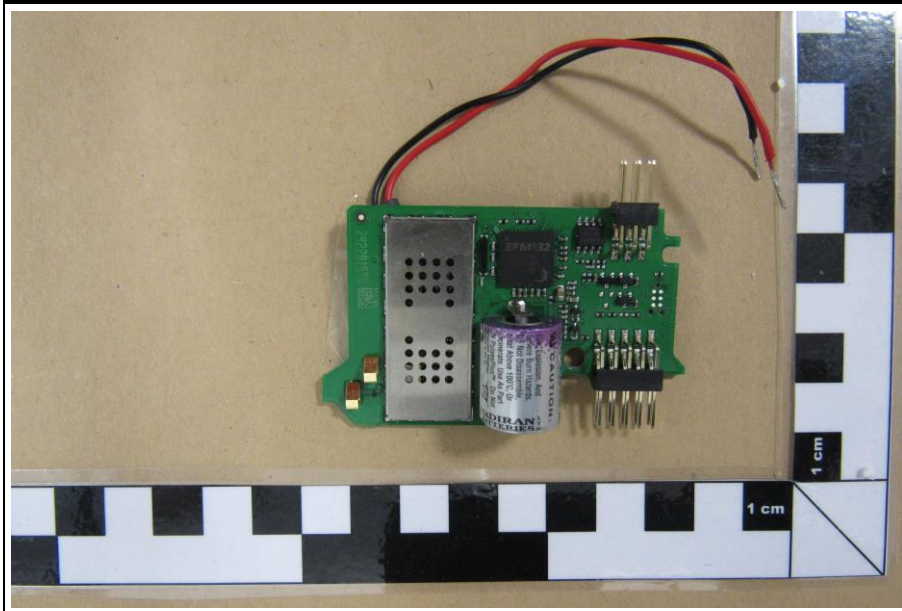
1.2 Photos - Equipment internal



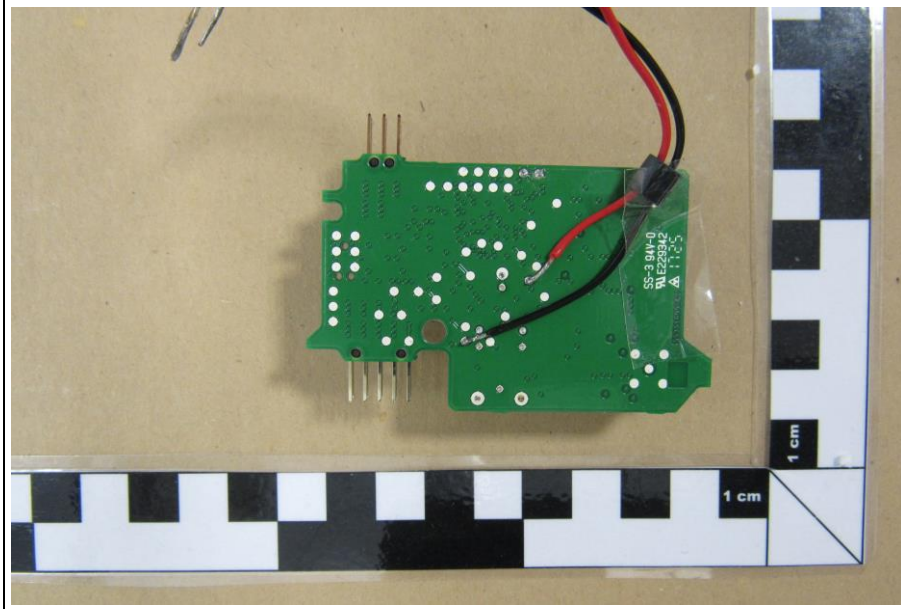
FlowIQ 2250



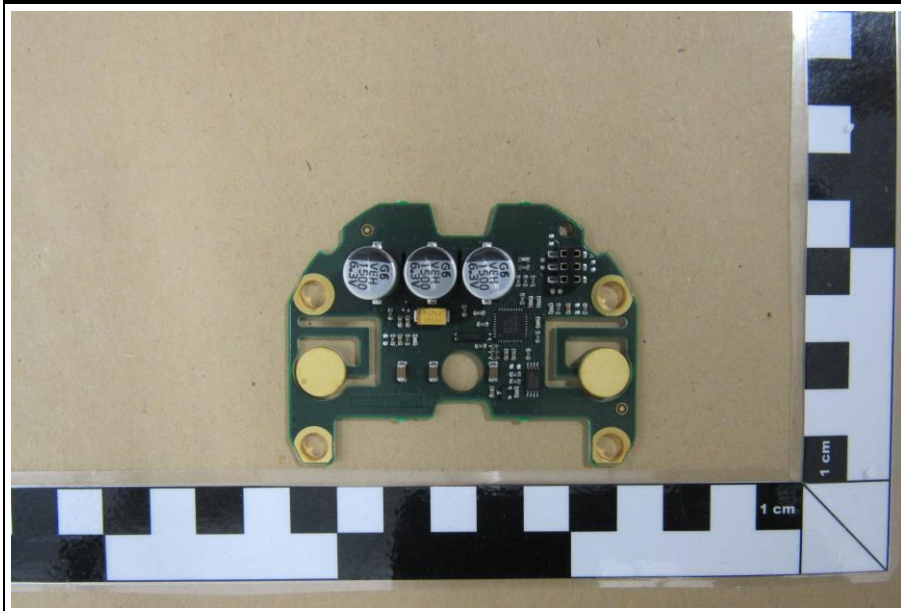
FlowIQ 2250 RF-PCB

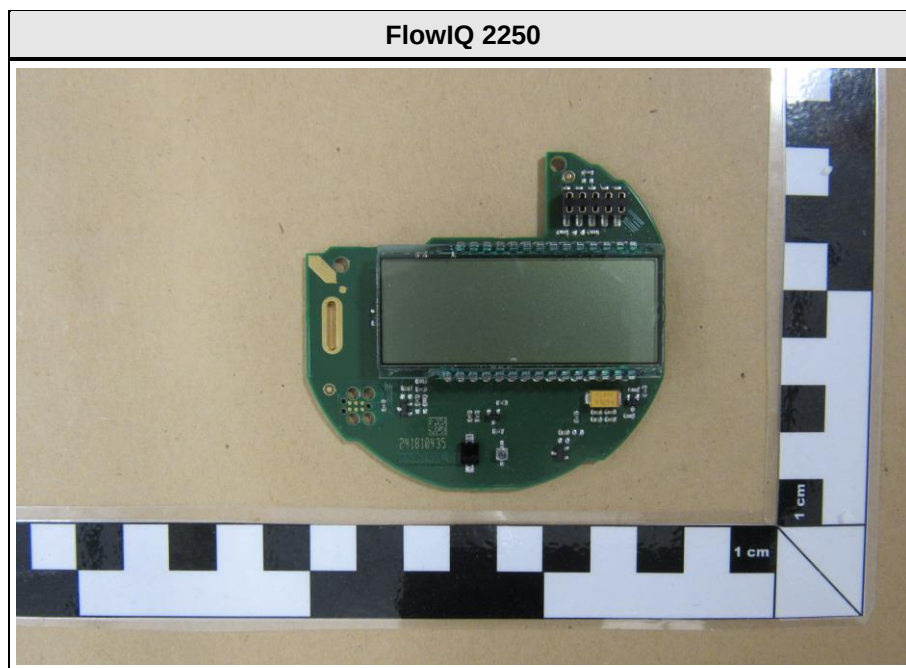
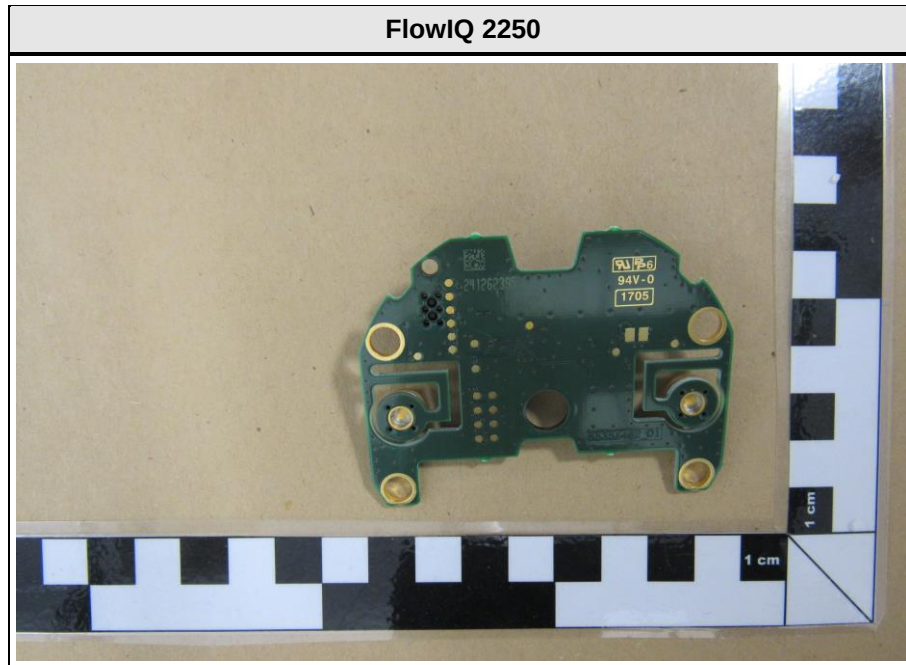


