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C.I.F. A29507456

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
74986RRF.006

Partial Test Report

USA FCC Part 27
CANADA IC RSS-130, RSS-139

(*) Identification of item tested	Ultrasonic Water Meter
(*) Trademark	flowIQ®3200
(*) Model and /or type reference	KWM3220
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); 55502094-A7 (Bottom PCB) SW version: 50981795 (Top PCB);
Applicant	Kamstrup A/S Industrivej 28 8660 Skanderborg, Denmark
Test method requested, standard	USA FCC Part 27 (10-1-21 Edition). CANADA RSS-130 Issue 2, Feb. 2019. CANADA RSS-139 Issue 4, Sep. 2022. ANSI C63.26: 2015. KDB 971168 D01 Power Meas License Digital Systems v03r01, April 2018.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2024-03-25
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación) to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U.is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

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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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General conditions

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Uncertainty

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

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 KWM3220 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 Antenna is a click-on antenna or a wall antenna. The KWM3220 contains a NB-IoT module with the FCC ID: XMR2021BC660KGL. The NB-IoT module is controlled by the RF micro controller. The KWM3220 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 KWM3220 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.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	74986C_4.1	Water Meter	flowIQ®3200	02L82D18F8CA	2023-08-31	Element Under Test
	74986C_5.1	Click On Antenna Kit	6699663	--	2023-08-31	Element Under Test
	70058_6.1	Optical Readout USB	6699-099	--	2023-08-31	Auxiliary Element
S/02	74986C_4.1	Water Meter	flowIQ®3200	02L82D18F8CA	2023-08-31	Element Under Test
	74986C_8.1	Wall antenna	6699666	--	2023-08-31	Element Under Test
	70058_6.1	Optical Readout USB	6699-099	--	2023-08-31	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated test with Click On antenna
S/02	Sample used for radiated test with Wall antenna

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	PE
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: 3.6 Volt D celle Battery					
Rated Power .....:	.....						
Clock frequencies.....:	.....						
Other parameters .....:	.....						
Software version .....:	.....						
Hardware version .....:	.....						
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			
	KWM3220		02L82D18F8UB	Kamstrup			
	KWM3220		02L82D18F8CA	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)	2024-03-19
Date (finish)	2024-03-21

Document history

Report number	Date	Description
74986RRF.006	2024-03-21	First release.

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Álvaro Gutiérrez Naranjo

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6791	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
6792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06609	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2024-04-25
06615	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2024-04-25
6143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
6496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2026-12-01
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2025-03-15
4716	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2024-08-12
6157	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2025-01-18
9227	WIDEBAND RADIO COMMUNICATION TESTER	CMW500	ROHDE AND SCHWARZ	2024-07-17
5880	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
7758	DIGITAL MULTIMETER	175	FLUKE	2024-11-08
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

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

Summary

FCC PART 27 / RSS-130, RSS-139		
Requirement – Test case	**Verdict**	**Remark**
FCC 27.50 / RSS-130 4.6, RSS-139 6.5: RF Output Power	N/M	(1)
FCC 2.1047 / RSS-130 4.2, RSS-139 6.2: Modulation Characteristics	N/M	(1)
FCC 27.54 / RSS-130 4.5, RSS-139 6.4: Frequency Stability	N/M	(1)
FCC 2.1049 / RSS-130 4.5, RSS-139 6.4: Occupied Bandwidth	N/M	(1)
FCC 27.53 / RSS-130 4.7, RSS-139 6.6: Spurious Emissions at Antenna Terminals	N/M	(1)
FCC 27.53 / RSS-130 4.7, RSS-139 6.6: Radiated Emissions	P	--
Supplementary information and remarks: (1) Test not requested.		

Appendix A: Test results for FCC Part 27 / RSS-130, RSS-139

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Radiated Emissions 13

TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

Vnominal:	3.6 Vdc
Type of Power Supply:	Battery

ANTENNA GAIN (*):

Bands	Gain (dBi)	Type
NB-IoT Band 4	+0.0	Click On Antenna
	+4.8	Wall Antenna

TEST FREQUENCIES:

NB-IoT Band 4. π/2-BPSK modulation:

	Channel Number (Frequency. MHz)
	Tone Channel BW = 15 kHz
Middle	131973 (1710.10)

The worst case has been determined as channel 131973 (1710.10MHz), Pi/2-BPSK modulation, Tone Number=1, Tone Channel Bandwidth=15 kHz, TBS=0 and Tone Offset=11. The following tables and plots show the results for this worst-case configuration.

