

Test report No:
NIE: 67125REM.004A1

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	Wireless datalogger
(*) Trademark	Loadsensing G6
(*) Model and /or type reference	LS-G6-PICO
Other identification of the product	HW version: LS-G6-PICO-4 rev1 SW version: 2.49 FCC ID: 2AHN4-LS-G6-PICO IC: 21260-LSG6PICO
(*) Features	LoRa communication
Manufacturer	Worldsensing, S. L. C/ Viriat 47, planta 10. 08014. Barcelona. Spain.
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)	Rafael López EMC Consumer & RF Lab. Manager
Date of issue	2021-11-04
Report template No	FDT08_23 (*) "Data provided by the client"

Index

ACRONYMS3

COMPETENCES AND GUARANTEES3

GENERAL CONDITIONS4

UNCERTAINTY4

DATA PROVIDED BY THE CLIENT4

USAGE OF SAMPLES5

TEST SAMPLE DESCRIPTION6

IDENTIFICATION OF THE CLIENT7

TESTING PERIOD AND PLACE7

DOCUMENT HISTORY7

ENVIRONMENTAL CONDITIONS8

REMARKS AND COMMENTS9

TESTING VERDICTS9

LIST OF EQUIPMENT USED DURING THE TEST9

SUMMARY10

APPENDIX A: TEST RESULTS11

Acronyms

Acronym ID	Acronym Description
Avg	Radiated Average Level
Avg	Conducted Average Level
Az	Azimuth
CPL	Zones / Coupling Cables
Code	EMC Test Code
Freq	Frequency
Freq Rng	Frequency Range
H	Height
Line	Conducted Emissions - Tested Line
MP	Measurement Point
Max	Conducted Maximum Level
MaxPeak	Radiated Maximum Peak Level
OM	Operation Mode
Pol	Polarization
QuasiPeak	Conducted Quasi Peak Level
QuasiPeak	Radiated Quasi Peak Level
S/	Sample
V	Verdict
Volt Immunity Lvl	Voltage Immunity Severity Level
Volt Immunity Type	Voltage Immunity Type

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.

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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 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 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 wireless datalogger to measure analog sensors like strain gauges or thermistors. After digitizing the data it sends it via radio.

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 under test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	67125_04	Wireless datalogger	LS-G6-PICO	44275	2020-12-28	Element under test
S/01	66635_03	Piezometer sensor	EPP-30V	11494	2020-11-09	Auxiliary element

Notes referenced to samples during the project.

Id	Note
	N/A

Test sample description

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

Ports..... :	Port name and description	Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	Miniusb port for configuration		☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
Supplementary information to the ports..... :	N/A						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐ AC:		☐	☐	☐	☐	☐
	☐ AC:		☐	☐	☐	☐	☐
	☒ DC:	DC: DC lithium battery. Saft LSH 14. 3.6Vdc					
	☐ DC:						
Rated Power	1300mA at 3.6V recommended continuous current by manufacturer.						
Clock frequencies.....	Not provided data						
Other parameters	Not provided data						
Software version	2.49						
Hardware version	LS-G6-PICO-4 rev1						
Dimensions in mm (W x H x D) ...	113 x 80 x 60 mm						
Mounting position	☒ Table top equipment						
	☒ Wall/Ceiling mounted equipment						
	☐ Floor standing equipment						
	☐ Hand-held equipment						
	☐ Other:						
Modules/parts..... :	Module/parts of test item		Type		Manufacturer		
	N/A						
Accessories (not part of the test item)	Description		Type		Manufacturer		
	2 x Saft batteries		Battery		Saft		
Documents as provided by the applicant..... :	Description		File name		Issue date		
	N/A						

Identification of the client

Worldsensing S.L.
C/ Viriat 47, planta 10. 08014 Barcelona. Spain.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-02-08
Date (finish)	2021-02-08

Document history

Report number	Date	Description
67125REM.004	2021-06-21	First release
67125REM.004A1	2021-11-04	First modification due to typos. This modification test report cancels and replaces the test report 67125REM004.

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 %

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 %

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

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

Remarks and comments

The tests have been performed by the technical personnel: Antonio Ruiz.

Testing verdicts

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

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
2942	EMI TEST RECEIVER 20Hz-40GHz	ESU40	ROHDE AND SCHWARZ	2021-09-17
4523	EMI TEST RECEIVER 20Hz-26.5GHz	ESU26	ROHDE AND SCHWARZ	2022-05-27
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2021-06-14
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER III	SAC-3	Frankonia	---
6126	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-17
6132	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2021-04-20
6195	PRE-AMPLIFIER G>55dB 1-18GHz	AMF-7D-01001800-22-10P	NARDA	2021-05-19
6329	SHIELDED ROOM	---	FRANKONIA	---

Summary

Test Specification.	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) Sec. 15.109 & ICES-003 Issue 7 (October 2020). ANSI C63.4 (2014)	Radiated emission	Pass	---
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 7 (October 2020) ANSI C63.4 (2014)	Conducted emission	N/A	(1)
(1) Test not applicable according to the standard. Equipment powered by internal batteries.			

