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: 67398REM.001

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	WEARABLE BIOSIGNALS MONITOR
(*) Trademark	ACUPEBBLE
(*) Model and /or type reference	ACUPEBBLE 100
Other identification of the product	FCC ID: 2A258-AP100C04 IC: Not Provided Data HW version: C04 SW version: 1.1.0
(*) Features	Bluetooth LE
Manufacturer	ACURABLE LIMITED FINSGATE, 5-7 CRANWOOD STREET, LONDON EC1V 9EE, UNITED KINGDOM
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: 2021.09.13 13:12:58 +02'00'
Date of issue	2021-06-24
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.

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 wearable biosignals monitor, model ACUPEBBLE 100.

   AcuPebbleTM is a miniature electronic wireless wearable device, enclosed in a plastic case which is intended to be worn attached to the body with double coated medical tape.

   AcuPebbleTM aims to capture body sounds. The sensed acoustic signal is interfaced with very low power electronic blocks which optimize both the quality of the signal and the wireless transmission to commercially existing mobile base stations (for example mobile phone or tablet which are Bluetooth Low Energy compatible).

   Transmission is carried out using a commercial Bluetooth Low Energy (BLE) integrated circuit. AcuPebbleTM operates with a small Li-Po battery (80mAh capacity), which has been tested for safety as per EN62133:2013.

   In continuous operation, the system can function for over 23 hours (although note that for the intended purpose less than half of this is needed).

   Hence the average current through the system is less than 4mA. The device can be recharged using a standard micro-USB connector.

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	67398_8.1	WEARABLE BIOSIGNALS MONITOR	AcuPebble 100	--	2021-06-18	Element Under Test

Notes referenced to samples during the project.

Test sample description

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

<table>
<tr><td rowspan="5">Ports…… :</td><td colspan="2" rowspan="2">Port name and description</td><td colspan="4">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td><td>Coupled to patient(3)</td></tr>
<tr><td colspan="2">.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td colspan="2">.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td colspan="2">.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>Supplementary information to the ports…… :</td><td colspan="6">.....</td></tr>
<tr><td rowspan="5">Rated power supply .....:</td><td colspan="2" rowspan="2">Voltage and Frequency</td><td colspan="5">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>[ ]</td><td>AC: .....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>[ ]</td><td>AC: .....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>[X]</td><td colspan="5">DC: 3.7 V</td></tr>
<tr><td>Rated Power .....:</td><td>[ ]</td><td colspan="5">DC: .....</td></tr>
<tr><td>Clock frequencies.....:</td><td colspan="6">Average power: 14.1 mW</td></tr>
<tr><td>Other parameters .....:</td><td colspan="6">32.768 kHZ, 32.0 MHz</td></tr>
<tr><td>Software version .....:</td><td colspan="6">.....</td></tr>
<tr><td>Hardware version .....:</td><td colspan="6">1.1.0</td></tr>
<tr><td>Dimensions in cm (W x H x D) ....:</td><td colspan="6">C04</td></tr>
<tr><td>Mounting position .....:</td><td colspan="6">Circle with a diameter of 2.95cm</td></tr>
<tr><td rowspan="5">Mounting position .....:</td><td>[ ]</td><td colspan="5">Table top equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Wall/Ceiling mounted equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Floor standing equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Hand-held equipment</td></tr>
<tr><td>[X]</td><td colspan="5">Other: Body worn equipment</td></tr>
</table>

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	Apple iPhone SE for receiving data	.....	Apple
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Documents as provided by the applicant.....:	Description	File name	Issue date
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....

(3) Only for Medical Equipment

Identification of the client

ACURABLE LIMITED
FINSGATE, 5-7 CRANWOOD STREET,
LONDON EC1V 9EE,
UNITED KINGDOM

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-06-21
Date (finish)	2021-06-21

Document history

Report number	Date	Description
67398REM.001	2021-06-24	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 %
Air pressure	Min. = 860mbar Max. = 1060mbar

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 %
Air pressure	Min. = 860mbar Max. = 1060mbar

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 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Juan Manuel Pino Blanco.

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.	Description	Model	Manufacturer	Next Calibration
7743	HORN ANTENNA 0,75-18GHz	3115	ETS LINDGREN	2023-08-24
7746	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-07-23
6142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2022-03-08
6196	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2022-02-25
6666	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE & SCHWARZ	2022-02-05

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC 47 CFR Part 15B	Radiated emission	Pass	--
FCC 47 CFR Part 15B	Conducted emission	N/A	1)

Supplementary information and remarks:

1) Internal battery powered device

Appendix A: Test results

Appendix A content

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. Collecting sleep data. Bluetooth OFF. Power supply: Internal battery (3.7 Vdc).

