



Test report No:
 NIE: 64983REM.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	Thingsee AIR is an IoT device for monitoring indoor air quality
(*) Trademark	Thingsee AIR
(*) Model and /or type reference	TCO
Other identification of the product	HW Version: TCO_01 SW Version: ts-air-wp50_2020.08.18.4_rel_0.0.17 FCC ID: 2AEU3TSAIR IC: 20236-TSAIR
(*) Features	BLE 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
Date of issue	2020-10-06
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 $l = \pm 4,9$ dB for quasi-peak measurements, $l = \pm 4,6$ 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 $l = \pm 2,6$ 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 Thingsee AIR is an IoT device for monitoring indoor air quality, the device contains Co², TVOC, temperature, barometric pressure and humidity sensors and data is sent to cloud via Thingsee Gateway.

DEKRA 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**, emission sample, is composed by the following elements:

Control N°	Description	Model	Serial N°	Date of reception
64983/003	Thingsee AIR device	TCO	EW102500596	2020-08-31

Test sample description

Ports..... :	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded		
				<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>		
Supplementary information to the ports..... :	Not provided data						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	AC:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	DC: 3.0V, 2 x AA 1.5V alkaline primary batteries					
Rated Power	Peak 300mW (3V x 100mA x 5ms) , Average 240 uW (3V x 80uA)						
Clock frequencies..... :	BT IC clocks 32.768kHz, 32MHz						
Other parameters	Not provided data						
Software version	ts-air-wp50_2020.08.18.4_rel_0.0.17						
Hardware version	TCO_01						
Dimensions in mm (W x H x D) ...:	9,2 x 5,5 x 2,6						
Mounting position	<input type="checkbox"/>	Table top equipment					
	<input checked="" type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					
Modules/parts..... :	Module/parts of test item		Type		Manufacturer		
	Not provided data						
Accessories (not part of the test item)	Description		Type		Manufacturer		
	Not provided data						
Documents as provided by the applicant..... :	Description		File name		Issue date		
	Not provided data						

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)	2020-08-31
Date (finish)	2020-08-31

Document history

Report number	Date	Description
64983REM.001	2020-10-06	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
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2021-07-31
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	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	---
6496	HORN ANTENNA 1-18 GHz	BBHA 9120 D	SCHWARZBECK	2023-08-24

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

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 %
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 °C Max. = 35 °C
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: 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 – 26 GHz)	N/A	(1)
Continuous conducted emission (150 KHz – 30 MHz)	N/A	(2)
<u>Supplementary information and remarks:</u>		
(1) Range: $f > 12.75$ GHz. Test required only if the 5 th harmonics of the maximum internal work frequency EUT is higher than 12.75GHz.		
(2) Not applicable according to Clause 15.107 of the standard. Battery powered device.		

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 in RX mode. Power supply: 3Vdc, 2 x AA batteries.

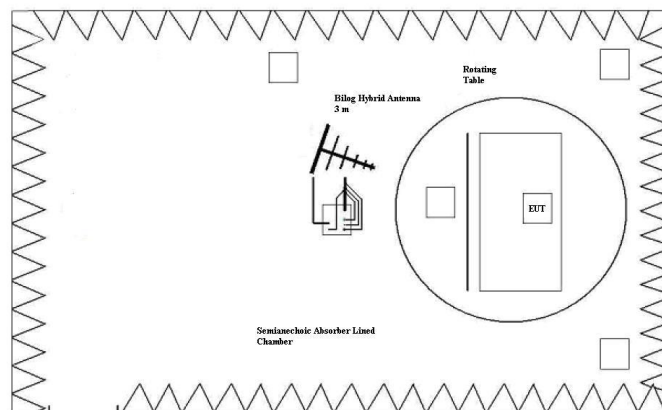
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

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)

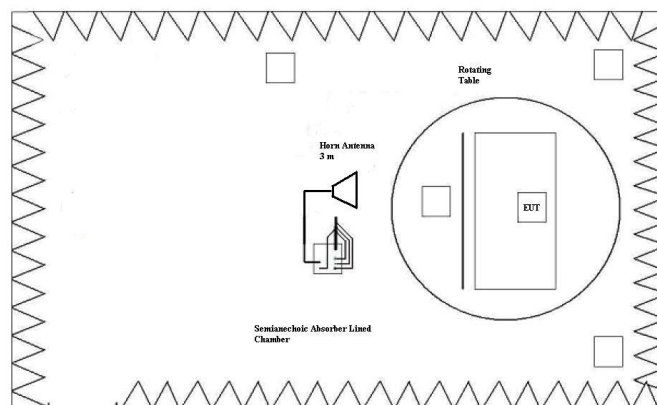
Limits of interference Class B

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.

