DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

Test report No:
NIE: 66479REM.030

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	Radio mesh device
(*) Trademark	KONE
(*) Model and /or type reference	Pulse (KM51671506G03)
Other identification of the product	Powered by primary batteries Kone Reference Number: 51786350D21 FCC ID: A2LQBPULSE IC: 4228A-PULSE HW version: Rev.C SW version: 5.0.0.46
(*) Features	Wirepas radio, USB and RS485 serial connections
Manufacturer	KONE CORPORATION Keilasatama 3 02150 ESPOO, Finland
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Industrial & Automotive EMC Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) Fecha: 2021.07.02 08:53:12 +02'00'
Date of issue	2021-07-01
Report template No	FDT08_23 (*) “Data provided by the client”

Index

Acronyms

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

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 the appropriate scope of accreditation that covers the performed test in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, 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 S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

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 conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is I = ± 3,9 dB for quasi-peak measurements, I = ± 3,2 dB for peak measurements (k = 2).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is I = ± 4,9 dB for quasi-peak measurements, I = ± 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 = ± 2,6 dB for peaks 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 a Radio mesh device

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	66479C_26.1	KONE MESH NODE	Pulse (KM51671506G03)	18	2021-03-17	Element Under Test

Notes referenced to samples during the project.

Test sample description

Test Sample description (compulsory information for EMC and RF testing services

Ports…… :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
	.....	.....	[ ]	[ ]	[ ]	
Supplementary information to the ports…… :	.....					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: Internal Batteries (2xAA)					
	[ ]	DC:					
Rated Power .....:	250mW						
Clock frequencies.....:	32,678 kHz, 32 MHz						
Other parameters .....:	.....						
Software version .....:	5.0.0.46						
Hardware version .....:	Rev. C						
Dimensions in cm (W x H x D) ....:	90mm x 90 mm x 43 mm						
Mounting position .....:	[ ]	Table top equipment					
	[X]	Wall/Ceiling mounted equipment					
	[ ]	Floor standing equipment					

	[ ]	Hand-held equipment		
	[ ]	Other:		
Modules/parts.....:	Module/parts of test item		Type	Manufacturer
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
Accessories (not part of the test item) .....:	Description		Type	Manufacturer
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
	.....		.....	.....
Documents as provided by the applicant.....:	Description		File name	Issue date
	Schematics		51671507D02	.....
	Layout		51671507D03	.....
	Part list / Bom		51671507D01	.....
	Production files (Gerber)		51671508D01	.....

(3) Only for Medical Equipment

Identification of the client

Bittium Oy
Ritaharjuntie 1
90590 Oulu,
Finland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-04-16
Date (finish)	2021-04-16

Document history

Report number	Date	Description
66479REM.030	2021-07-01	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. = 30 % 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. = 30 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 60 %

Remarks and comments

The tests have been performed by the technical personnel: Alejandro Marin Chorro.

Testing verdicts

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

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
7816	EMI TEST RECEIVER 1Hz-26.5GHz	ESW26	ROHDE AND SCHWARZ	2021-09-05
7746	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2022-07-11
7743	HORN ANTENNA	3115	ETS LINDGREN	2023-08-24
6196	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2022-02-25

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC 47 CFR Part 15B	RE Radiated emission. Electromagnetic field measure	Pass	

Supplementary information and remarks:
None

Appendix A: Test results

Appendix A context

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

The operation modes used by the samples to which the present report refers, are shown in the following table:

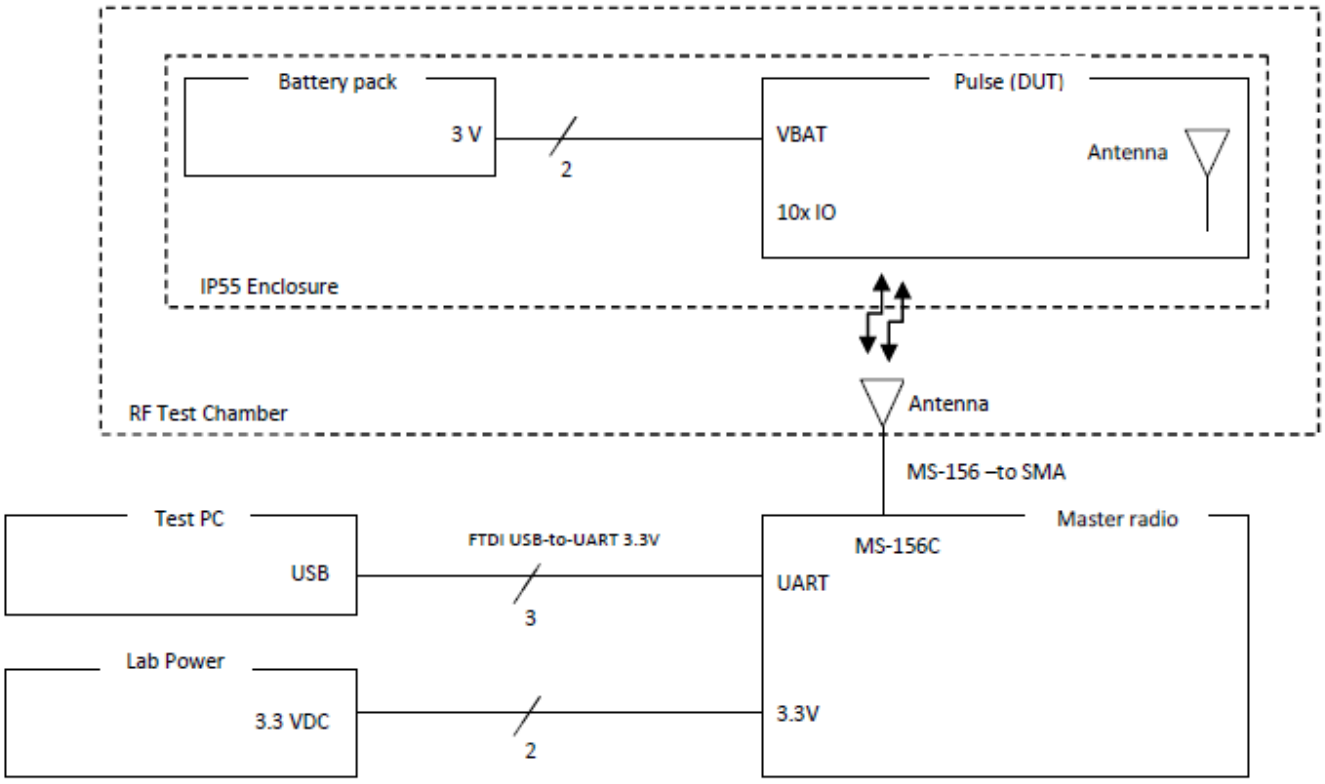
Id	Description
OM/01	EUT ON. Bluetooth (Wirepas) RX mode. Power supply: Internal battery.

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 (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	CE Continuous conducted emission

Test Setup:



Test Cases Details

FCC 47 CFR Part 15B

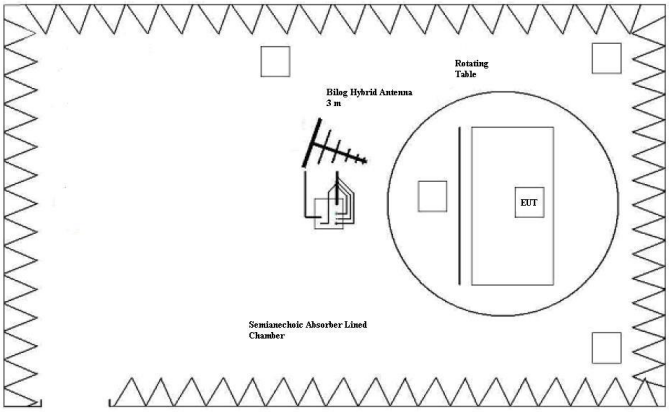
RE Radiated emission. Electromagnetic field measure