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 + ANSI C63.4a-2017	RE Radiated emission.
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4-2014 + ANSI C63.4a-2017	CE Continuous conducted emission

Test Cases Details

FCC 47 CFR Part 15B

RE Radiated emission. Electromagnetic field measure

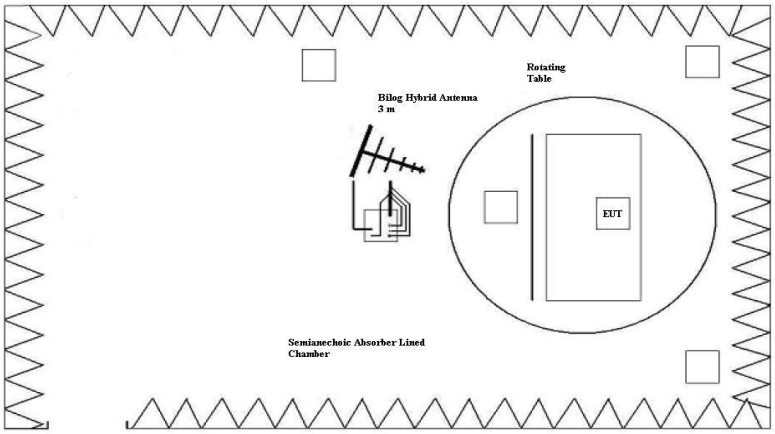
Limits

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

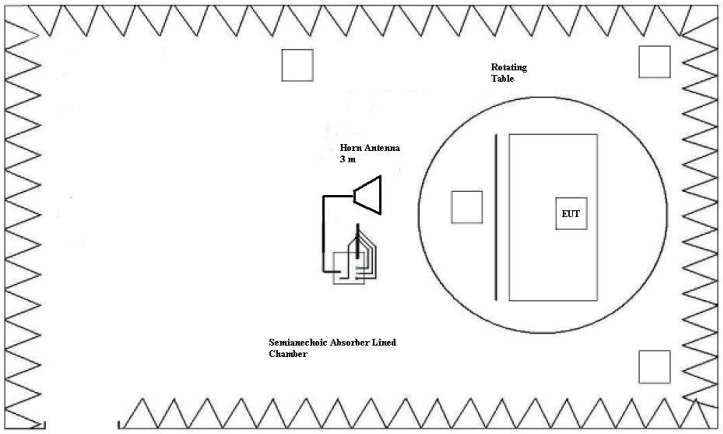
Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(μV/m)	(dBμV/m)	(μV/m)	(dBμV/m)	(dBμV/m)	(dBμV/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46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

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

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

According to the requirements of FCC Part 15 & ICES-003 Issue 7:

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

Verdict

Pass

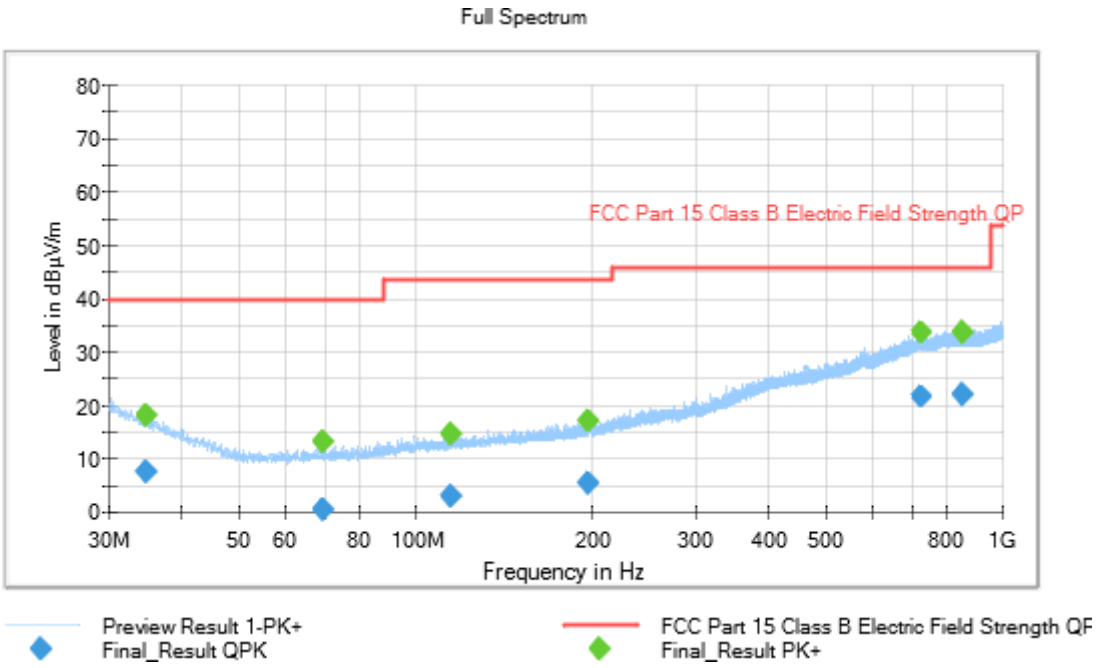
Attachments

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

Sample ID: S/01

Operation Mode: OM/01. EUT ON. Collecting sleep data. BT OFF. Power supply: Internal battery (3.7 Vdc).