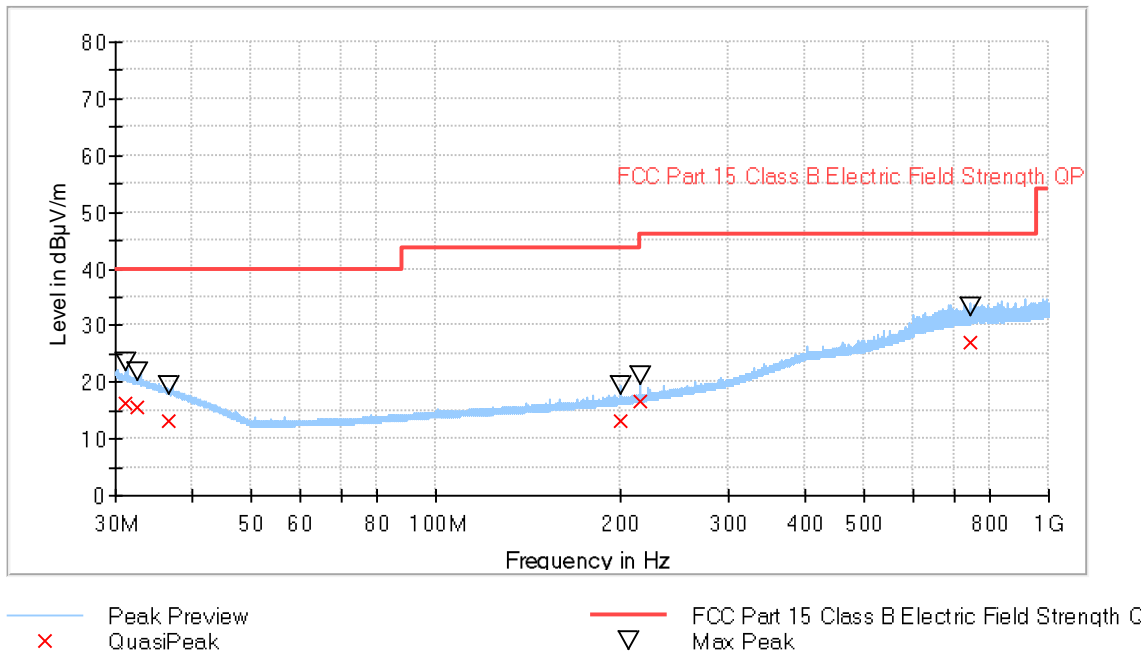
TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR_HP	Range: 1 GHz – 12,75 GHz. Horizontal Polarization.	P
CR0101HR_VP	Range: 1 GHz – 12,75 GHz. Vertical Polarization.	P

Radiated Emission. CR0101LR

Project: 64983REM.001
 Company: GRANT4COM OY (FINAL CUSTOMER: HALTIAN)
 Sample: S/01
 Operation mode: OM/01
 Description: EUT ON. Bluetooth in RX mode. Power supply: 3Vdc, 2 x AA batteries.

Full Spectrum



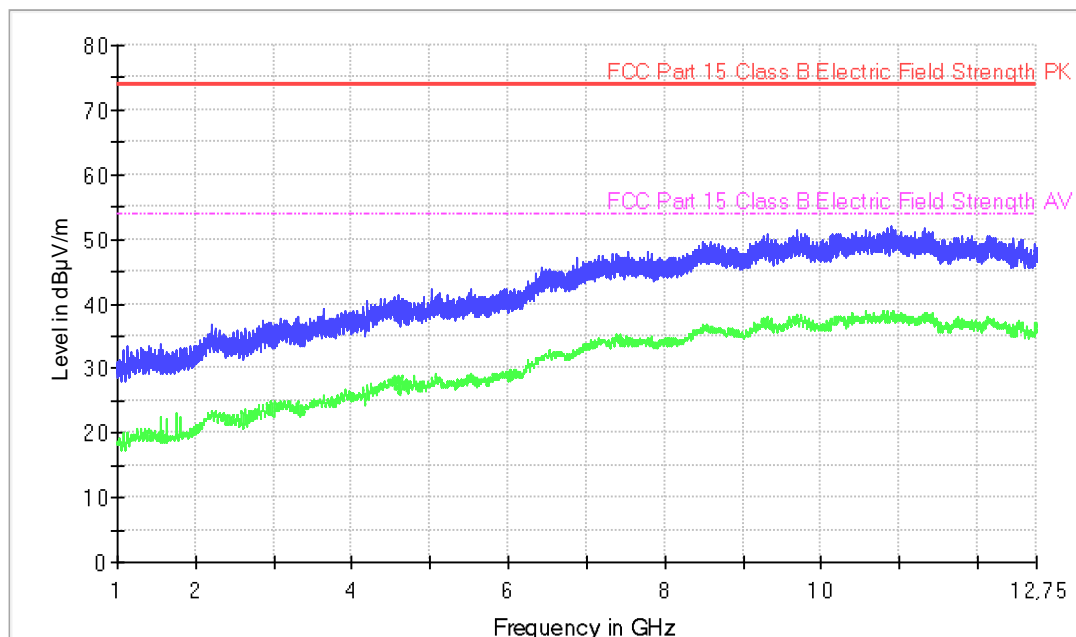
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.075000	16.14	23.62	40.00	23.86	256.0	H	-100.0
32.428000	15.43	21.67	40.00	24.57	363.0	H	-8.0
36.729000	13.28	19.31	40.00	26.72	311.0	H	27.0
200.048000	13.29	19.37	43.52	30.23	227.0	H	75.0
215.996000	16.79	21.19	43.52	26.73	107.0	V	-174.0
744.406000	27.03	33.10	46.00	18.97	218.0	V	-125.0