FlowIQ 2250 RF PCB

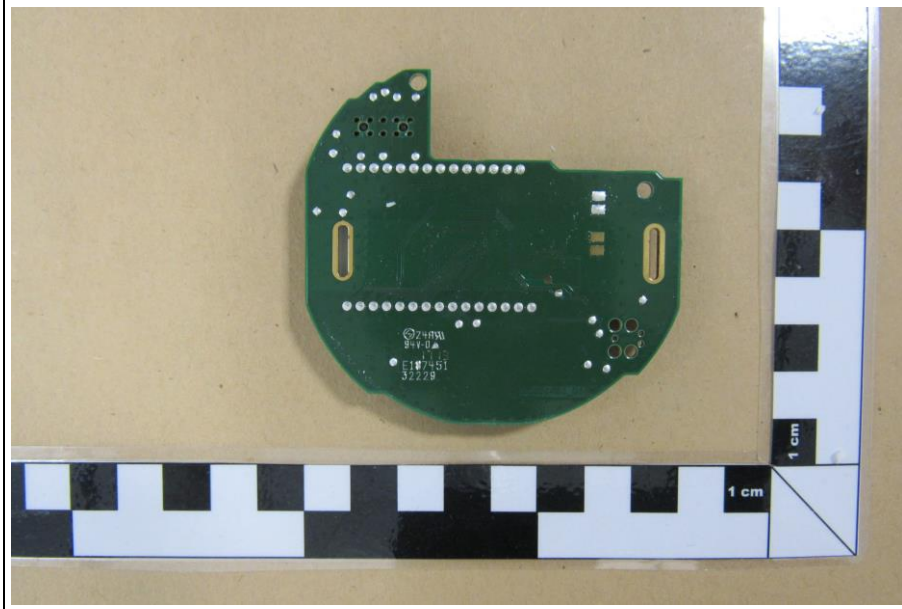


FlowIQ 2250





FlowIQ 2250



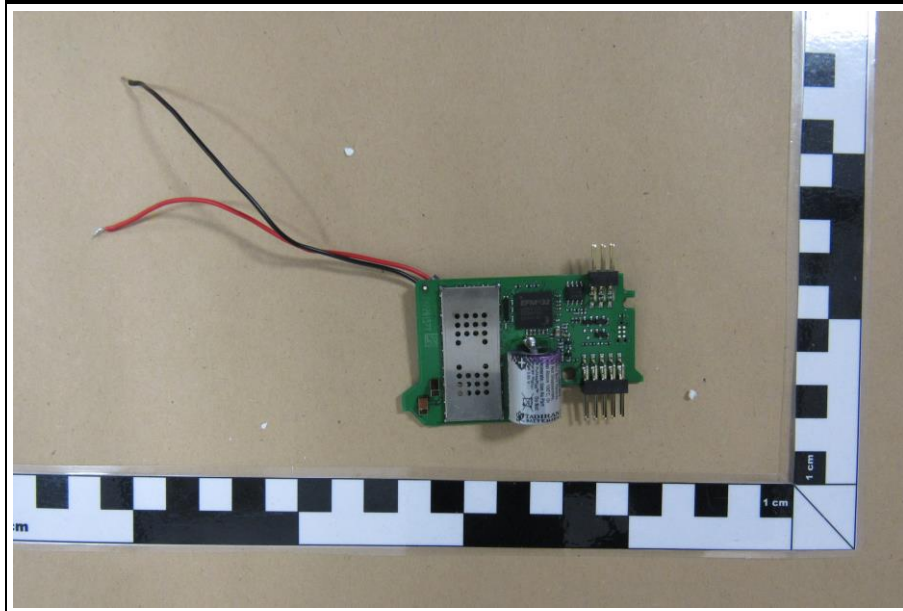
FlowIQ 3250



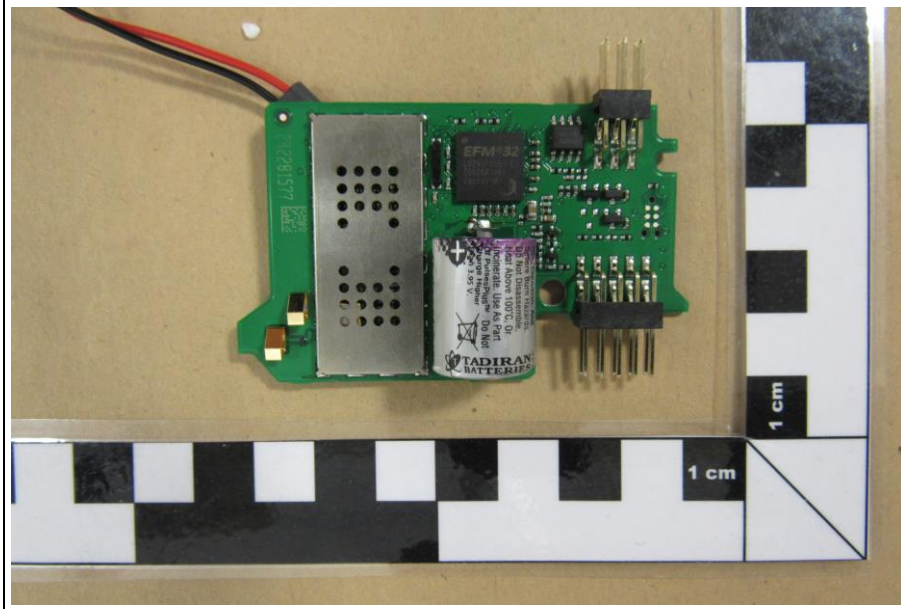
FlowIQ 3250



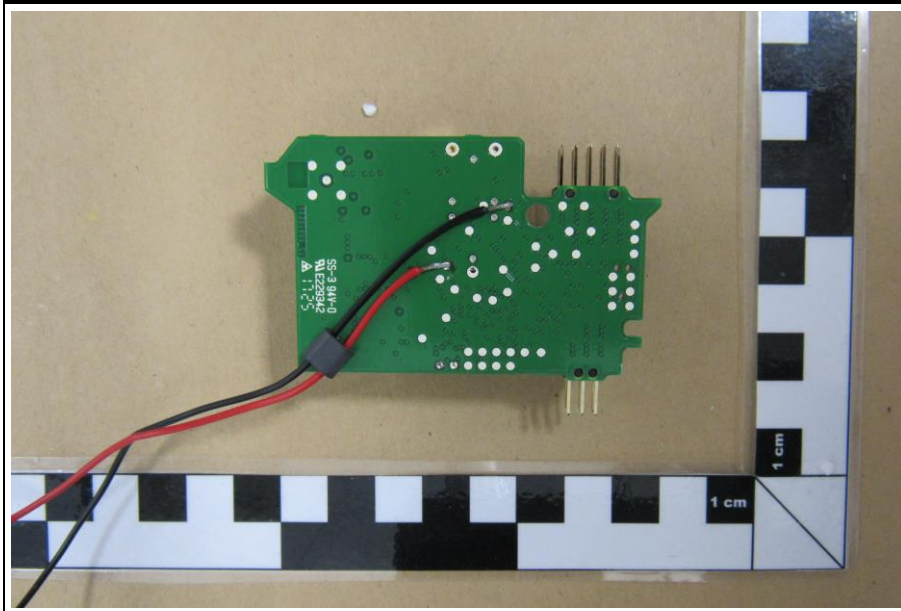
FlowIQ 3250 RF PCB

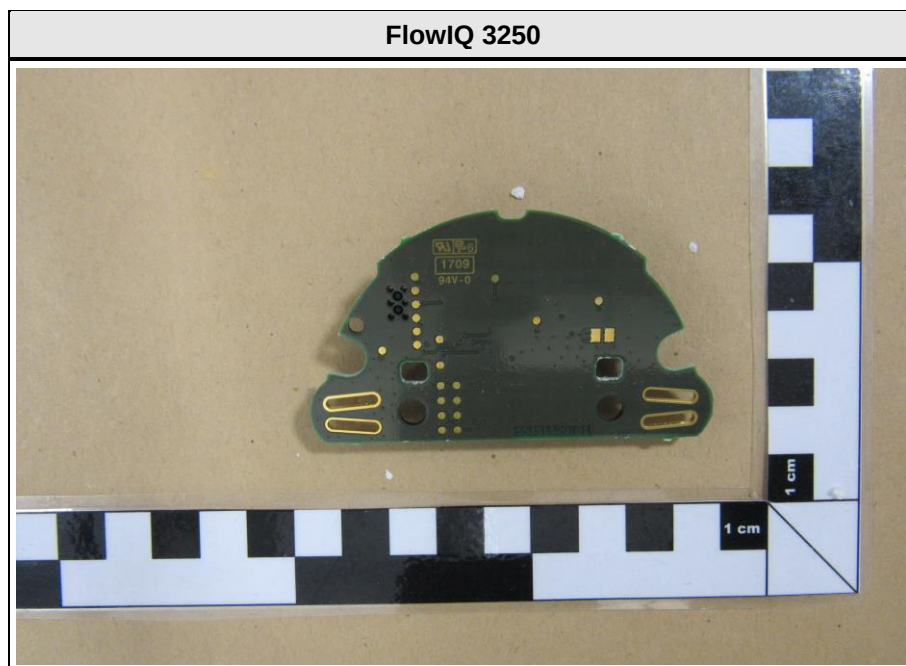
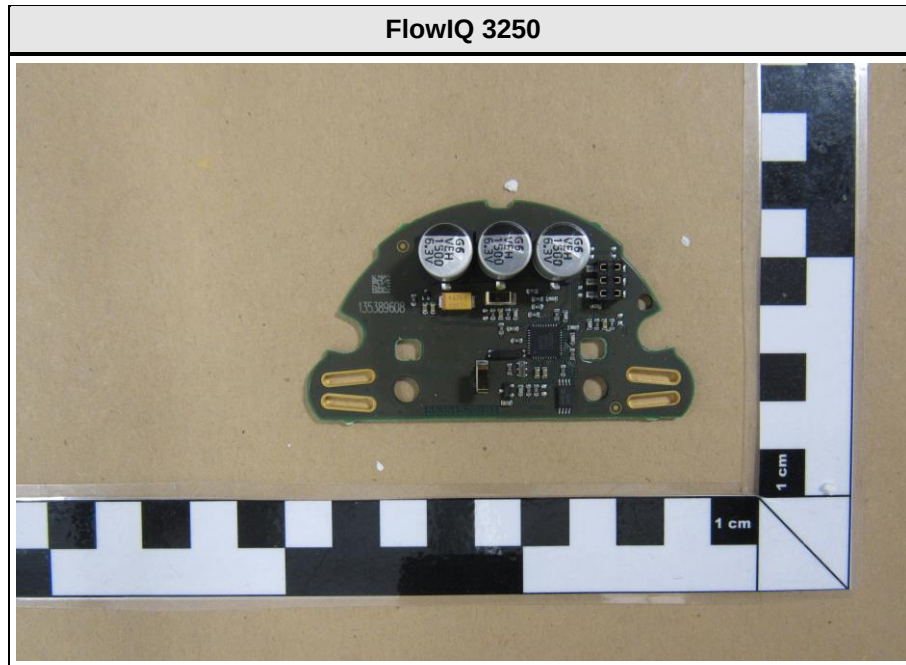