Radiated Emissions

SPECIFICATION:

FCC §2.1053 & §27.53 (h) / RSS-139 Issue 4 Clause 6.6.

FCC §27.53 (h):

> (h) Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

RSS-139 Clause 5.6:
Unwanted emissions shall be measured in terms of average values.

For all equipment, the TRP or total conducted power (sum of conducted power across all antena connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 6.

Table 6: Unwanted emission limits

Offset from the edge of the frequency block or frequency block group	Unwanted emission limits
≤1 MHz	-13 dBm/(1% of OB*)
>1 MHz	-13 dBm/MHz

*OB is the occupied bandwidth.

MEASUREMENT LIMIT:

> At Po transmitting power, the specified minimum attenuation becomes 43+10 log (Po), and the level in dBm relative Po becomes:
>
> Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = -13 dBm

METHOD:

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna for measurements from 30 MHz up to 18 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

The maximum field strength (dBµV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

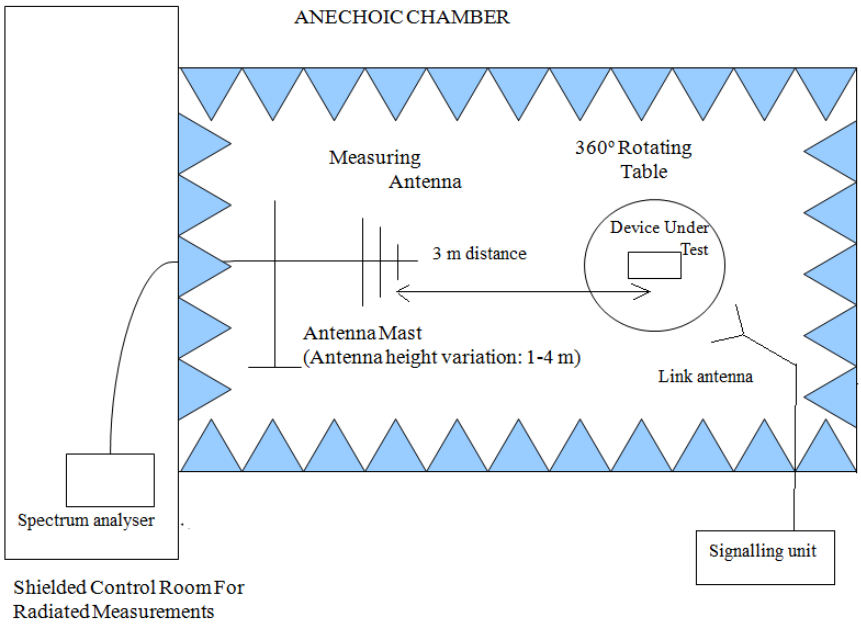
$$EIRP\ (dBm) = E(dB\mu V/m) + 20 \log (D) – 104.8$$

Where D is the measurement distance (in the far field region) in m. D = 3 m.

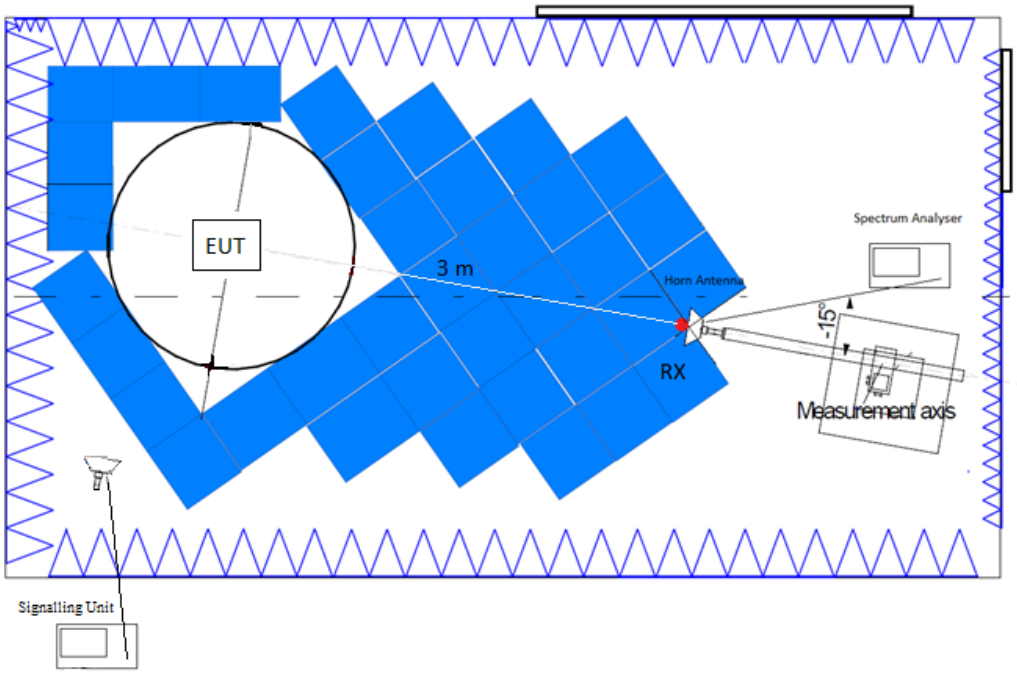
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 18 GHz.



