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ENSAYOS Nº 51/LE147

Test report No:
NIE: 66212REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)

(*) Identification of item tested	Sensor device with Wirepas mesh network connectivity
(*) Trademark	Thingsee Leakage Rugged
(*) Model and /or type reference	LEAK
Other identification of the product	HW version: PD2_03 SW version: 2020.06.16.3_ts_pod4leakage FCC ID: 2AEU3TSLEAK IC: 20236-TSLEAK
(*) Features	Measurement of resistance, temperature, ambient light, magnetism and acceleration. Wirepas protocol stack using BT LE radio.
Manufacturer	HALTIAN PRODUCTS OY Yrttipellontie 1 D, 90230 Oulu, Finland
Test method requested, standard	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager  RAFAEL LÓPEZ MARTÍN 2020.10.23 14:25:02 +02'00'
Date of issue	2020-10-23
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification 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 is a FCC recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report, FCC designation number ES0004.

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

DEKRA Testing and Certification 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.

DEKRA Testing and Certification 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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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.
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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 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 = ± 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" and "Derived model not tested").

2. The sample of the model LEAK is a sensor device to detect water leakage. The device reports the resistance value between the detecting pins and sends this information to a Wirepas protocol mesh network. The device has also sensors for temperature, ambient light, magnetism and acceleration and it includes a LED for indication purposes. It has also sensors for humidity and air pressure but this data is not useful because of the closed structure of the device. Typically, LEAK is used together with MTXH Thingsee Gateway in use cases where the measurements are performed in several locations and this data is wirelessly collected and sent via 2G cellular connection to a data server / cloud.

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.

Sample **S/01** is composed by the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
66212/005	Sensor device with Wirepas mesh network connectivity	LEAK	EW202500109	2020/09/22

Test sample description

Ports…… :	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded		
	N/A			☐	☐		
				☐	☐		
Supplementary information to the ports…… :	N/A						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 3.0 V, 2 x AAA 1.5 V alkaline primary batteries					
	☐	DC:					
Rated Power .....:	Peak 24 mW (3V x 8mA), average 120uW (3v x 40 uA)						
Clock frequencies.....:	BT IC clocks 32.768kHz, 32MHz						
Other parameters .....:	Not provided data						
Software version .....:	2020.06.16.3_ts_pod4leakage						
Hardware version .....:	PD2_03						
Dimensions in mm (W x H x D)...:	34 mm x 17.5mm x 58mm						
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			
	nRF52832		BT IC	Nordic Semicond.			
Accessories (not part of the test item) .....:	Description		Type	Manufacturer			
	N/A						
Documents as provided by the applicant.....:	Description		File name	Issue date			
	N/A						

Identification of the client

HALTIAN PRODUCTS OY
Yrttipellontie 1 D, 90230 Oulu, Finland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-09-23
Date (finish)	2020-09-24

Document history

Report number	Date	Description
66212REM.001	2020-10-23	First release.

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
4623	N CABLE 2m	SUCOFLEX 106	HUBER+SUHNER	---
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	---

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. = 860 mbar Max. = 1060 mbar

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. = 860 mbar Max. = 1060 mbar

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. = 860 mbar Max. = 1060 mbar

Remarks and comments

The test have been performed by the technical personnel: Lorena Oviedo & Antonio Ruiz.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

Emission Test Requirement – Test case	Verdict	Remark
Radiated emission. Electromagnetic field measure (30 MHz – 1000 MHz)	P	---
Radiated emission. Electromagnetic field measure (1 GHz – 12.75 GHz)	P	---
Radiated emission. Electromagnetic field measure (12.75 GHz – 40 GHz)	N/A	(1)
Continuous conducted emission (150 KHz – 30 MHz)	N/A	(2)
Supplementary information and remarks: (1) Range: f>12.75 GHz. Test required only if the 5th harmonics of the maximum internal work frequency EUT is higher than 12.75GHz. (2) This test is not applicable according to standard. Equipment powered by DC internal 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:

OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Bluetooth Low Energy OFF. Power supply: 3Vdc (2xAAA 1.5Vdc batteries)

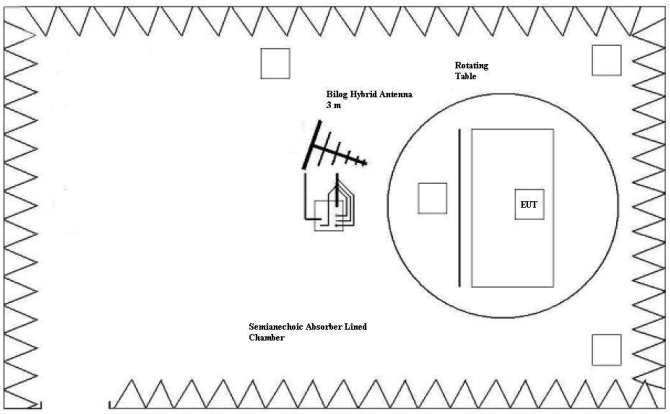
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)

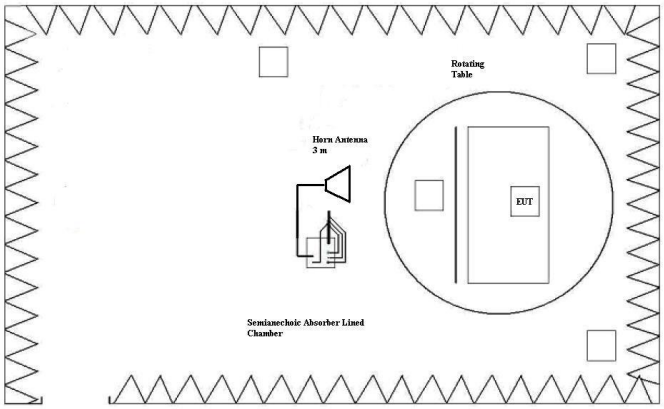
Limits of interference Class B

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



Setup for measurements < 1GHz.



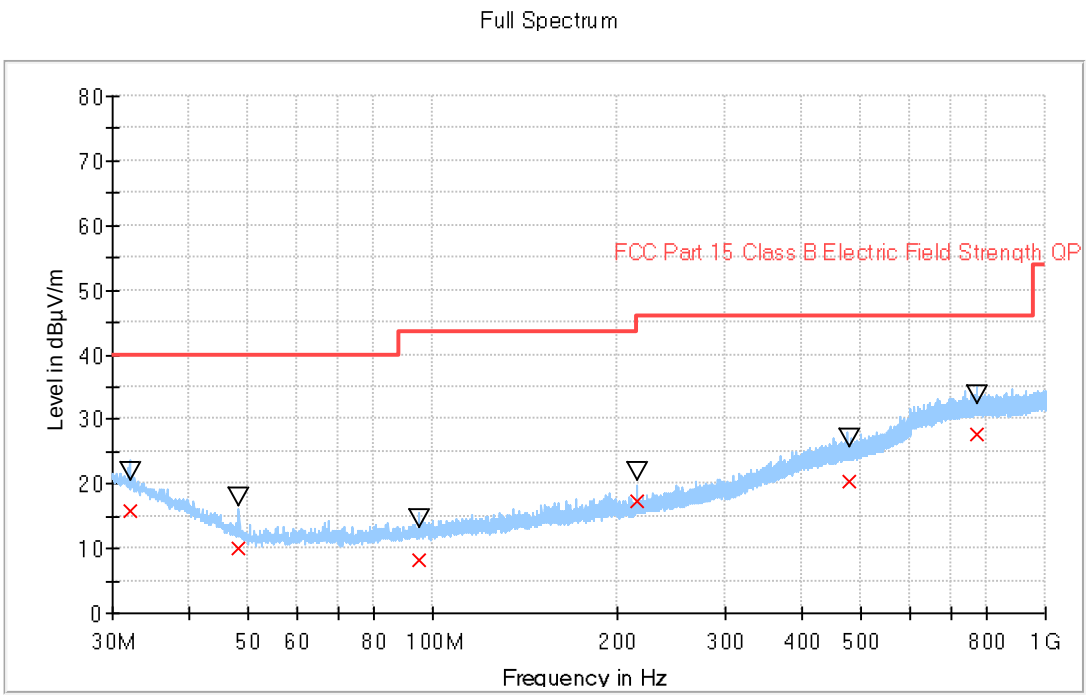
Setup for measurements > 1GHz.

TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnnRR_PP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR_PH	Range: 1 GHz – 12.75 GHz. Horizontal polarization.	P
CR0101HR_PV	Range: 1 GHz – 12.75 GHz. Vertical polarization.	P

Radiated Emission. CR0101LR

Project:	66212REM.001
Company:	GRANT4COM OY(FINAL CUSTOMER: HALTIAN)
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Bluetooth Low Energy OFF. Power supply: 3Vdc (2xAAA 1.5Vdc batteries)



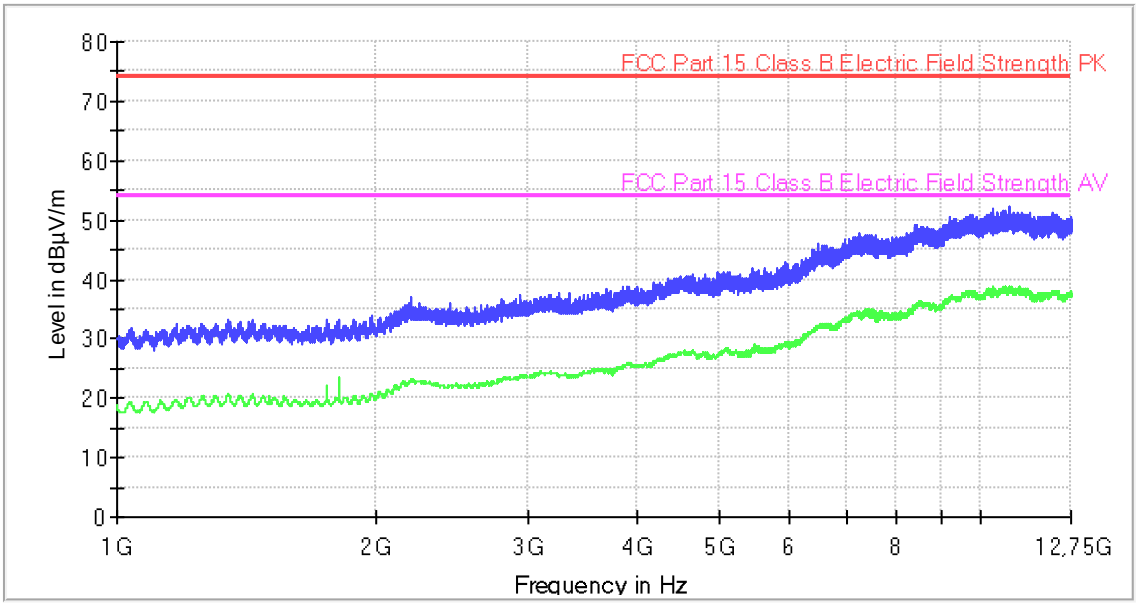
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
32.054000	15.81	21.85	400.0	V	24.0
48.290000	10.12	17.99	117.0	V	-87.0
94.965000	8.20	14.61	220.0	H	31.0
215.994000	17.49	21.84	100.0	V	-157.0
476.538000	20.51	27.06	136.0	V	-136.0
772.900000	27.61	33.91	107.0	H	-167.0

Radiated Emission. CR0101HR_PH

Project:	66212REM.001
Company:	GRANT4COM OY(FINAL CUSTOMER: HALTIAN)
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Bluetooth Low Energy OFF. Power supply: 3Vdc (2xAAA 1.5 Vdc batteries). Horizontal polarization

