

Test report No:
79807REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B
(10-1-23 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Ultrasonic Water Meter
(*) Trademark	flowIQ® 2200 Cellular
(*) Model and /or type reference	KWM2220
Other identification of the product	FCC ID: OUY-2023NB82 IC: 22376-2023NB82
(*) Features	LTE Cat NB2 and SRD in ISM band. HW version: 55502095-A4 (Top PCB); 55502080-D5 (Bottom PCB) SW version: 50981795 (Top PCB)
Manufacturer	Kamstrup A/S Industrivej 28 8660, Skanderborg, DENMARK
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez EMC Consumer & RF Lab. Manager
Date of issue	2024-10-25
Report template No	FDT08_25 (*) "Data provided by the client"



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Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
MP	Measurement Point
OM	Operation Mode
S/	Sample
V	Verdict

Competences and guarantees

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The results presented in this Test Report apply only to the particular item under test established in this document.

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Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,9$ dB for quasi-peak measurements, $I = \pm 4,6$ dB for peak measurements (k= 2).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $I = \pm 2,6$ dB for peak and average measurements (k = 2).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of an Ultrasonic Water Meter. The KWM2220 is based on 2 PCB boards and an Antenna.
 - Top PCB, where the MCU of the Meter calculator, the MCU of the communication and the NB-IoT modem and a short range device (SRD) radio are presented.
 - Bottom PCB, used for water flow measurement via Piezo electric device controlled with an ASIC.
 - The Antennas can be used is either a click-on antenna or a wall antenna or a Pit antenna.

The KWM2220 contains a NB-IoT module with the FCC ID: XMR2021BC660KGL. The NB-IoT module is controlled by the RF micro controller. The KWM2220 forwards data directly to Meter Data Management system (MDM) READY Manager over the NB-IoT network with a subscription handled by Kamstrup. The main configuration of the KWM2220 is 1 daily data transmission.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	74986C_1.1	Ultrasonic Water Meter	KWM2220	02K82D18B8UB	2023-08-31	Element Under Test
S/01	79807_1.1	Pit antenna	6699664	2406210072	2024-07-30	Element Under Test

Notes referenced to samples during the project:

Id	Note
S/01	Sample used for testing

Test sample description

Ports..... :	Port name and description		Cable				
			Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	Antenna port		7.5	[X]	[X]	[]	
.....			[]	[]	[]		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency			Reference poles			
				L1	L2	L3	N
	[]	AC:	[]	[]	[]	[]	[]
[X]		DC: 3.6V from D-cell Battery					
Rated Power							
Clock frequencies..... :							
Other parameters							
Software version	50981795						
Hardware version	55502095-A4 (Top PCB); 55502080-D5 (Bottom PCB)						
Dimensions in cm (W x H x D)							
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[X]	Other: in the water pipe-Line in house or in the a pit.					
Modules/parts..... :	Module/parts of test item			Type		Manufacturer	
	KWM2220			02K82D18B8UB		Kamstrup	
	KWM2220			02K82D18B8CA		Kamstrup	
							
Accessories (not part of the test item)	Description			Type		Manufacturer	
	USB optical eye			6699099		Kamstrup	
							
Documents as provided by the applicant..... :	Description			File name		Issue date	
	Instruction to how set the test item into diff. testmodes			KWM_NB-C2 Instruction Manual		10-07-2023	
							

⁽³⁾ Only for Medical Equipment

Identification of the client

Kamstrup A/S
Industrivej 28
8660, Skanderborg, DENMARK

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-09-18
Date (finish)	2024-09-23

Document history

Report number	Date	Description
79807REM.001	2024-10-25	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Antonio Ruiz Sánchez and Ivan Guerrero González.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P
Partial Passed	P*

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
06064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	FRANKONIA	N/A
06329	SHIELDED ROOM	--	FRANKONIA	N/A
06132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-09
06126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-04
08866	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-06-12
03541	HYBRID BILOG ANTENNA 30MHz-6GHz	JB6	SUNOL SCIENCES CORPORATION	2024-11-15
06496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-12-01
09360	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2025-08-05
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Summary

Test Specification	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	P	(1)
	CE Continuous conducted emission	N/A	(2)
<u>Supplementary information and remarks:</u> (1) Test required only to the 5th harmonics of the maximum internal work frequency in the EUT. (2) According to the standards, this test is not applicable because EUT is powered by battery.			

Appendix A: Test results

Appendix A content

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Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself.
The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM/01	EUT ON. Cellular searching networks. SRD in reception mode. Power supply: 3.6Vdc (D-cell battery)

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.