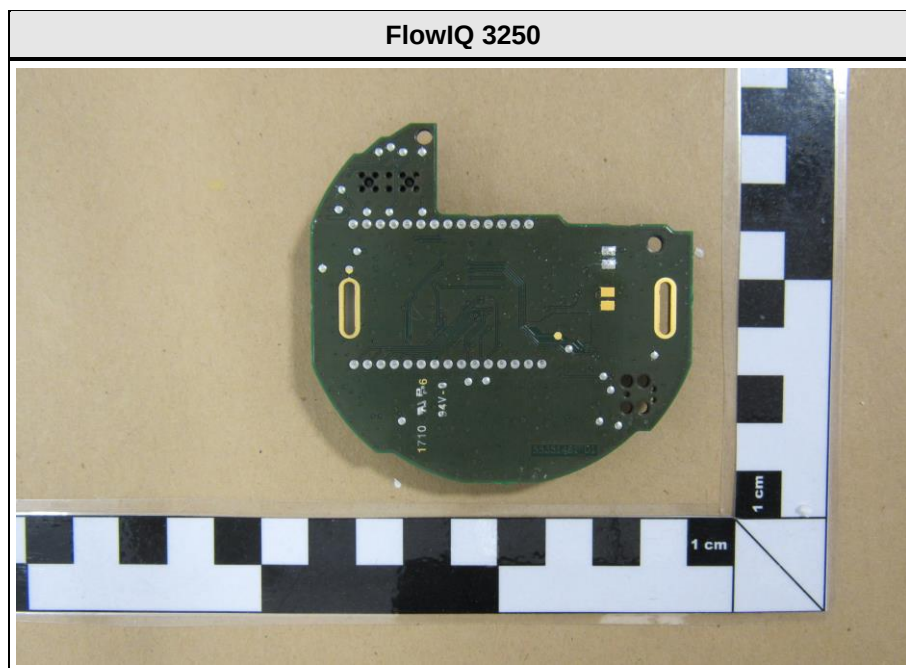
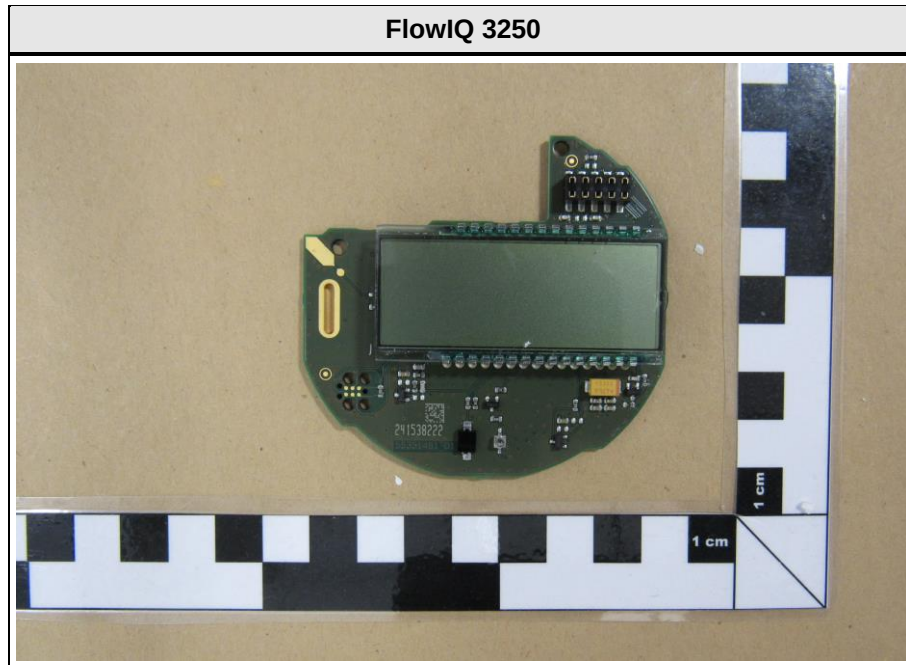
FlowIQ 3250 RF PCB



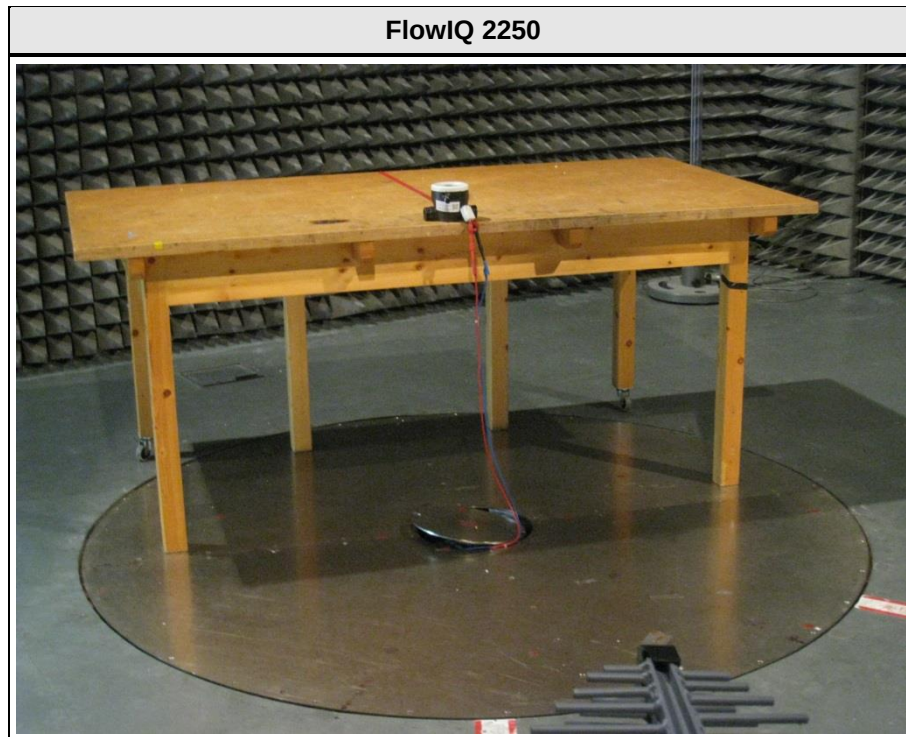
FlowIQ 3250 RF PCB



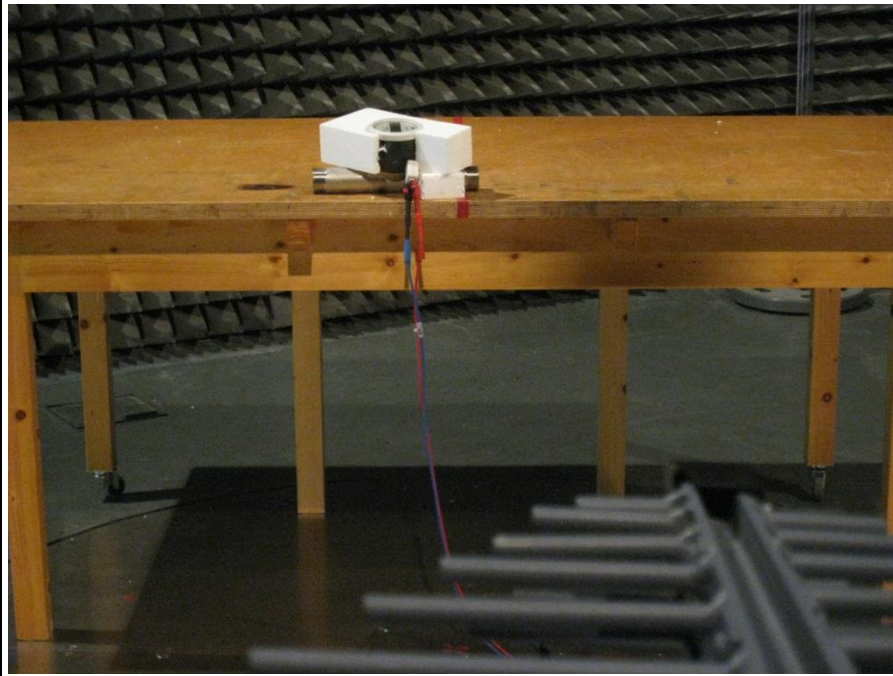




1.3 Photos – Test setup



FlowIQ 3250



FlowIQ 3250 with Load



1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Laboratory power supply	Statron	2224.2	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.
*Note: Use the following abbreviations: AE : Auxiliary/Associated Equipment, or SIM : Simulator (Not Subjected to Test) CABL : Connecting cables				

1.5 Test Modes

Mode #	Description	
Transmit modulated	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone mode Modulation = 4-GFSK Duty cycle = 100% Power level = maximum
Transmit unmodulated	General conditions:	EUT powered by laboratory power supply.
	Radio conditions:	Mode = standalone mode Modulation = none Duty cycle = 100% Power level = maximum

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

Conducted					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSW 43	EF00896	2017-07	2018-07
Modulation Domain Analyzer	R&S	FSIQ 26	EF00151	2016-03	2017-03
Rubidium Frequency Standard	EFRATOM	MFS	EF00308	2013-05	2018-05

Radiated spurious emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-anechoic chamber	Frankonia	AC 1	EF00062	2017-02	2020-02
EMI Test Receiver	R&S	ESR7	EF00943	2016-10	2017-10
Spectrum Analyzer	R&S	FSIQ26	EF00151	2017-03	2018-03
Antenna	R&S	HK 116	EF00030	2016-04	2019-04
Antenna	R&S	HL 223	EF00187	2016-05	2019-05
Antenna	R&S	BBHA 9120D	EF00018	2016-09	2019-09
Antenna	Amplifier Research	AT4560	EF01152	2016-09	2017-09

2 Result Summary

FCC 47 CFR Part 90I				
Product Specific Standard Section	Requirement – Test	Reference Method	Result	Remarks
FCC 90.205 FCC 2.1046	Power	TIA-603-D 2.2.17.2	PASS	
FCC 90.209 FCC 90.210 FCC 2.1049	Authorized bandwidth Emission masks Occupied bandwidth	FCC 90.210	PASS	
FCC 90.210 FCC 2.1051	Spurious emissions at antenna terminal	FCC 90.210 TIA-603-D 2.2.13	PASS	
FCC 90.210 FCC 2.1053	Spurious emissions radiated	FCC 90.210 TIA-603-D 2.2.12	PASS	
FCC 90.213 FCC 2.1055	Frequency stability	TIA-603-D 2.2.2	PASS	
FCC 90.214	Transient frequency behavior	TIA-603-D 2.2.19.2	PASS	
Remarks:				

3 Test Conditions and Results

3.1 Power

Maximum peak conducted power acc. to FCC 90.205				Verdict: PASS	
EUT requirement rule parts and clause		Reference			
		FCC 90.205, FCC 2.1046			
Test according to measurement reference		Reference Method			
		TIA-603-D 2.2.17.2			
Test frequency range		Tested frequencies			
		F _{LOW} / F _{MID} / F _{HIGH}			
EUT test mode		Transmit unmodulated			
Maximum antenna gain		0.5 dBi			
Limit					
2 W (33 dBm) ERP					
Test setup					
Spectrum Analyzer EUT					
Test procedure					
- EUT set to transmit mode - Center frequency set to test channel center frequency - Span set to twice the 20 dB bandwidth and detector to peak and max hold - Resolution bandwidth is set to 3 MHz - Peak conducted power is determined from peak of spectrum envelope					
ERP calculation					
- EIRP [dBm] = Conducted power [dBm] + Max EUT antenna gain [dBi] - ERP [dBm] = EIRP [dBm] -2.15 dB					
Test results					
Channel	Conducted peak power [dbm]	ERP peak power [dbm]	ERP peak power [W]	ERP Limit [dBm]	Margin [dB]
F _{LOW}	29.4	27.8	0.603	33	-2.2
F _{MID}	29.3	27.7	0.589	33	-2.3
F _{HIGH}	29.2	27.6	0.575	33	-2.4
Comments:					