Radiated Emission. CR0101HR_HP

Project: 64983REM.001
 Company: GRANT4COM OY (FINAL CUSTOMER: HALTIAN)
 Sample: S/01
 Operation mode: OM/01
 Description: EUT ON. Bluetooth in RX mode. Power supply: 3Vdc, 2 x AA batteries. Horizontal polarization.

RE FCC Part 15 ClassB 1-12,75 GHz



— Peak Scan — Average Scan

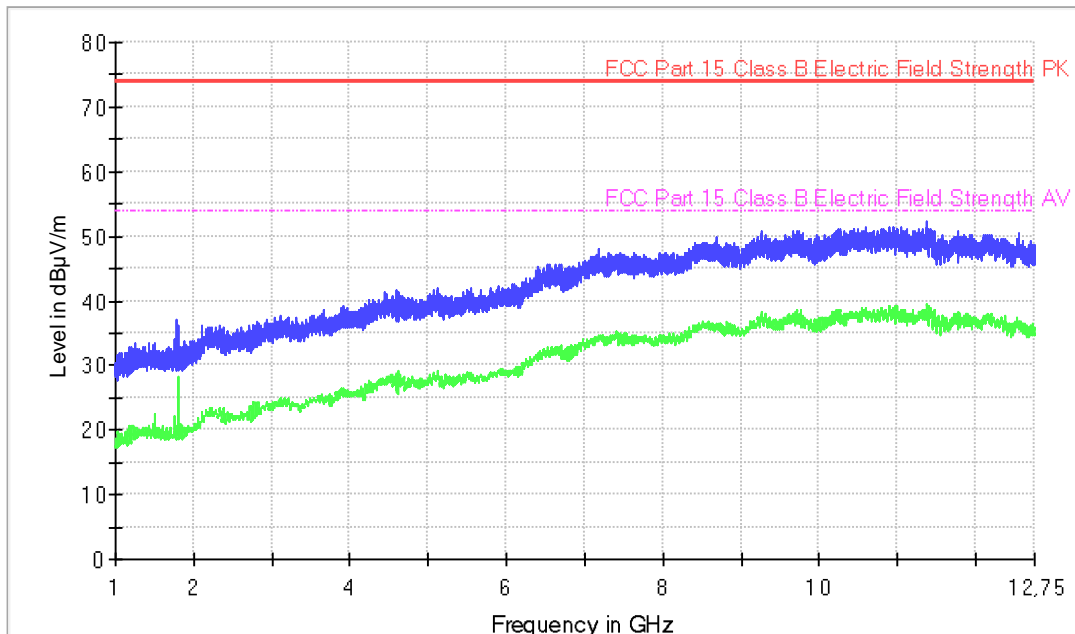
Subrange Maxima

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
2155.200000	35.2	22.8
3300.400000	38.1	24.9
4354.400000	40.9	27.6
5529.600000	42.4	28.9
6833.600000	45.8	32.7
7518.400000	48.0	34.4
9223.200000	49.7	36.7
9690.800000	51.4	37.5
10889.200000	52.1	38.5
12128.000000	50.6	37.7

Radiated Emission. CR0101HR_VP

Project: 64983REM.001
 Company: GRANT4COM OY (FINAL CUSTOMER: HALTIAN)
 Sample: S/01
 Operation mode: OM/01
 Description: EUT ON. Bluetooth in RX mode. Power supply: 3Vdc, 2 x AA batteries. Vertical polarization.

RE FCC Part 15 ClassB 1-12,75 GHz



— Peak Scan — Average Scan

Subrange Maxima

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
1783.600000	37.1	20.6
3105.200000	37.8	24.6
4429.200000	41.4	27.4
5550.400000	42.1	28.2
6544.800000	45.8	32.3
7174.400000	48.1	34.0
9219.200000	49.9	37.2
10261.200000	51.2	38.1
11379.600000	52.4	39.6
11766.800000	50.8	37.1