Test Cases Details

RE Radiated emission. Electromagnetic field measure

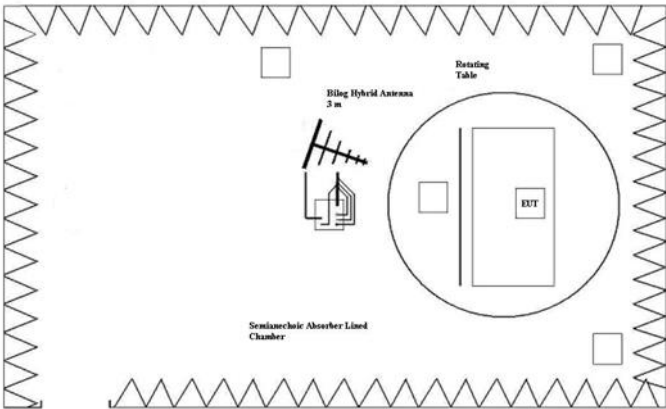
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-23 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

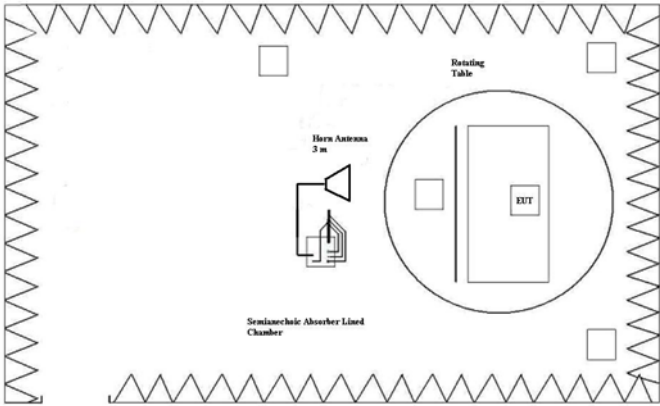
Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(µV/m)	(dBµV/m)	(µV/m)	(dBµV/m)	(dBµV/m)	(dBµV/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47		
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

Limits according to FCC Part 15B, are equal or more stringent than those of ICES-003 Issue 7.

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

S/	OM	Code	Freq Rng (MHz)	V
01	OM/01	RE0101LR	[30, 1000]	P
01	OM/01	RE0101HR1	[1000, 12750]	P

Verdict

Pass

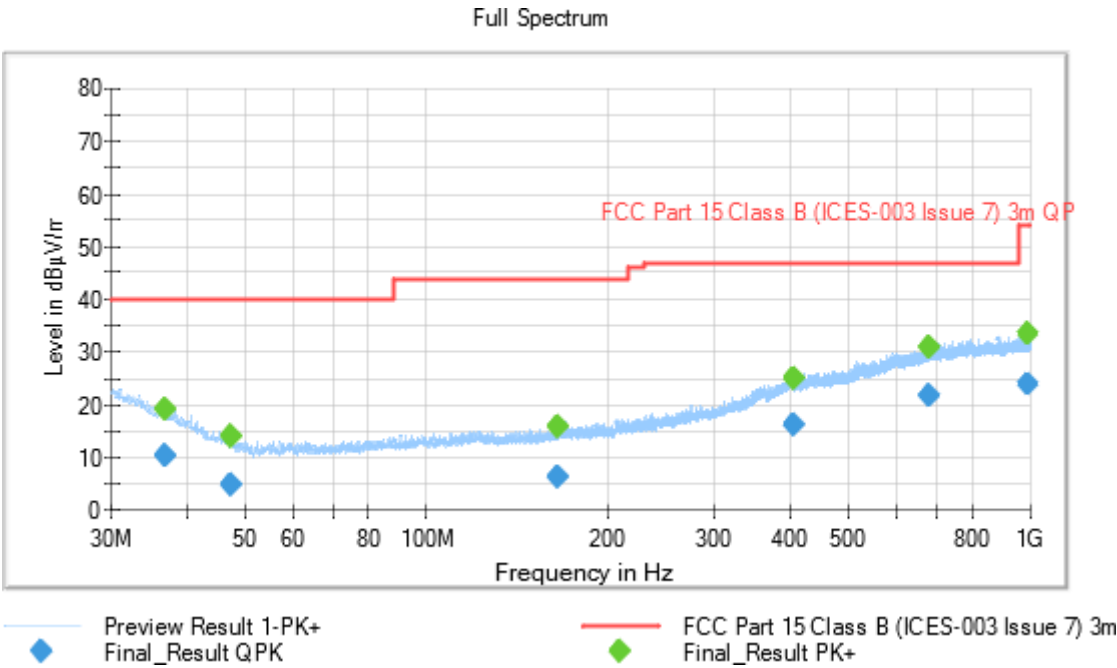
Attachments

EMC Test Code = RE0101LR Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: OM/01