Limits

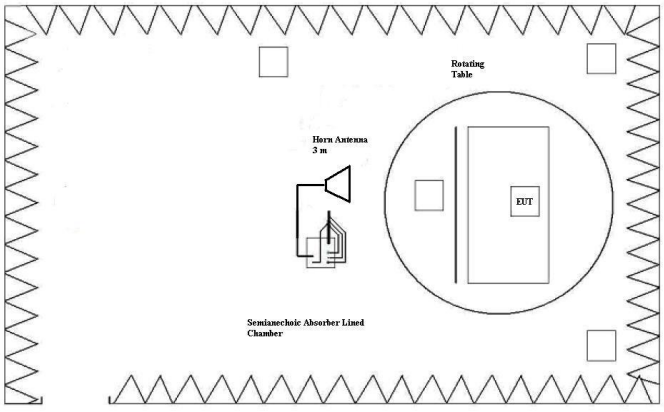
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 6 (Updated 04-2019)

Frequency of emission (MHz)	Field strength (microvolt/meter)
30-88	100
88-216	150
21-960	200
Above 960	500
*Above 1GHz, the limit is defined for an AVG detector.	



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

S/	OM	Code	Freq Rng (MHz)	Comments	V
01	OM/01	RE0101LR	[30, 1000]	---	P
01	OM/01	RE0101HR	[1000, 12750]	---	P

Verdict

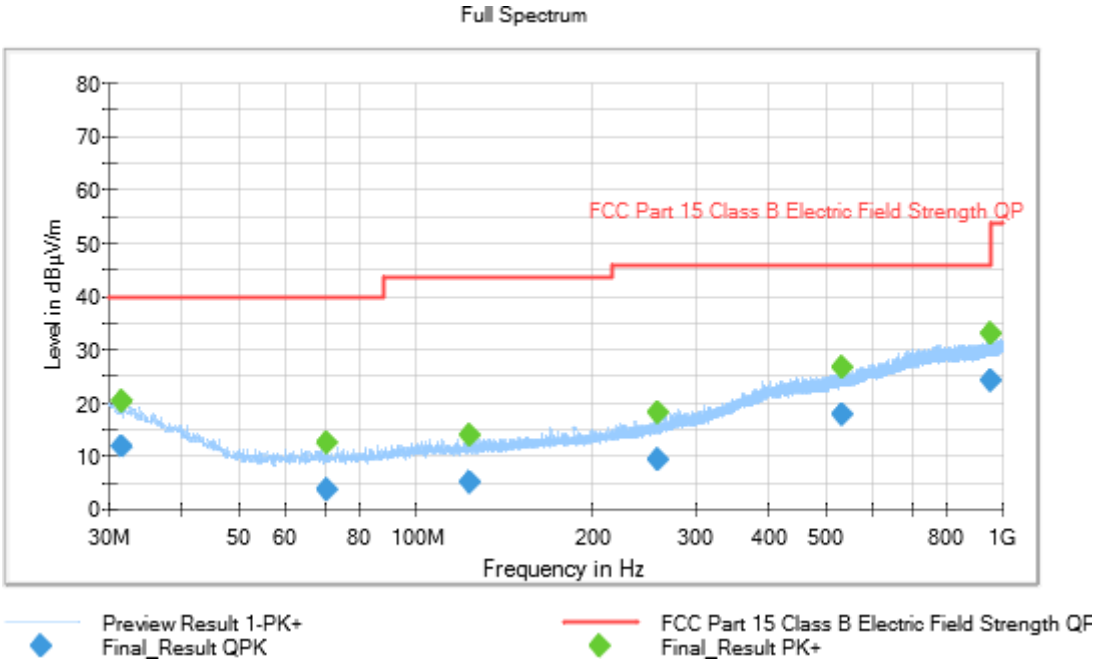
Pass

Attachments

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

Sample ID: S/01
Operation Mode: OM/01. EUT ON. Bluetooth (Wirepas) RX mode. Power supply: Internal battery.

Images:



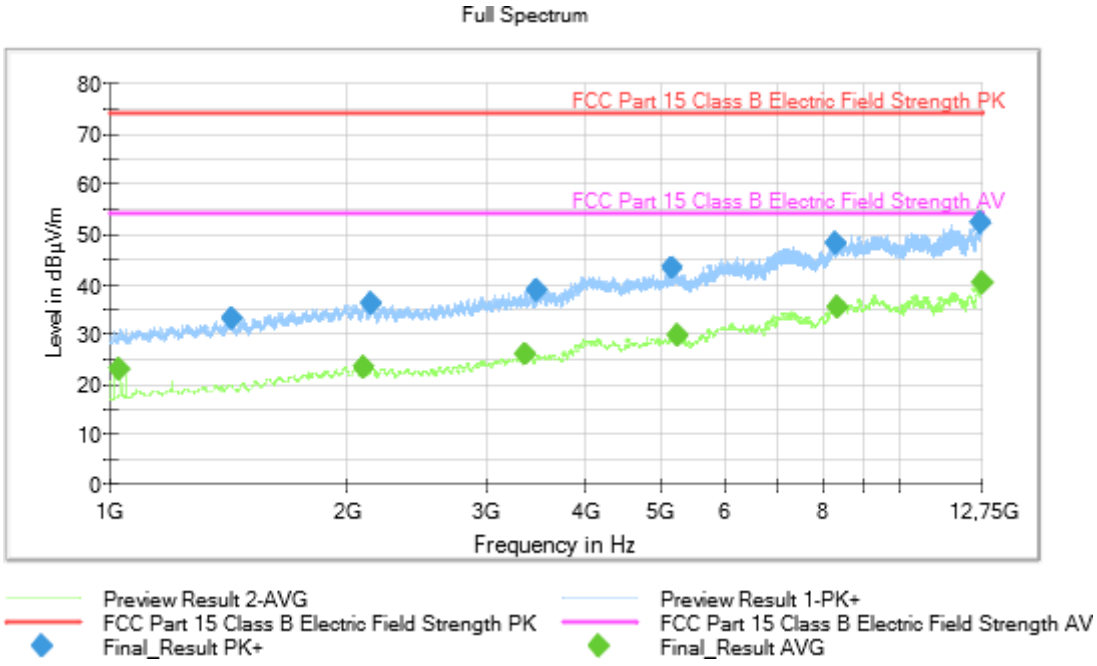
Documents:

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.631000	---	20.09	---	---	327.0	V	290.0
31.631000	11.56	---	40.00	28.44	327.0	V	290.0
70.529000	---	12.29	---	---	152.0	V	37.0
70.529000	3.36	---	40.00	36.64	152.0	V	37.0
123.877000	5.04	---	43.52	38.48	213.0	H	39.0
123.877000	---	13.82	---	---	213.0	H	39.0
259.098000	---	18.11	---	---	392.0	H	328.0
259.098000	9.36	---	46.00	36.64	392.0	H	328.0
533.260000	17.70	---	46.00	28.30	139.0	V	232.0
533.260000	---	26.53	---	---	139.0	V	232.0
958.655000	---	33.08	---	---	168.0	V	118.0
958.655000	24.19	---	46.00	21.81	168.0	V	118.0

EMC Test Code = RE0101HR, Frequency Range MHz = [1000, 12750]

Sample ID: S/01
Operation Mode: OM/01. EUT ON. Bluetooth (Wirepas) RX mode. Power supply: Internal battery.

Images:



Documents:

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin(dB)
1030.000000	---	23.07	53.97	30.90
1425.600000	33.14	---	73.97	40.83
2101.600000	---	23.30	53.97	30.67
2147.200000	36.23	---	73.97	37.74
3363.200000	---	25.89	53.97	28.08
3480.400000	38.83	---	73.97	35.14
5156.000000	43.14	---	73.97	30.83
5229.200000	---	29.82	53.97	24.15
8331.200000	48.12	---	73.97	25.85
8336.400000	---	35.20	53.97	18.77
12686.800000	52.20	---	73.97	21.77
12749.600000	---	40.11	53.97	13.86