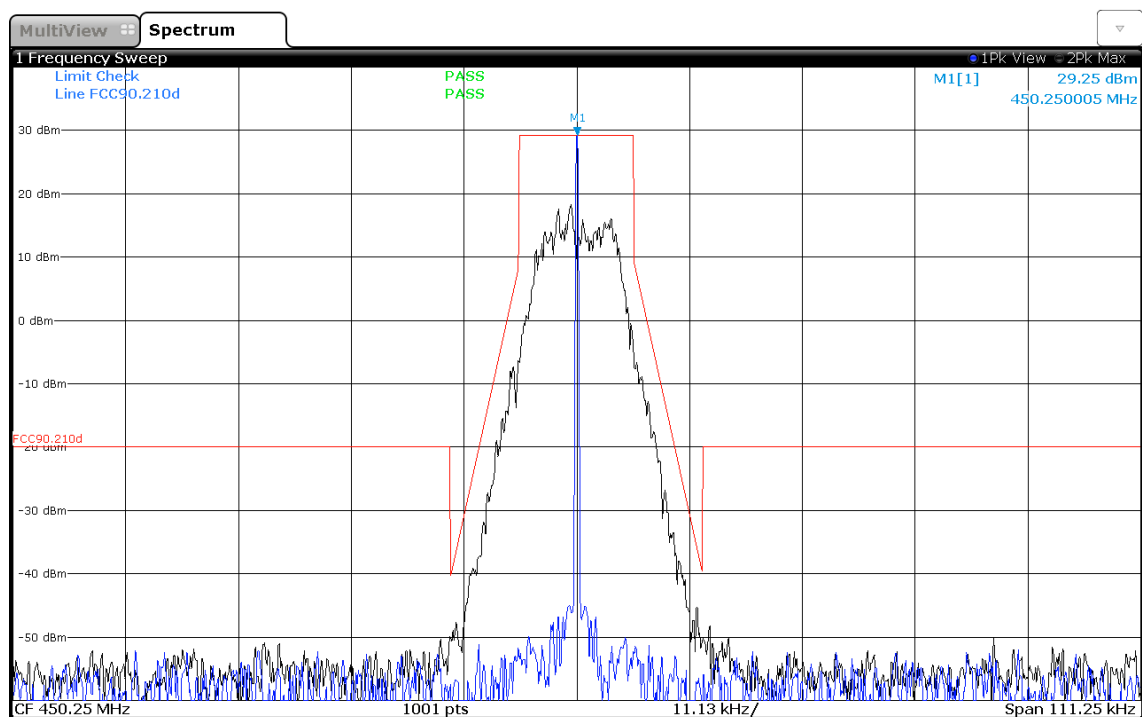
3.2 Emission Mask and authorized bandwidth

Emission mask acc. to FCC 90.209, FCC 90.210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 90.209(b), FCC 90.210 (d), FCC 2.1049	
Test according to measurement reference	Reference Method	
	FCC 90.210	
Test frequency range	Tested frequencies	
	F _{LOW} / F _{MID} / F _{HIGH}	
EUT test mode	Transmit modulated	
Limits		
Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows: (1) On any frequency from the center of the authorized bandwidth f₀ to 5.625 kHz removed from f₀: Zero dB. (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d–2.88 kHz) dB. (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.		
Test setup		
EUT Spectrum Analyzer Rubidium Reference		
Test procedure		
- EUT set to transmit mode - Center frequency set to test channel center frequency and the highest emission is determined - Resolution bandwidth is set to 100 Hz and detector to peak and max hold. - As for the authorized bandwidth the 99% power bandwidth is measured.		

Test results emission mask			
Channel	Verdict		
F _{LOW}	PASS		
F _{MID}	PASS		
F _{HIGH}	PASS		
Test results authorized bandwidth			
Channel	Authorized bandwidth [kHz]	Limit [kHz]	Verdict
F _{LOW}	9.6	11.25	PASS
F _{MID}	9.7	11.25	PASS
F _{HIGH}	9.7	11.25	PASS
Comments:			

Emission Mask

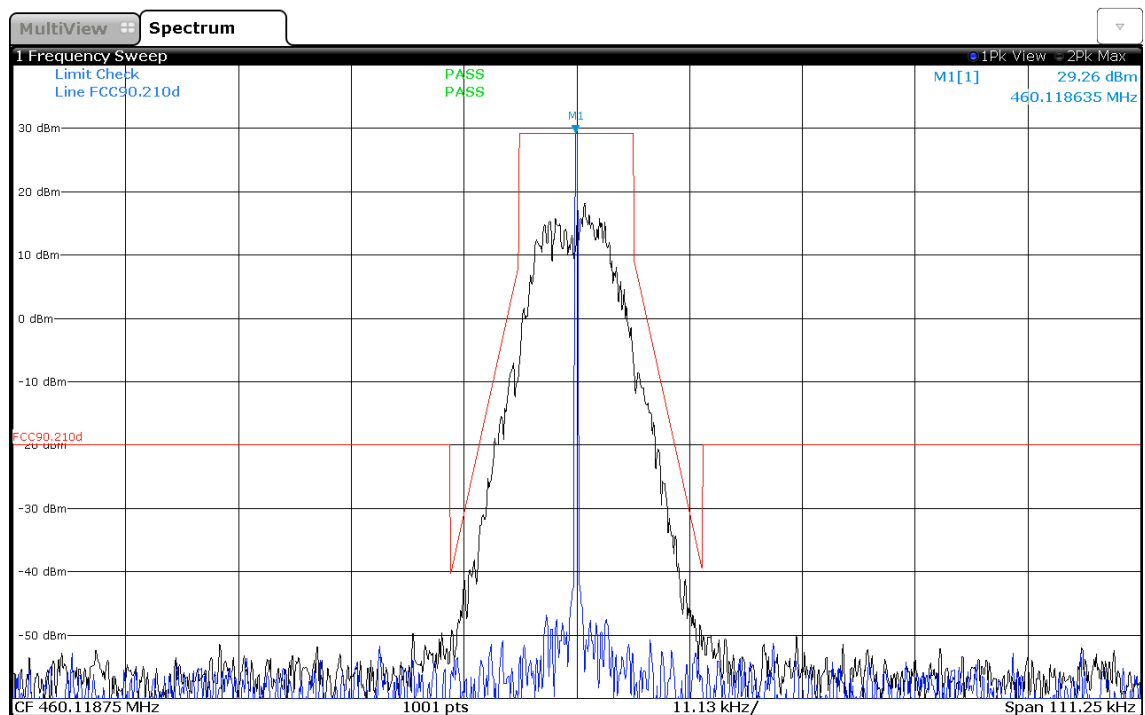
Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-22
Note 1:	Channel Low
Note 2:	Pass



16:23:36 22.08.2017

Emission Mask

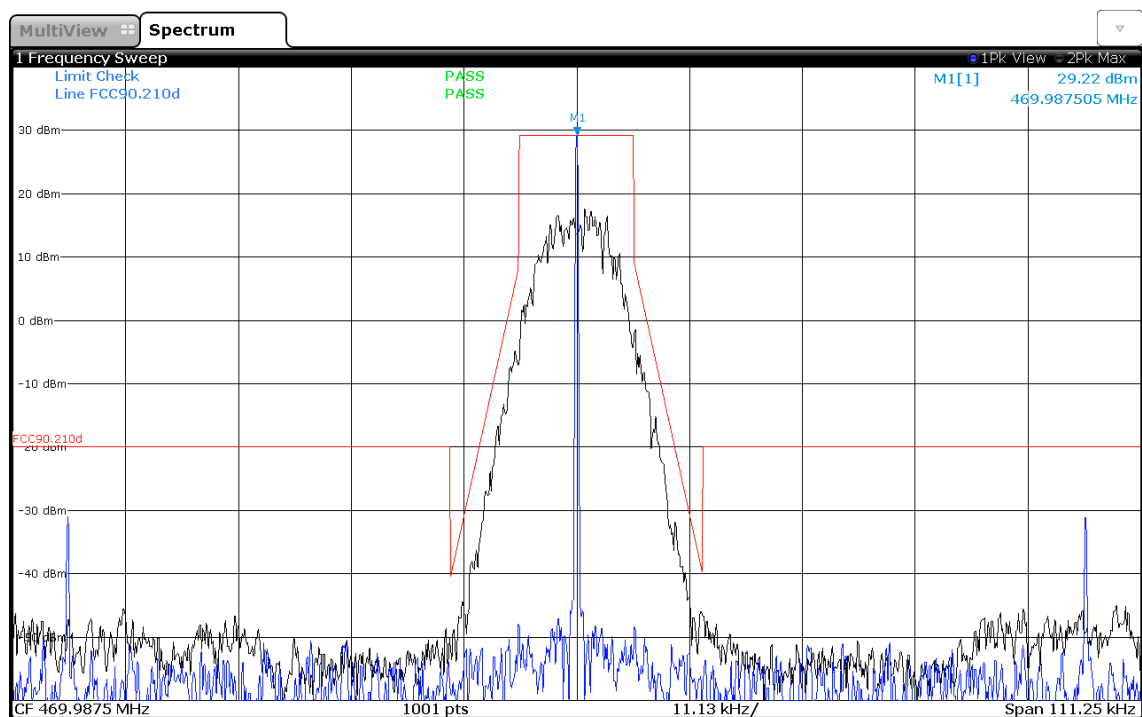
Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-22
Note 1:	Channel Mid
Note 2:	Pass



16:27:51 22.08.2017

Emission Mask

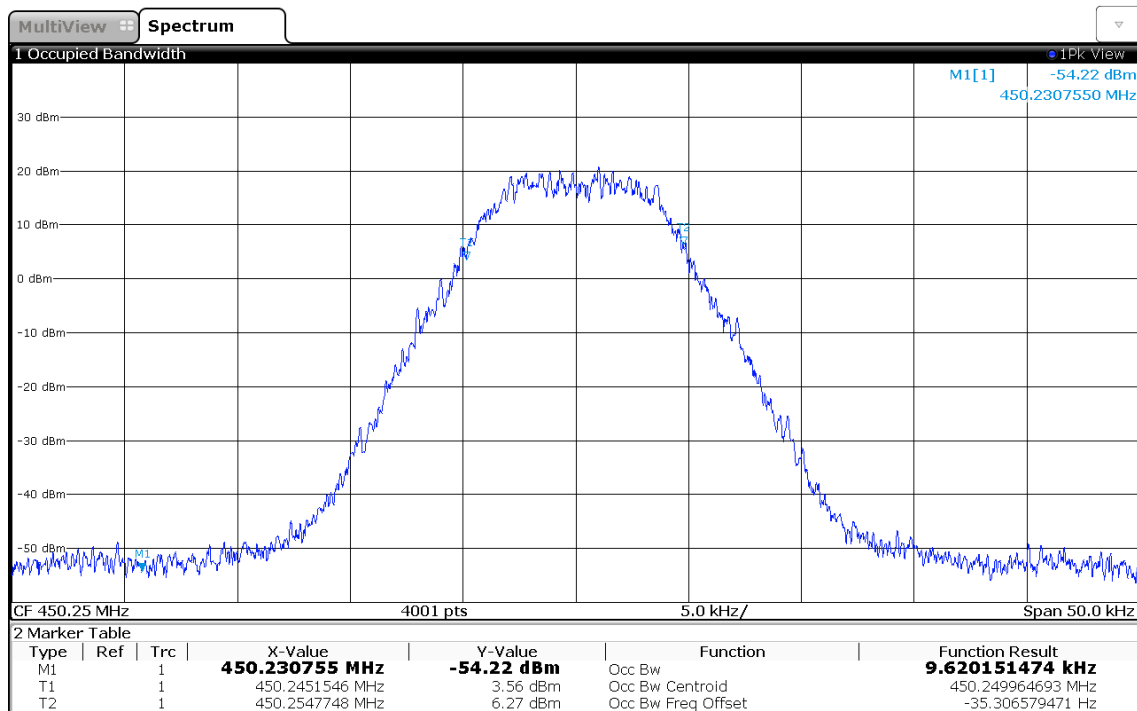
Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-22
Note 1:	Channel High
Note 2:	Pass