RE FCC Part 15 ClassB 1-12,75 GHz

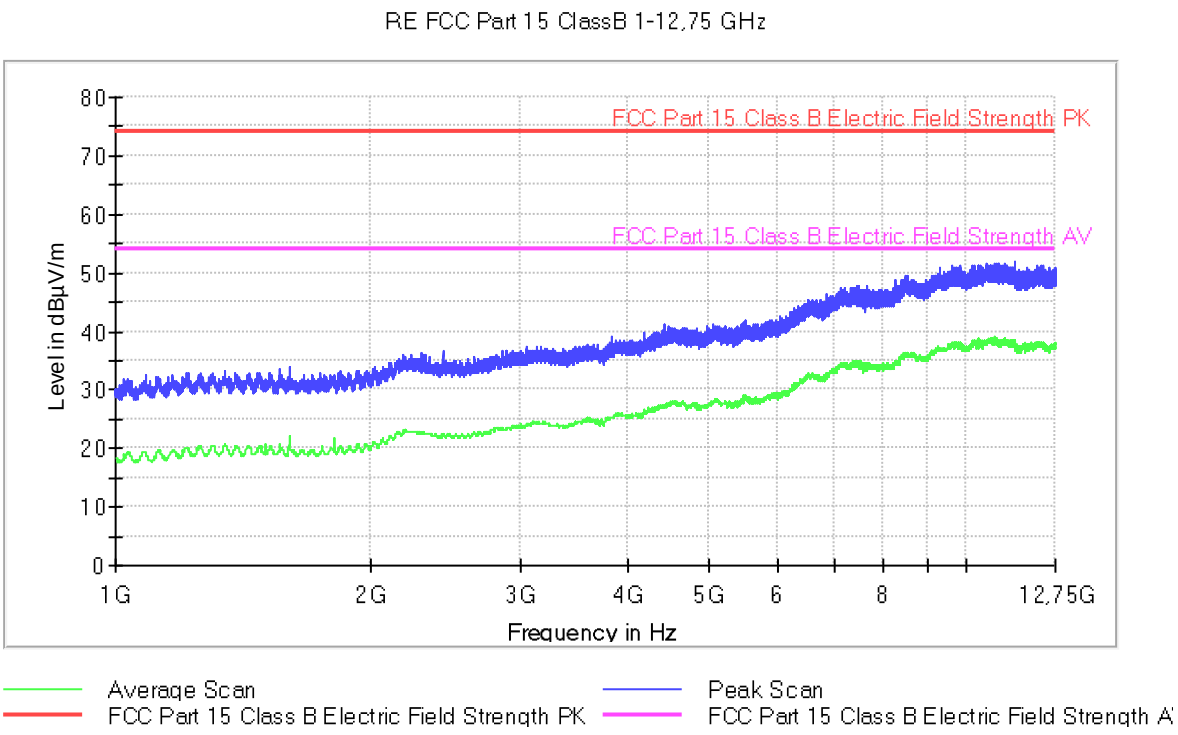


Subrange Maxima

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
2162.800000	35.6	22.3
3259.600000	37.7	23.9
4499.600000	40.6	27.8
5617.600000	42.0	28.2
6477.200000	46.2	32.2
7226.800000	47.7	34.2
9221.600000	50.6	36.9
10351.600000	51.9	38.4
10820.800000	52.2	38.4
12126.800000	51.2	37.9

Radiated Emission. CR0101HR_PV

Project:	66212REM.001
Company:	GRANT4COM OY(FINAL CUSTOMER: HALTIAN)
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Bluetooth Low Energy OFF. Power supply: 3Vdc (2x AAA 1.5Vdc batteries). Vertical polarization



Subrange Maxima

Frequency (MHz)	PK+_CLRWR (dBµV/m)	AVG_CLRWR (dBµV/m)
2174.000000	35.9	22.6
3051.600000	37.6	24.2
4411.200000	41.1	27.4
5514.400000	41.9	28.5
6863.200000	46.5	32.2
7473.600000	47.8	34.2
9181.200000	49.7	36.7
10256.000000	51.4	38.6
11402.800000	52.1	38.1
12282.400000	51.2	38.0