Images:



Documents:

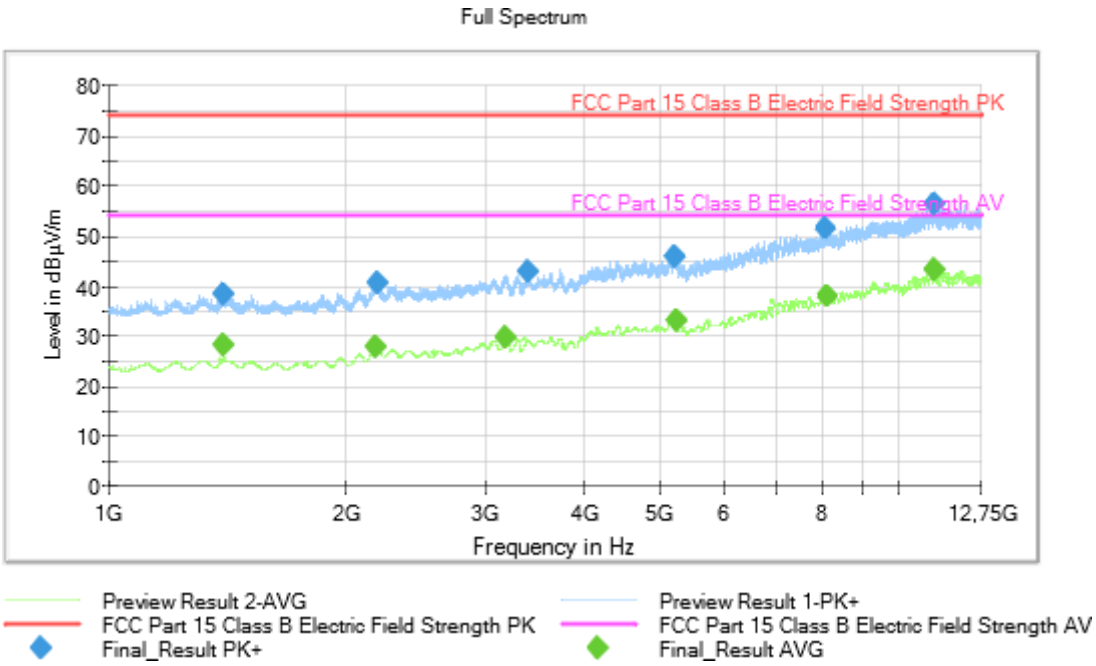
Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
34.860000	---	18.21	---	---	156.0	H	309.0
34.860000	7.38	---	40.00	32.62	156.0	H	309.0
69.718000	---	13.09	---	---	181.0	H	50.0
69.718000	0.36	---	40.00	39.64	181.0	H	50.0
115.033000	2.66	---	43.52	40.86	126.0	H	47.0
115.033000	---	14.60	---	---	126.0	H	47.0
197.532000	---	17.13	---	---	106.0	H	92.0
197.532000	5.18	---	43.52	38.34	106.0	H	92.0
729.503000	---	33.51	---	---	234.0	V	96.0
729.503000	21.61	---	46.00	24.39	234.0	V	96.0
853.635000	21.92	---	46.00	24.08	214.0	H	23.0
853.635000	---	33.46	---	---	214.0	H	23.0

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

Sample ID: S/01

Operation Mode: OM/01. EUT ON. Collecting sleep data. BT OFF. Power supply: Internal battery (3.7 Vdc).

Images:



Documents:

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1400.000000	---	28.28	53.97	25.69
1400.000000	38.41	---	73.97	35.56
2181.200000	---	27.73	53.97	26.24
2188.000000	40.49	---	73.97	33.48
3179.200000	---	29.53	53.97	24.44
3391.600000	42.89	---	73.97	31.08
5217.200000	45.68	---	73.97	28.29
5234.800000	---	32.95	53.97	21.02
8092.400000	51.38	---	73.97	22.59
8114.800000	---	37.85	53.97	16.12
11101.200000	---	43.12	53.97	10.85
11111.600000	56.52	---	73.97	17.45