16:34:43 22.08.2017

Authorized Bandwidth

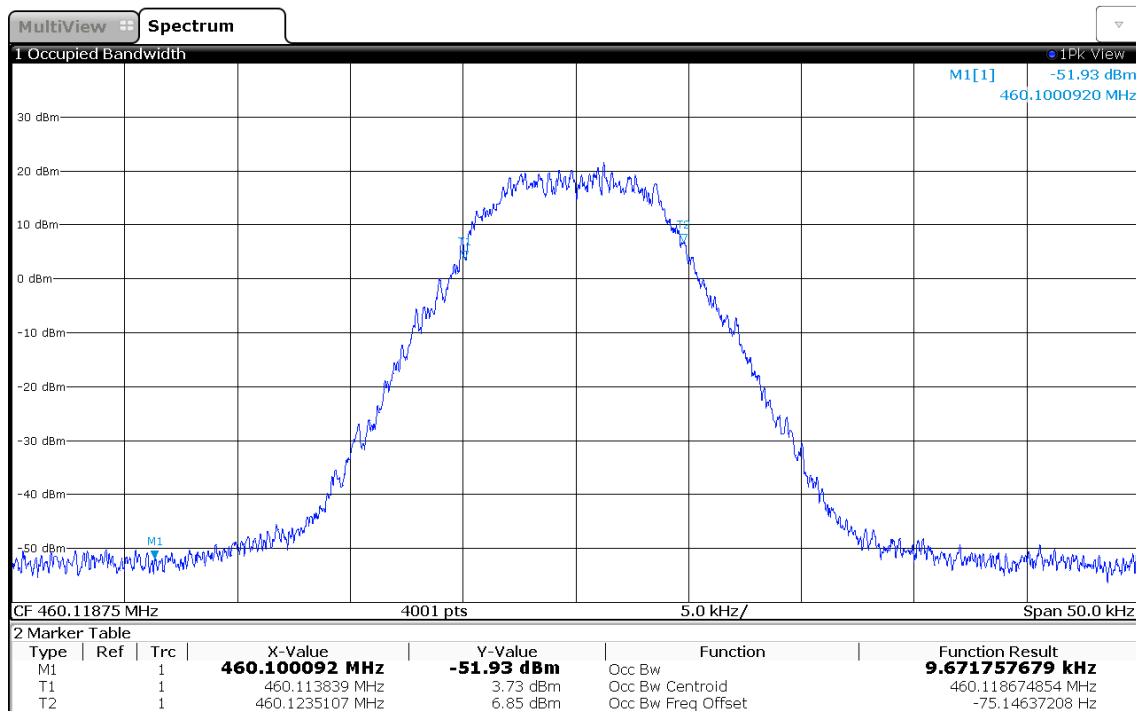
Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-22
 Note 1: Channel Low
 Note 2: Pass



16:17:40 22.08.2017

Authorized Bandwidth

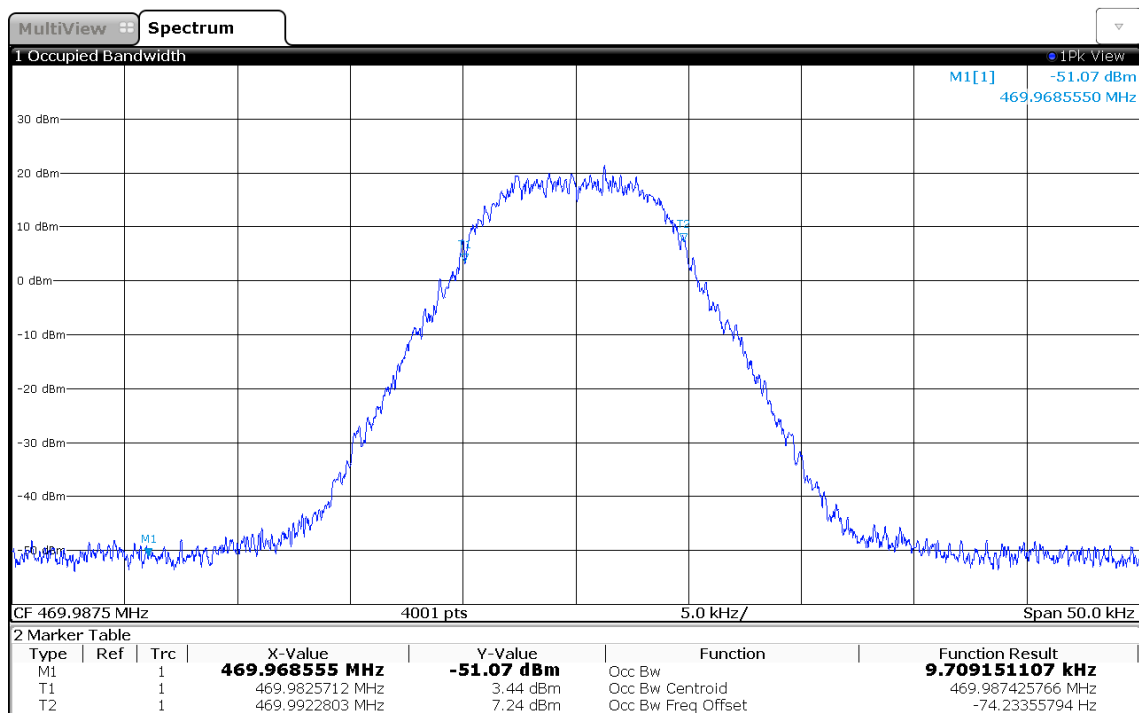
Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-22
 Note 1: Channel Mid
 Note 2: Pass



16:30:12 22.08.2017

Authorized Bandwidth

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-22
 Note 1: Channel High
 Note 2: Pass



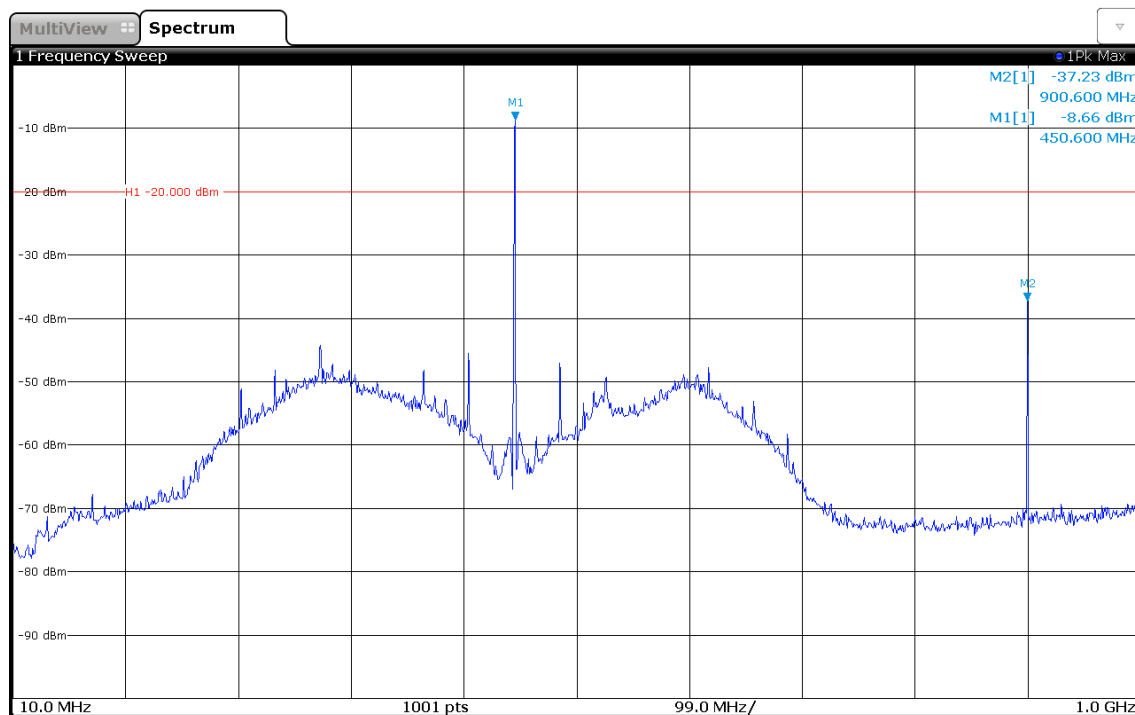
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3.3 Spurious emission at antenna terminal

Spurious emission at antenna terminal acc. to FCC 90.210		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 90.210 (d), FCC 2.1051	
Test according to measurement reference	Reference Method	
	FCC 90.210, TIA-603-D 2.2.13	
Test frequency range	Tested frequencies	
	10 MHz – 10 th Harmonic	
EUT test mode	Transmit unmodulated	
Limits		
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.		
Test setup		
EUT Spectrum Analyzer		
Test procedure		
- EUT set to transmit mode - Center frequency set to test channel center frequency - Below 1 GHz the carrier is suppressed with a notch filter. Above 1 GHz the carrier is suppressed with a high pass filter. - The detector is set to peak and max hold - Below 1 GHz the resolution bandwidth is set to 100 kHz. Above 1 GHz the resolution bandwidth is set to 1 MHz.		
Test results		
Channel	Limit [dBm]	Verdict
F _{LOW}	-20	PASS
F _{MID}	-20	PASS
F _{HIGH}	-20	PASS
Comments:		

Conducted spurious emissions

Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-24
Note 1:	Channel Low
Note 2:	Pass