RESULTS:

NB-IoT Band 4. Click On Antenna (S/01)

- Low Channel:

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 18 GHz:

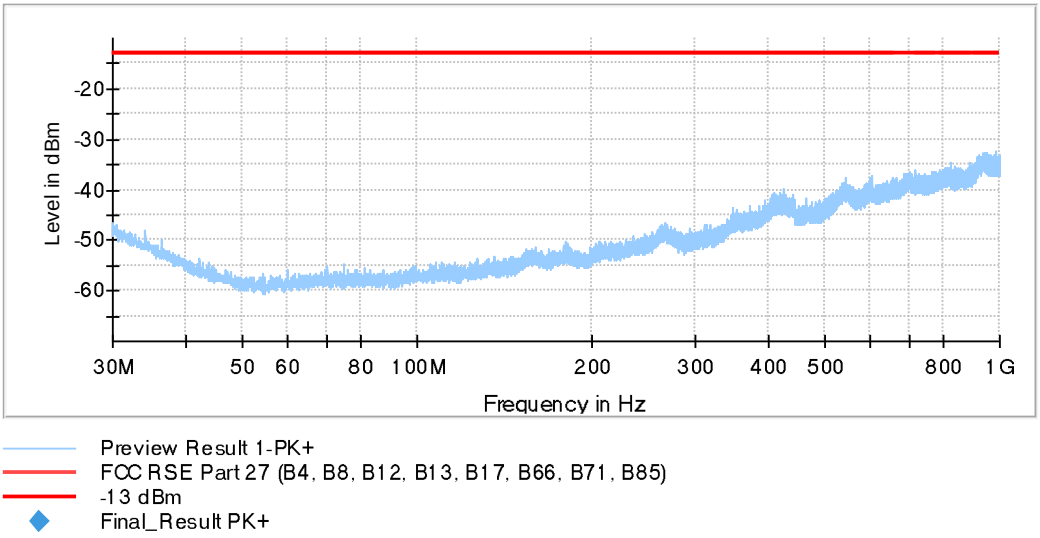
Spurious frequencies at less than 20 dB below the limit:

Measurement Uncertainty (dB): <± 4.90 for f ≥ 30 MHz up to 1 GHz
<± 4.11 for f ≥ 1 GHz up to 3 GHz
<± 4.32 for f ≥ 3 GHz up to 18 GHz

Verdict: PASS

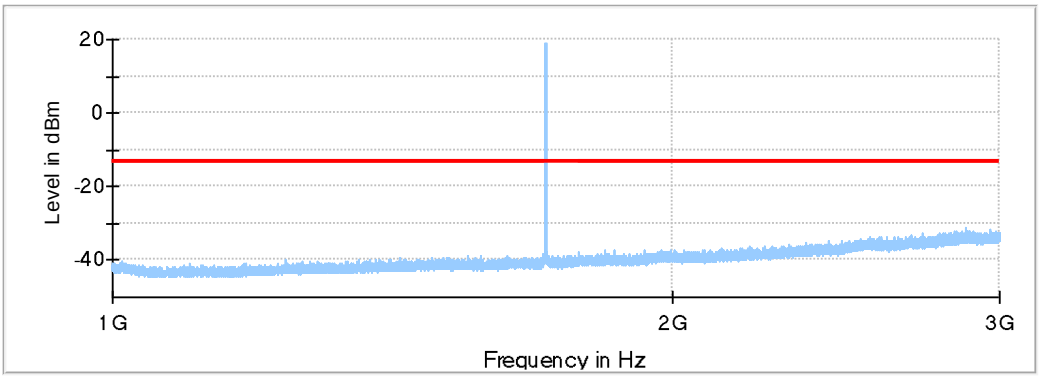
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [FSW 50]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 17 GHz	400 kHz	PK+	1 MHz	1 s	0 dB
Receiver: [FSV 40]					
17 GHz - 18 GHz	400 kHz	PK+	1 MHz	1 s	0 dB