Appendix A: Test results

Appendix A content

DESCRIPTION OF THE OPERATION MODES	13
TEST STANDARDS VERSION APPLIED	13
TEST CASES DETAILS	14
RE RADIATED EMISSION.....	14

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. LoRa in receive mode (*worst case). Power supply: 3.6Vdc.

*Worst case: the equipment has been tested with Lora off and with Lora in reception mode and next are shown the results of the worst case

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) Sec. 15.109 & ICES-003 Issue 7 (October 2020).	ANSI C63.4 (2014)	Radiated emission
FCC CFR 47, Part 15, Subpart B and C (10-1-19 Edition) Secs. 15.107 and 15.207 & ICES-003 Issue 7 (October 2020).	ANSI C63.4 (2014)	Conducted emission

Test Cases Details

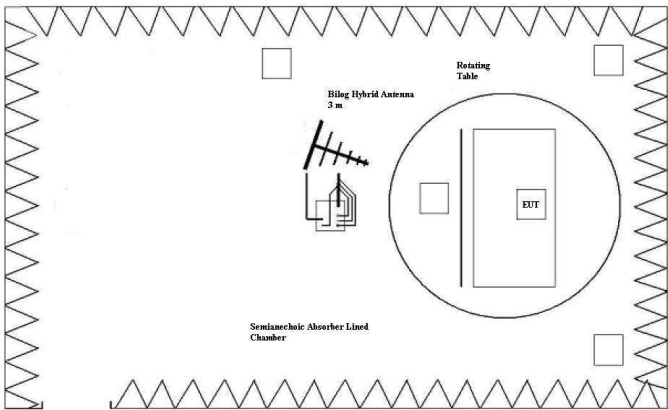
FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Sec. 15.109 &
ICES-003 Issue 7 (October 2020)
RE Radiated emission

Limits of interference Class B

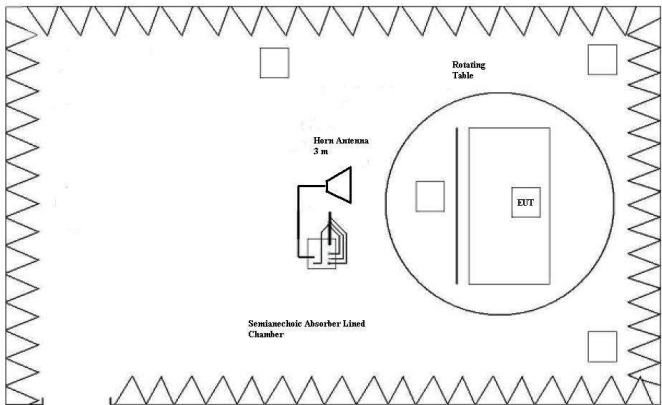
The applied limit for radiated emissions, 3 m distance, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

Frequency of emission (MHz)	Field strength limit (microvolt/meter) (QuasiPeak Detector)	ICES-003 Issue 7 Field strength (dBµV/m)
30-88	100	40
88-216	150	43.5
216-230	200	46
230-960	200	47
Above 960	500	54

*Above 1GHz, the limit is defined for an AVG detector.



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

RESULTS

REmmnnRR	Description	Result
RE0101LR	Range: 30 MHz - 1000 MHz.	P
RE0101HR	Range: 1 GHz – 17 GHz.	P

mm: Sample number; nn: Operation mode; RR: Measurement range.

*According to FCC 47 CFR Part 15B / ICES-003 Issue 7, this measurement is only needed up to the fifth harmonic of the internal working frequency.

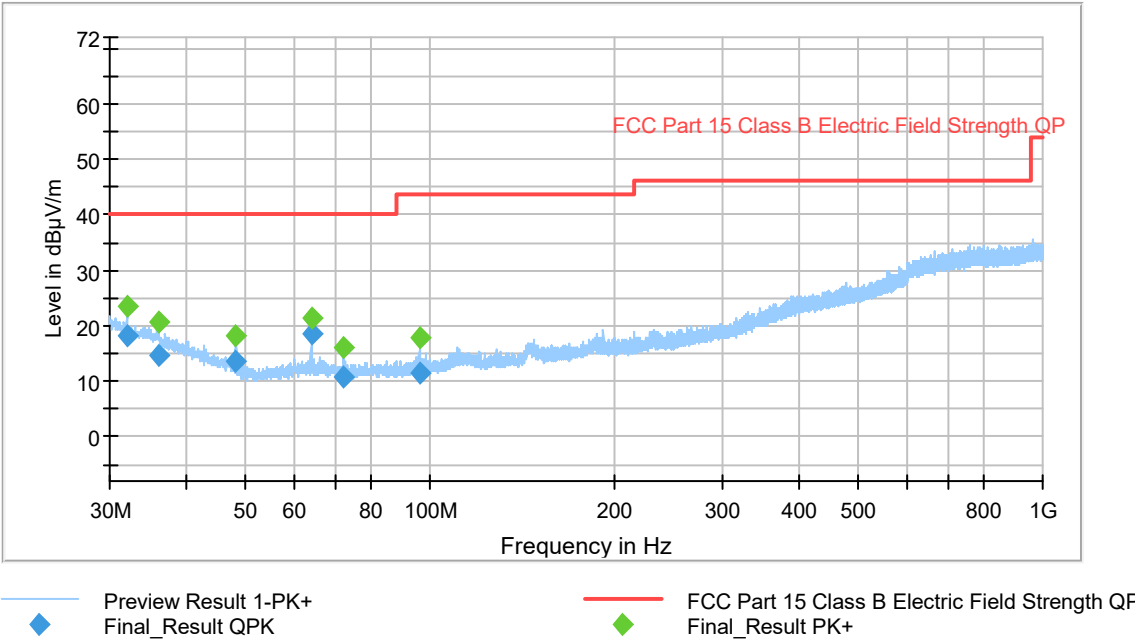
VERDICT

Pass

Images:

Project:67125REM.004
Company:WORLDSENSING S.L.
Sample:S/01
Operation mode:01
Graphical code:RE0101LR
Description:EUT ON. LoRa in receive mode (worst case). Power supply: 3.6Vdc.
Verdict:Passed

Full Spectrum

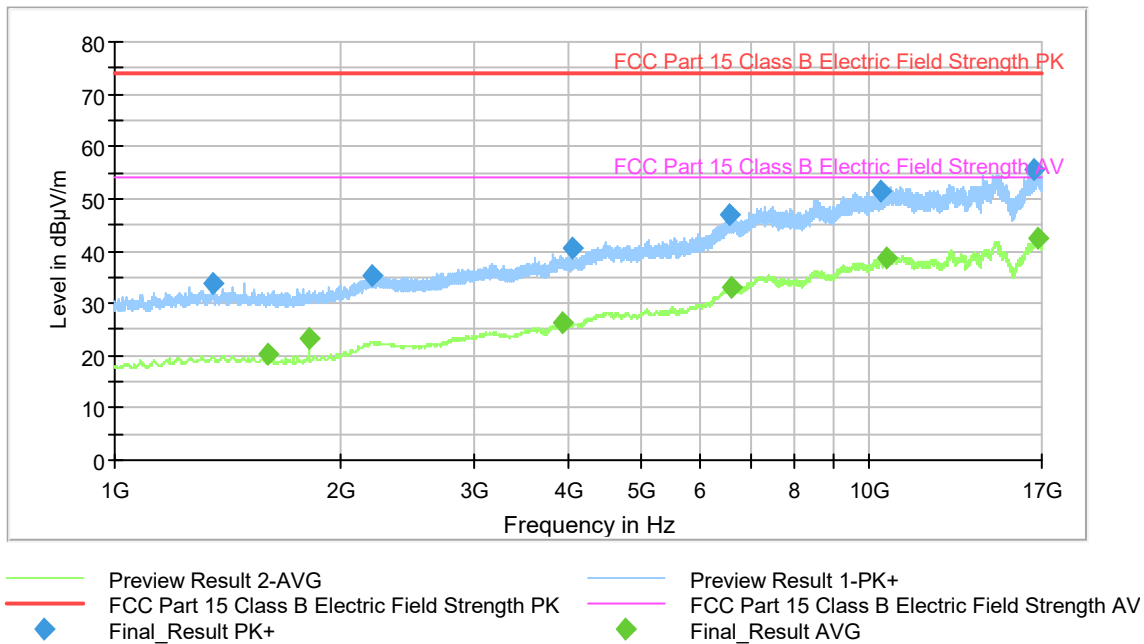


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.979000	---	23.52	---	---	400.0	H	-128.0
31.979000	18.31	---	40.00	21.69	400.0	H	-128.0
35.998000	14.65	---	40.00	25.35	133.0	V	-156.0
35.998000	---	20.71	---	---	133.0	V	-156.0
48.212000	13.64	---	40.00	26.36	348.0	H	-75.0
48.212000	---	18.09	---	---	348.0	H	-75.0
63.999000	---	21.23	---	---	189.0	V	-42.0
63.999000	18.43	---	40.00	21.57	189.0	V	-42.0
72.344000	10.63	---	40.00	29.37	115.0	V	-129.0
72.344000	---	16.22	---	---	115.0	V	-129.0
96.027000	11.40	---	40.00	28.60	333.0	V	102.0
96.027000	---	17.75	---	---	333.0	V	102.0

Project: 67125REM.004
Company: WORLDSENSING S.L.
Sample: S/01
Operation mode: 01
Graphical code: RE0101HR
Description: EUT ON. LoRa in receive mode (worst case). Power supply: 3.6Vdc.
Verdict: Passed

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1352.000000	33.67	---	73.97	40.30
1600.000000	---	20.14	53.97	33.83
1812.400000	---	23.22	53.97	30.75
2190.400000	35.47	---	73.97	38.50
3925.200000	---	26.19	53.97	27.78
4044.000000	40.39	---	73.97	33.58
6544.800000	46.80	---	73.97	27.17
6569.600000	---	33.06	53.97	20.91
10363.600000	51.54	---	73.97	22.43
10578.800000	---	38.57	53.97	15.40
16594.000000	55.72	---	73.97	18.25
16843.200000	---	42.61	53.97	11.36