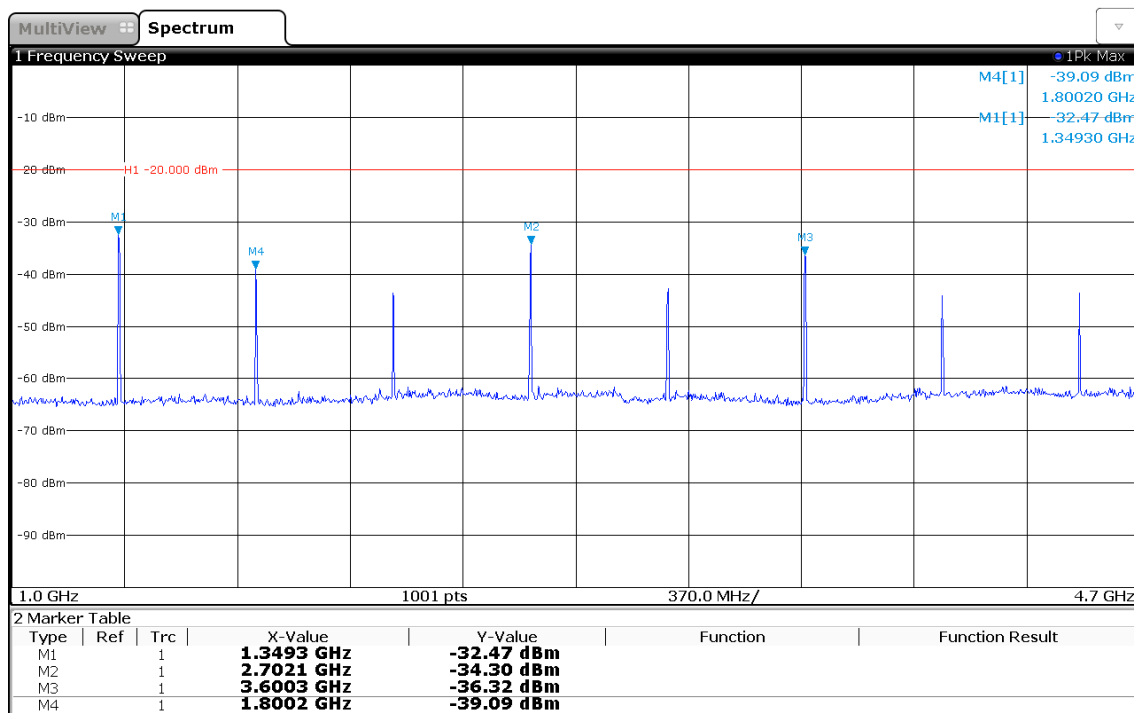
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Test Report No.: G0M-1707-6700-TFC90PMR-V01

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

Conducted spurious emissions

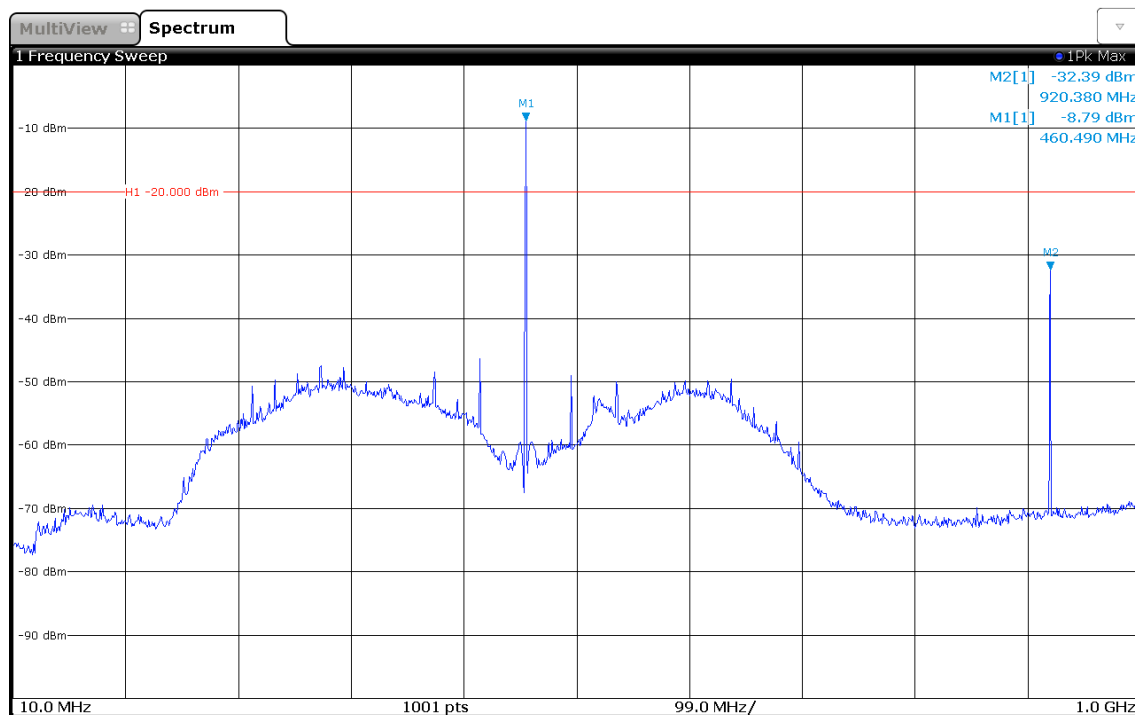
Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel Low
 Note 2: Pass



09:54:14 24.08.2017

Conducted spurious emissions

Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-24
Note 1:	Channel Mid
Note 2:	Pass



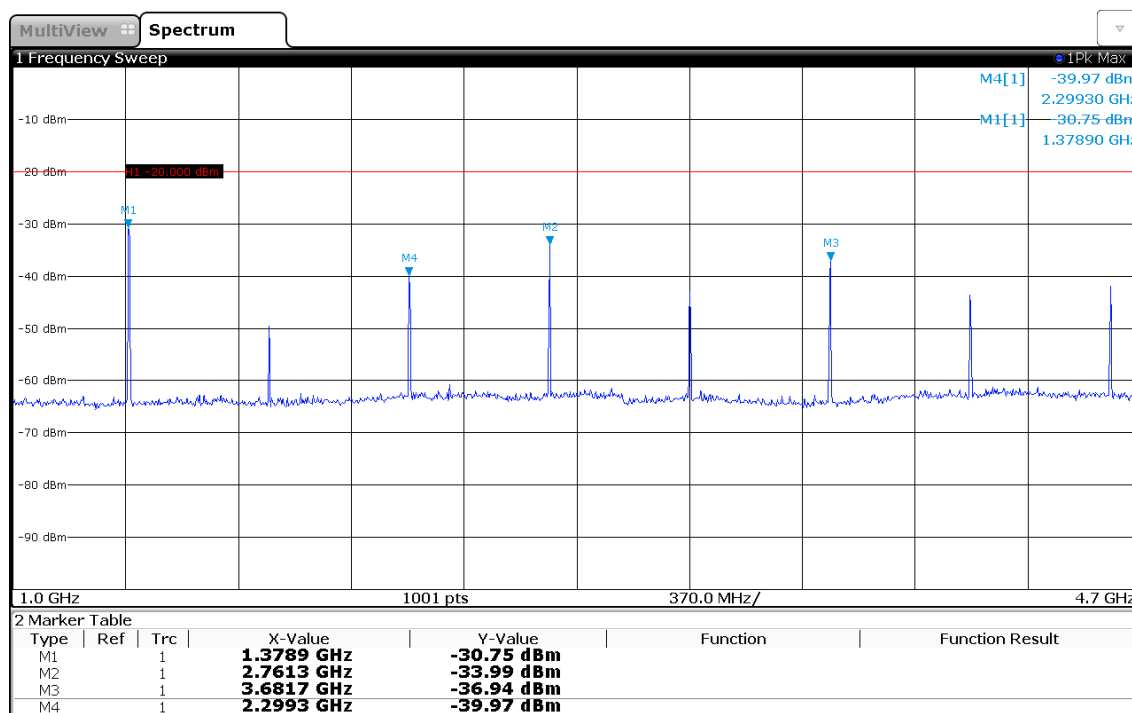
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Test Report No.: G0M-1707-6700-TFC90PMR-V01

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

Conducted spurious emissions

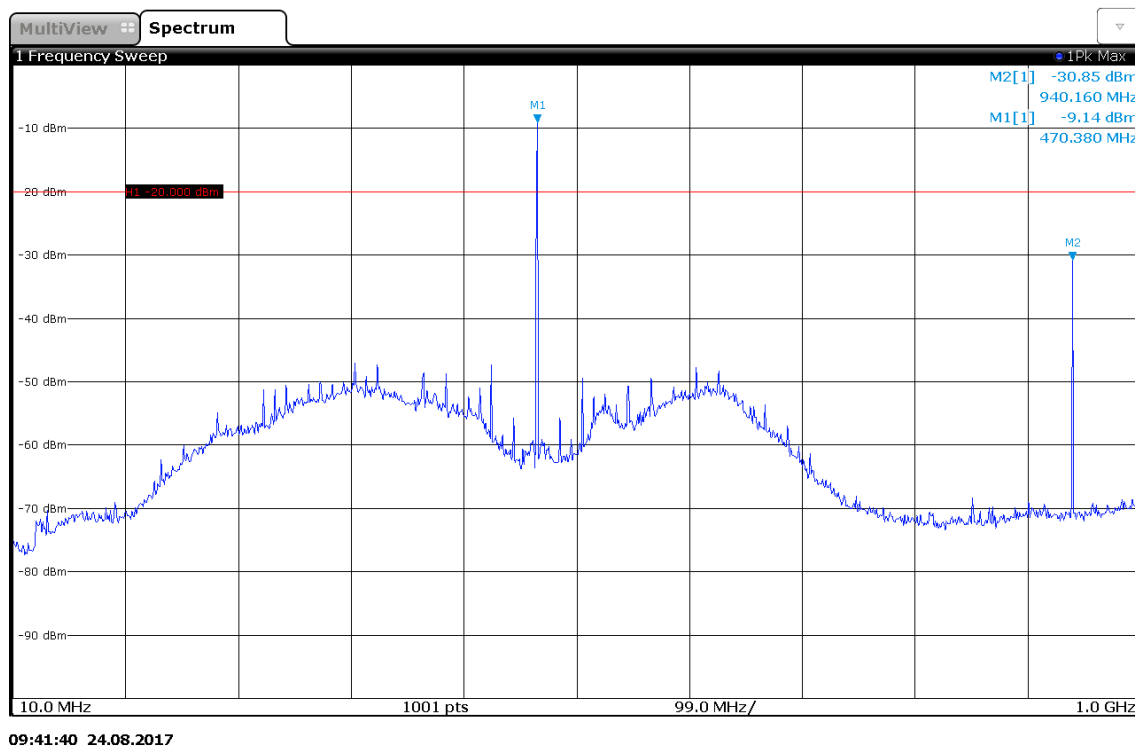
Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel Mid
 Note 2: Pass