FREQUENCY RANGE 30 MHz - 1 GHz:



Preview Result 1-PK+
FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
-13 dBm
Final_Result PK+

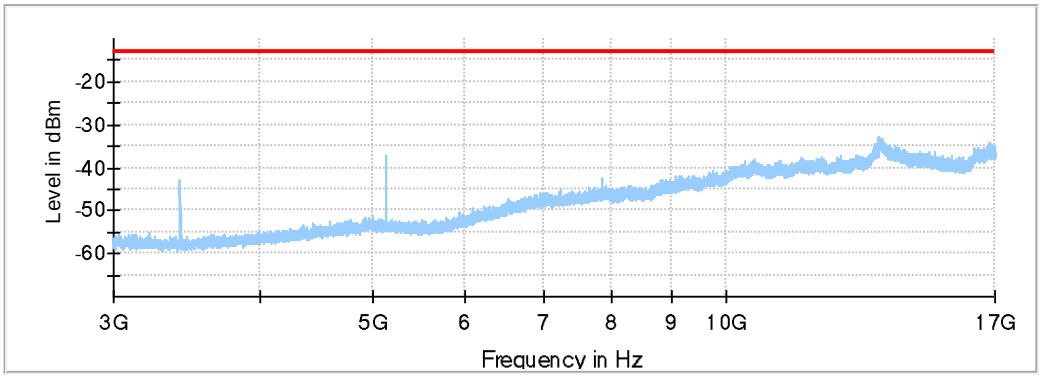
FREQUENCY RANGE 1 - 3 GHz:



Preview Result 1-PK+
Critical_Freqs PK+
FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
-13 dBm
Final_Result PK+
MaxPeak-PK+ (Single)

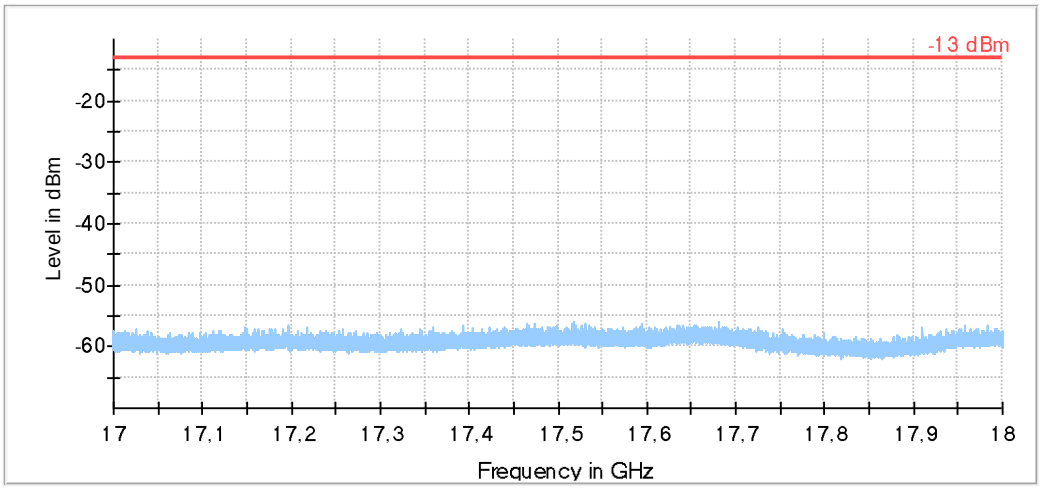
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:



Preview Result 1-PK+
Critical_Freqs PK+
FCC RSE Part 27 (B4, B8, B12, B13, B17, B66, B71, B85)
-13 dBm
Final_Result PK+
MaxPeak-PK+ (Single)

FREQUENCY RANGE 17 - 18 GHz:



Preview Result 1-PK+ -13 dBm Final_Result PK+

NB-IoT Band 4. Wall Antenna (S/02)

- Low Channel:

Frequency range 30 MHz - 1 GHz:

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 18 GHz:

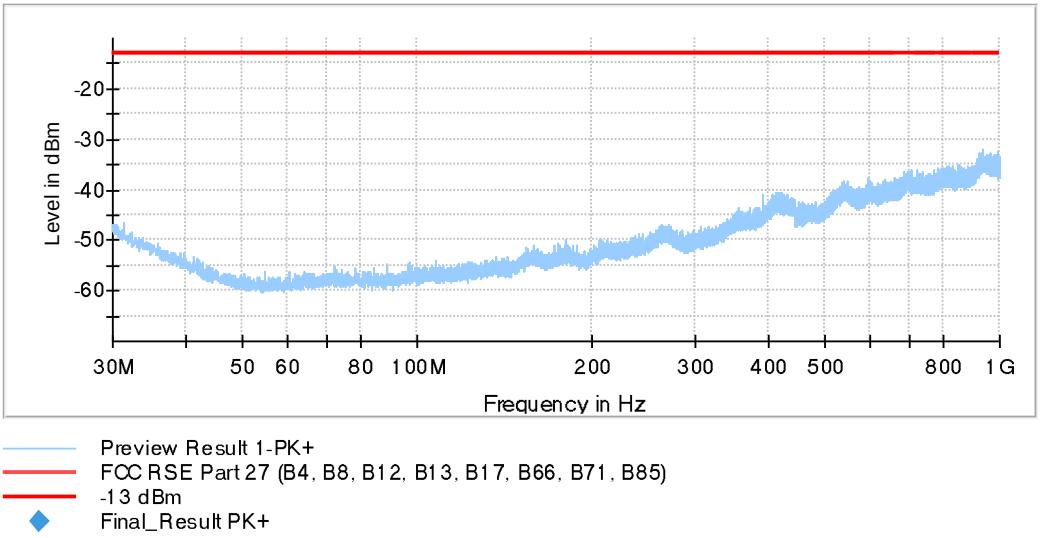
Spurious frequencies at less than 20 dB below the limit:

Measurement Uncertainty (dB): <± 4.90 for f ≥ 30 MHz up to 1 GHz
<± 4.11 for f ≥ 1 GHz up to 3 GHz
<± 4.32 for f ≥ 3 GHz up to 18 GHz

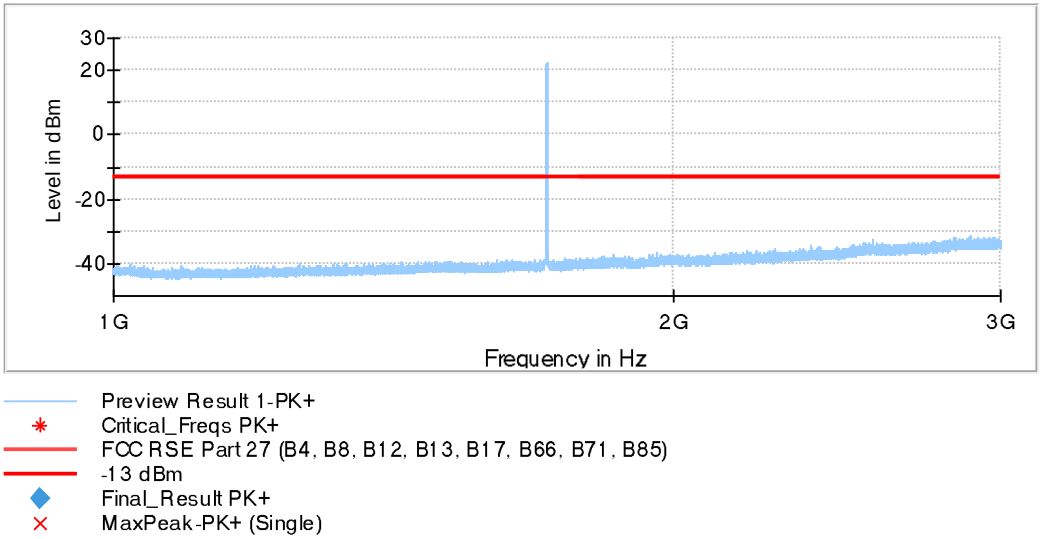
Verdict: PASS

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [FSW 50]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	Coupled	0 dB
1 GHz - 17 GHz	400 kHz	PK+	1 MHz	1 s	0 dB
Receiver: [FSV 40]					
17 GHz - 18 GHz	400 kHz	PK+	1 MHz	1 s	0 dB