Images:



Tables:

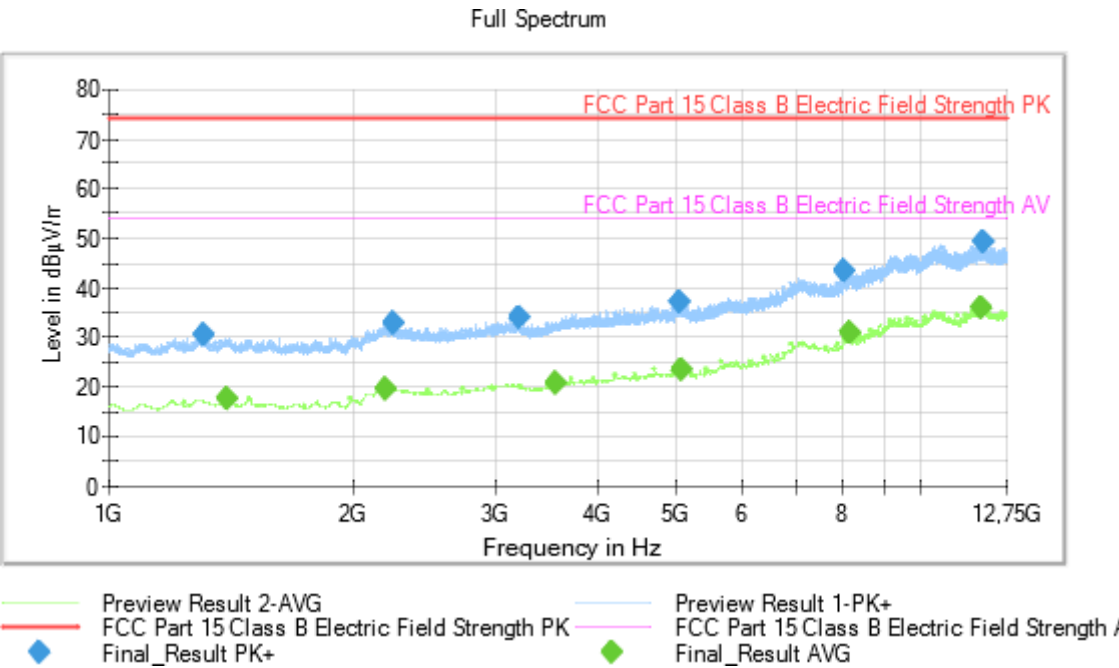
Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
36.880000	10.16	---	40.00	29.84	359.0	H	-143.0
36.880000	---	19.02	---	---	359.0	H	-143.0
47.327000	---	13.98	---	---	222.0	V	7.0
47.327000	4.60	---	40.00	35.40	222.0	V	7.0
164.595000	---	15.68	---	---	125.0	V	-73.0
164.595000	6.20	---	43.52	37.32	125.0	V	-73.0
407.471000	---	25.07	---	---	382.0	H	111.0
407.471000	16.08	---	47.00	30.92	382.0	H	111.0
681.809000	---	30.78	---	---	243.0	V	125.0
681.809000	21.58	---	47.00	25.42	243.0	V	125.0
992.283000	23.94	---	53.97	30.03	157.0	V	4.0
992.283000	---	33.36	---	---	157.0	V	4.0

EMC Test Code = RE0101HR1 Frequency Range MHz = [1000, 12750]

Sample ID: S/01

Operation Mode: OM/01

Images:



Tables:

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol
1310.500000	30.46	---	73.97	43.51	H
1398.500000	---	17.45	53.97	36.52	V
2187.250000	---	19.59	53.97	34.38	V
2242.000000	32.97	---	73.97	41.00	V
3197.750000	33.79	---	73.97	40.18	H
3559.250000	---	20.52	53.97	33.45	H
5050.000000	37.03	---	73.97	36.94	H
5061.750000	---	23.56	53.97	30.41	V
8055.500000	43.48	---	73.97	30.49	V
8156.250000	---	30.65	53.97	23.32	V
11900.000000	---	36.00	53.97	17.97	H
11957.000000	49.18	---	73.97	24.79	H