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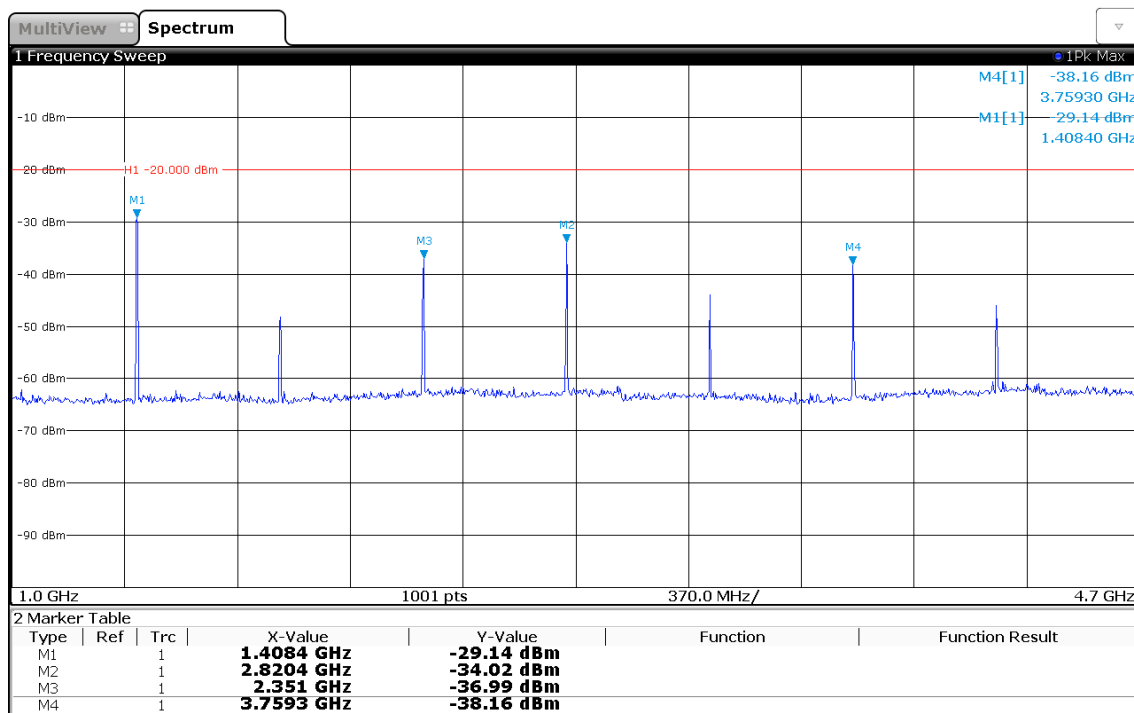
Conducted spurious emissions

Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-08-24
Note 1:	Channel High
Note 2:	Pass



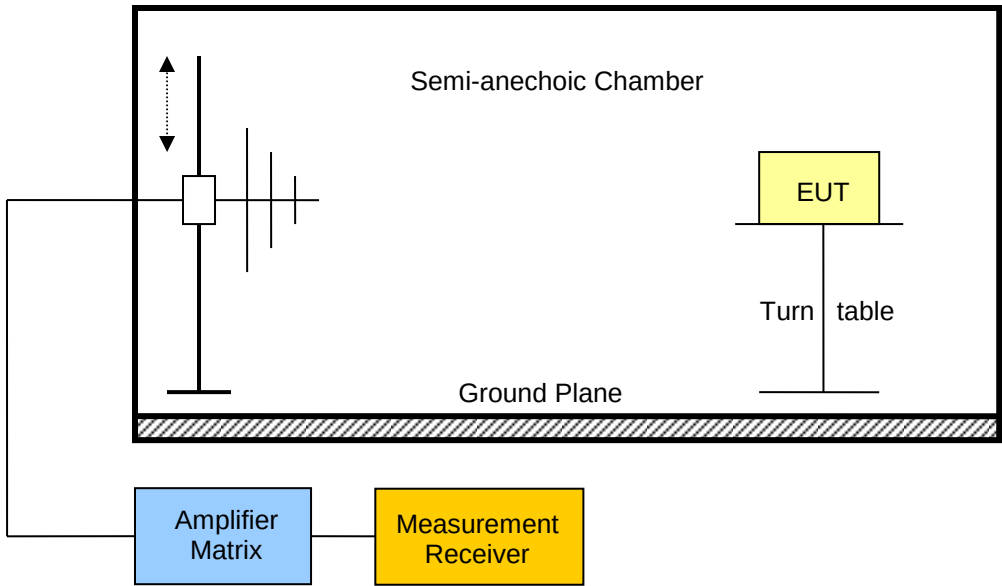
Conducted spurious emissions

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel High
 Note 2: Pass



09:47:53 24.08.2017

3.4 Spurious emissions radiated

Spurious emissions radiated acc. to FCC 90.210		Verdict: PASS
Test according referenced standards	Reference Method	
	FCC 15.210(d), FCC 2.1053	
Test according to measurement reference	Reference Method	
	FCC 90.210, TIA-603-D 2.2.12	
Test frequency range	Tested frequencies	
	30 MHz – 10 th Harmonic	
EUT test mode	Transmit unmodulated	
Limits		
On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation..		
Test setup		
		
Test procedure		
1. EUT antenna output connected to 50 Ohm load. 2. EUT set to transmit mode 3. Maximum emission level is measured by rotating the EUT and adjusting the antenna height for vertical polarization 4. The EUT is replaced by a substitution antenna and generator 5. The power level is set to obtain the same power reading 6. Measurement is repeated for horizontal polarization		

Test results FlowIQ 2250					
Channel	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
F _{LOW}	1348	-36.50	hor	-20.00	-16.52
F _{MID}	1378	-38.10	hor	-20.00	-18.07
F _{HIGH}	1408	-38.30	hor	-20.00	-18.28
Comments:					

Test results FlowIQ 3250					
Channel	Emission [MHz]	Level [dbm]	Pol.	Limit [dBm]	Margin [dB]
Flow	1348	-36.60	hor	-20.00	-16.65
Flow	1348	-39.90	ver	-20.00	-19.94
Fmid	1380	-35.90	hor	-20.00	-15.94
Fmid	1380	-38.90	ver	-20.00	-18.94
Fhigh	1410	-37.20	hor	-20.00	-17.17

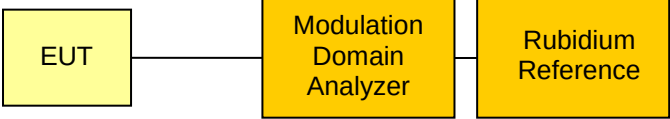
3.5 Frequency Stability

Frequency stability acc. to FCC 90.213		Verdict: PASS
EUT requirement rule parts and clause	Reference	
	FCC 90.213, FCC 2.1055	
Test according to measurement reference	Reference Method	
	TIA-603-D 2.2.2	
Test frequency range	Tested frequencies	
	F _{MID}	
EUT test mode	Transmit unmodulated	
Limits		
In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.		
In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.		
Test setup		
EUT Spectrum Analyzer Rubidium Reference		
Test procedure		
- The EUT is placed in a climatic chamber - EUT set to transmit mode - The frequency counter function of the spectrum analyzer is used - The frequency stability measurements are repeatead within temperature and voltage range		

Test results				
Voltage	Temperature	Frequency Error [ppm]	Limit [ppm]	Verdict
3.0 VDC	20°C	-0.18	± 2.5	PASS
3.6 VDC	20°C	-0.22	± 2.5	PASS
3.6 VDC	-30°C	0.00	± 2.5	PASS
3.6 VDC	-20°C	0.12	± 2.5	PASS
3.6 VDC	-10°C	0.18	± 2.5	PASS
3.6 VDC	0°C	0.05	± 2.5	PASS
3.6 VDC	10°C	0.01	± 2.5	PASS
3.6 VDC	20°C	0.02	± 2.5	PASS
3.6 VDC	30°C	-0.17	± 2.5	PASS
3.6 VDC	40°C	-0.22	± 2.5	PASS
3.6 VDC	50°C	-0.24	± 2.5	PASS
3.6 VDC	60°C	-0.10	± 2.5	PASS
3.6 VDC	65°C	-0.12	± 2.5	PASS

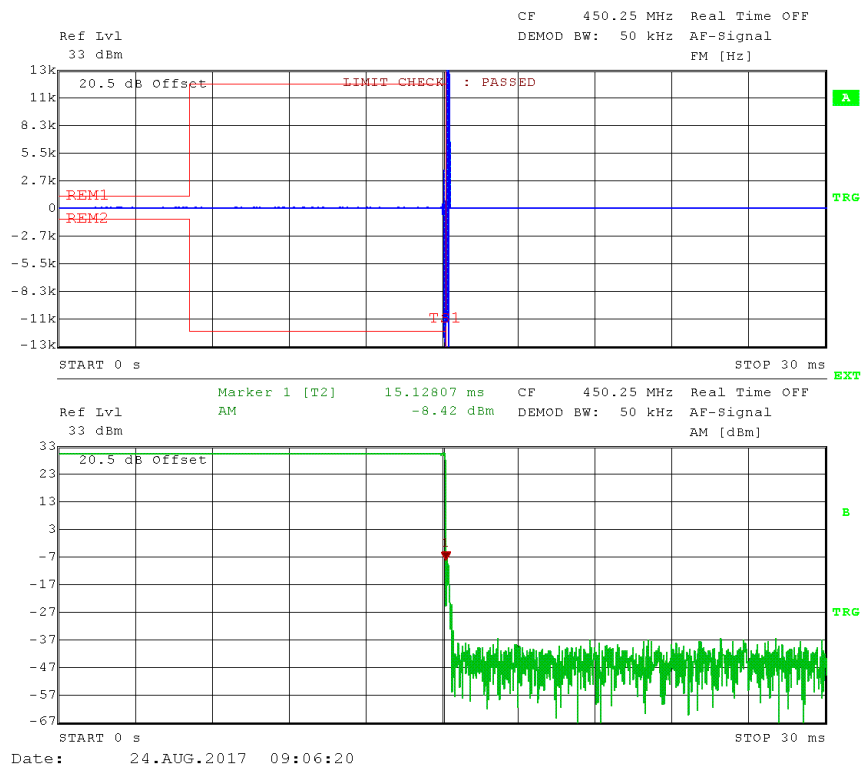
3.6 Transient Frequency Behavior

Frequency stability acc. to FCC 90.214			Verdict: PASS
EUT requirement rule parts and clause	Reference		
	FCC 90.214		
Test according to measurement reference	Reference Method		
	TIA-603-D 2.2.19.2		
Test frequency range	Tested frequencies		
	F _{LOW} , F _{MID} , F _{HIGH}		
EUT test mode	Transmit unmodulated		
Limits			
Time intervals ^{1, 2}	Maximum frequency difference ³	All equipment ⁴	
		150 to 174 MHz ⁵	421 to 512 MHz ⁵
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels ⁵			
t ₁ ⁴	±25.0 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
t ₂ ⁵	±12.5 kHz ⁵	20.0 ms ⁵	25.0 ms ⁵
t ₃ ⁴	±25.0 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels ⁵			
t ₁ ⁴	±12.5 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
t ₂ ⁵	±6.25 kHz ⁵	20.0 ms ⁵	25.0 ms ⁵
t ₃ ⁴	±12.5 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels ⁵			
t ₁ ⁴	±6.25 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
t ₂ ⁵	±3.125 kHz ⁵	20.0 ms ⁵	25.0 ms ⁵
t ₃ ⁴	±6.25 kHz ⁵	5.0 ms ⁵	10.0 ms ⁵
¹ t _{on} is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing. [¶]			
² t ₁ is the time period immediately following t _{on} . [¶]			
³ t ₂ is the time period immediately following t ₁ . [¶]			
⁴ t ₃ is the time period from the instant when the transmitter is turned off until t _{off} . [¶]			
⁵ t _{off} is the instant when the 1 kHz test signal starts to rise. [¶]			
⁶ During the time from the end of t ₂ to the beginning of t ₃ , the frequency difference must not exceed the limits specified in §90.213. [¶]			
⁷ Difference between the actual transmitter frequency and the assigned transmitter frequency. [¶]			
⁸ 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. [¶]			

Test setup		
		
Test procedure		
- EUT set to transmit mode - Center frequency set to test channel center frequency - The transient behavior is captured during switching the transmitter on and off		
Test results		
Channel	State	Verdict
F_{LOW}	Tx off	PASS
F_{MID}	Tx off	PASS
F_{HIGH}	Tx off	PASS
F_{LOW}	Tx on	PASS
F_{MID}	Tx on	PASS
F_{HIGH}	Tx on	PASS
Comments:		

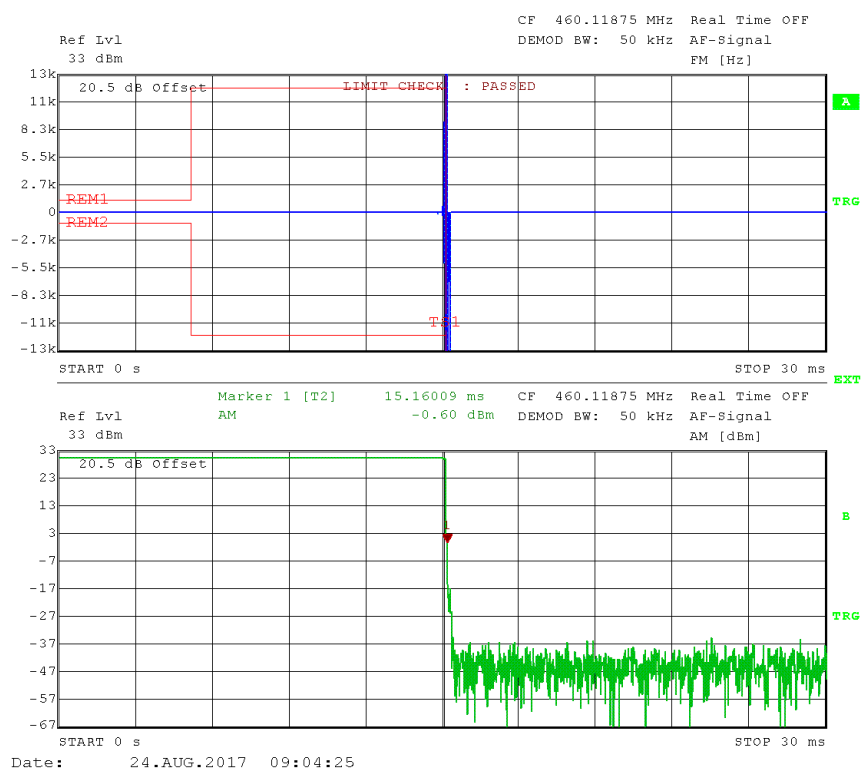
Transient stability Tx off

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel Low
 Note 2: Pass



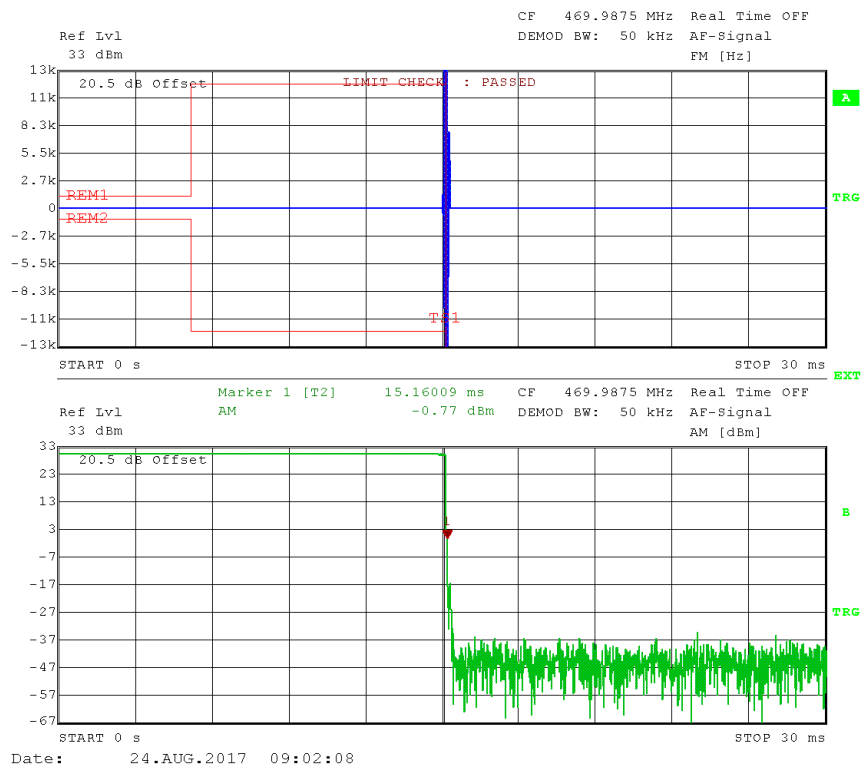
Transient stability Tx off

Project Number:	G0M-1707-6700
Applicant	Kamstrup A/S
Model Description	Ultrasonic water meter
Model:	FlowIQ 2250
Test Sample ID:	14778
Operator:	T. Jahn
Test Site:	Euromins Product Service GmbH
Test Date:	2017-08-24
Note 1:	Channel Mid
Note 2:	Pass



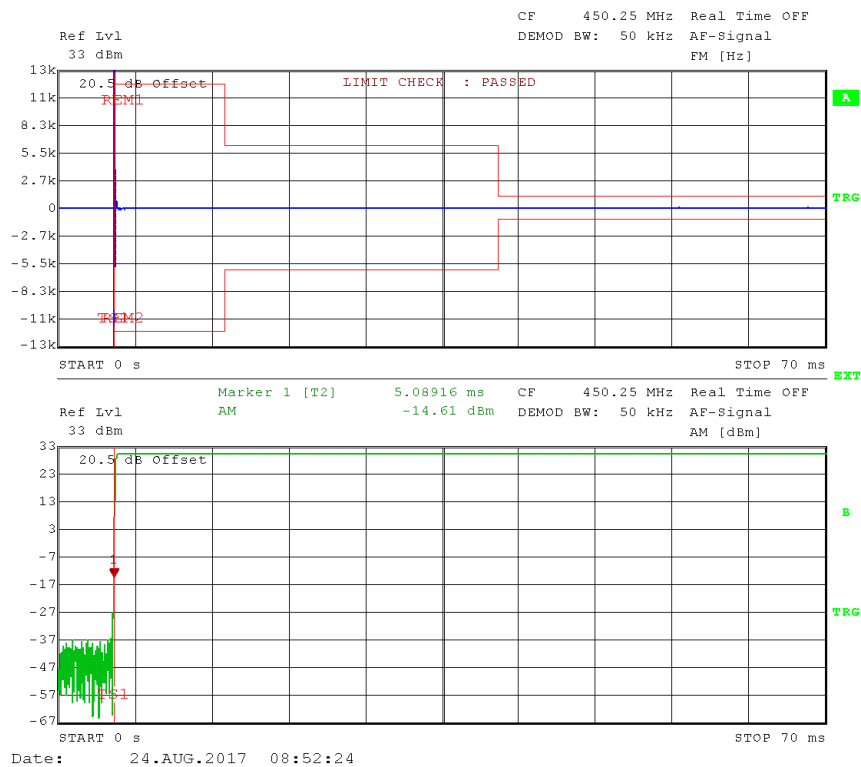
Transient stability Tx off

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel High
 Note 2: Pass



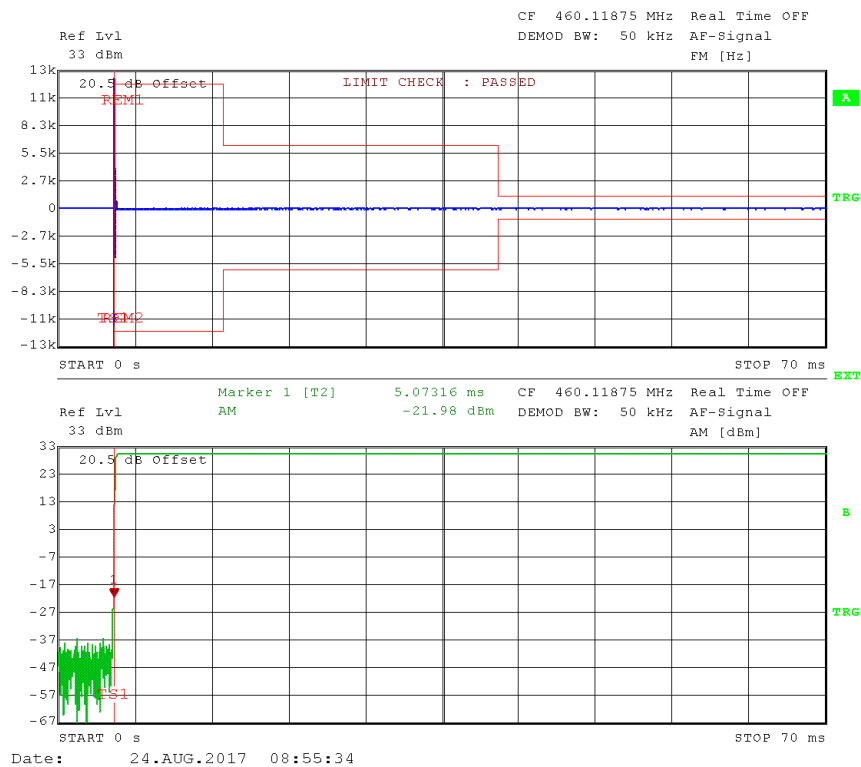
Transient stability Tx on

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel Low
 Note 2: Pass



Transient stability Tx on

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel Mid
 Note 2: Pass



Transient stability Tx on

Project Number: G0M-1707-6700
 Applicant: Kamstrup A/S
 Model Description: Ultrasonic water meter
 Model: FlowIQ 2250
 Test Sample ID: 14778
 Operator: T. Jahn
 Test Site: Eurofins Product Service GmbH
 Test Date: 2017-08-24
 Note 1: Channel High
 Note 2: Pass