FREQUENCY RANGE 30 MHz - 1 GHz:

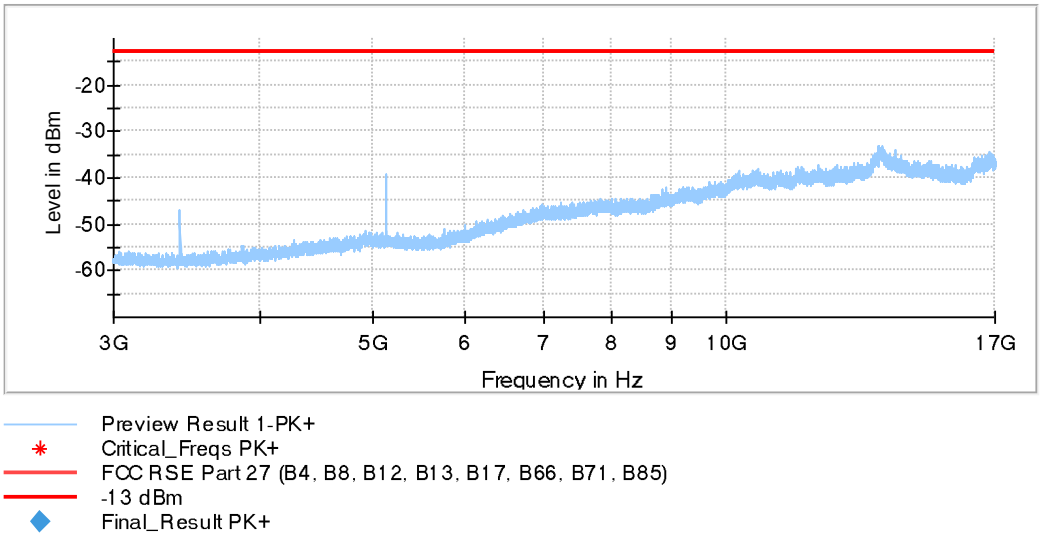
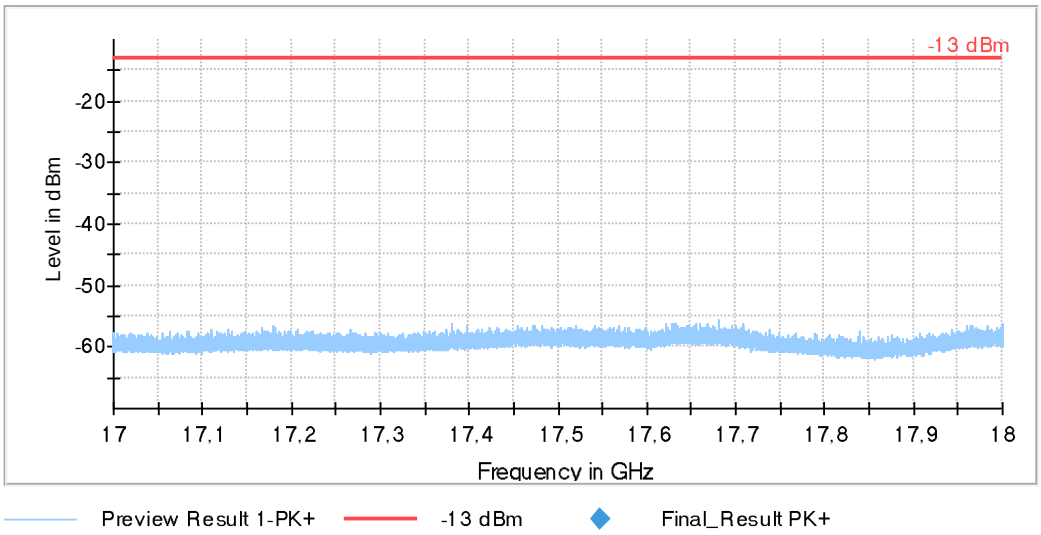


FREQUENCY RANGE 1 - 3 GHz:



The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:



FREQUENCY RANGE 17 - 18 GHz: