



Test report No:
NIE: 64734REM.001

Test report

FCC Rules and Regulations CFR 47, Part 15,
Subpart B (10-1-19 Edition) & ICES-003 Issue 6
(January 2016, Updated April 2019)

(*) Identification of item tested	Gateway device with Wirepas mesh network connectivity, getting data wirelessly from the sensors and delivering data via Ethernet connectivity to Thingsee Cloud.
(*) Trademark	Thingsee GATEWAY LAN
(*) Model and /or type reference	LKU
Other identification of the product	HW version: 0101 SW version: 2020.03.31.2 FCC ID: 2AEU3TSGWLN IC: 20236-TSGWLN
(*) Features	Passing sensor data to the internet. LED indicates operation mode. Device doesn't have any buttons. Device starts when connected to USB-C power supply and shuts down when power supply removed. LED functionality: - Normal operation (device is connected to LAN network with Ethernet cable): Green blinking once in every second - Searching or cannot find Ethernet connectivity: Green blinking once in every two seconds Firmware update: Green and red LED blinking during update process.
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 (Updated 04-2019)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager
Date of issue	2020-06-01
Report template No	FDT08_22 (*) "Data provided by the client"

Index

Competences and guarantees	3
General conditions	3
Uncertainty	3
Data provided by the client.....	4
Usage of samples	4
Test sample description	4
Identification of the client.....	5
Testing period and place.....	5
Document history	5
List of equipment used during the test.....	6
Environmental conditions	7
Remarks and comments	8
Testing verdicts.....	8
Summary	8

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.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Testing and Certification.

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.
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.

Data provided by the client

The following data has been provided by the client:

- Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
- The sample consists of a device that functions as gateway. Thingsee sensors are connected to the device via Wirepas Mesh network. Sensors send data to the Gateway, which collects the data and sends the data to the Thingsee cloud via Ethernet connectivity.

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 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
64734/004	GATEWAY LAN device	LKU	ESC91800050	2020-04-20

Sample S/01 is composed of the following auxiliary elements:

Control N°	Description	Model	Serial N°	Date of reception
64734/007	AC/DC adapter	SYS1561-1105	---	2020-04-20

Test sample description

Ports..... :	Port name and description		Cable				
			Specified length [m]	Attached during test		Shielded	
	LAN		10	☒		☐	
	USB-C		1.4	☒		☐	
			☐		☐		
Supplementary information to the ports..... :	Expansion (inside equipment): Holdover and GNSS receiver						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐ AC:	☐	☐	☐	☐	☐	☐
☒ DC: 5Vdc.							
Rated Power	0,7W (140mA/5V)						
Clock frequencies	BLE clock 32MHz, LAN clock 25MHz, MCU clock 25MHz						
Other parameters..... :	Not provided data						
Software version	Not provided data						
Hardware version..... :	0101						
Dimensions in mm (W x H x D).... :	Not provided data						

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
	Nordic nRF52832			Nordic
Accessories (not part of the test item)	Description		Type	Manufacturer
Documents as provided by the applicant.....	Description		File name	Issue date

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)	2020-04-21
Date (finish)	2020-04-22

Document history

Report number	Date	Description
64734REM.001	2020-06-01	First release

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
0482	SEMIANECHOIC ABSORBER LINED CHAMBER 1	11.BS	IRSA	---
0549	CAMARA CONDUCTIDA	-	IRSA	---
1650	THREE-PHASE ARTIFICIAL V-NETWORK 100A	NNLK8121	SCHWARZBECK	2021-09-24
1935	PRECOMPLIANCE EMI TEST RECEIVER 9kHz-3GHz	ESPI3	ROHDE AND SCHWARZ	2022-02-05
3545	USB TEMPERATURE AND HUMIDITY SENSOR	HUMIDIPROBE	PICO TECHNOLOGY	2021-04-22
3547	USB TEMPERATURE AND HUMIDITY SENSOR	HUMIDIPROBE	PICO TECHNOLOGY	2020-04-03
3548	USB TEMPERATURE AND HUMIDITY SENSOR	HUMIDIPROBE	PICO TECHNOLOGY	2021-04-29
5151	TRANSIENT LIMITER 10DB N CONNECTOR	VTSD 9561-F	SCHWARZBECK	2020-10-01
6815	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2022-02-01
7816	EMI TEST RECEIVER 1Hz-26.5GHz	ESW26	ROHDE AND SCHWARZ	2021-09-05

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: José Antonio Santiago & Juan Manuel Pino.

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)	P	---
<u>Supplymentary information and remarks:</u> (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.		

Appendix A: Test results

Appendix A content

DESCRIPTION OF THE OPERATION MODES..... 11

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE..... 12

CONTINUOUS CONDUCTED EMISSION..... 17

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. BLE unpaired. RX mode. Power supply: 5Vdc.
OM#02	EUT ON. BLE unpaired. TX mode. Power supply: 5Vdc.

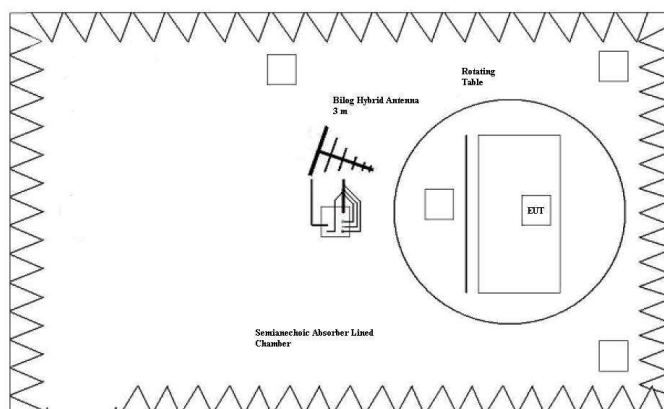
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Secs. 15.109; ICES-003 (January 2016, updated April 2019)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Secs. 15.109; ICES-003 (January 2016, updated April 2019)

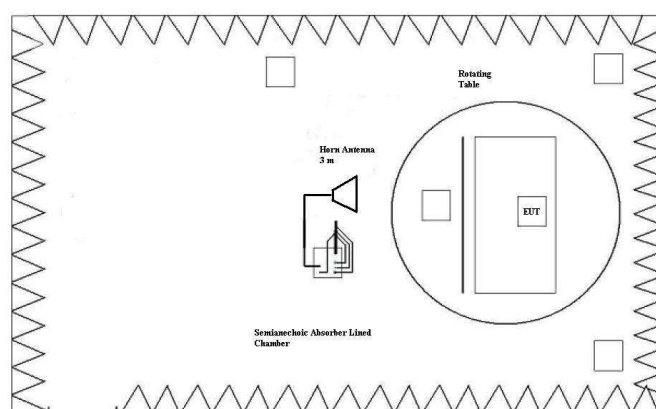
Limits of interference Class B

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.

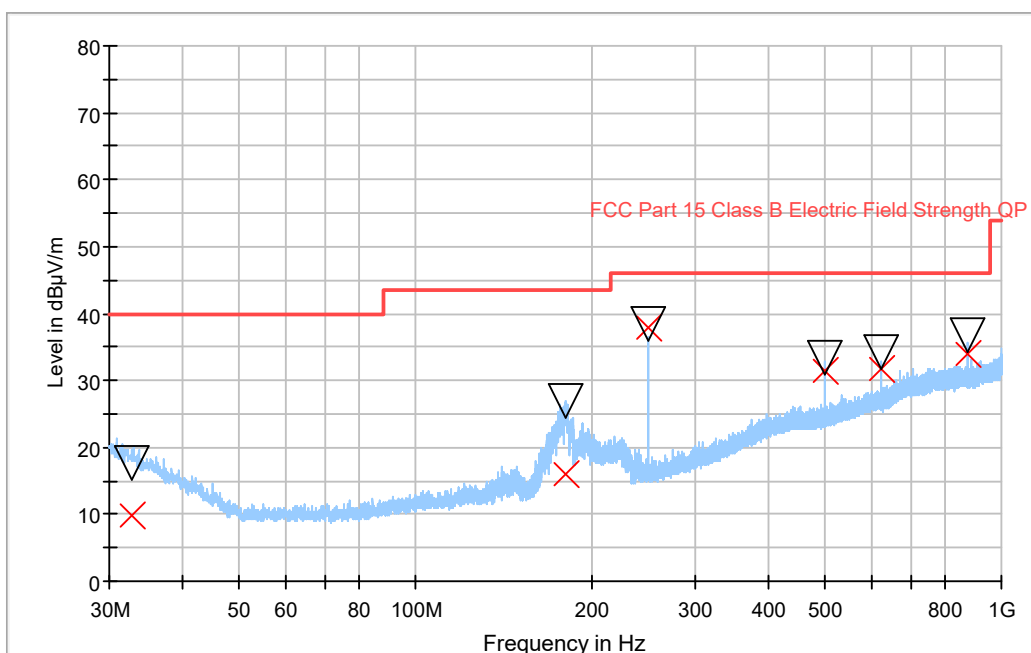
TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01
TEST RESULTS:	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

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

Radiated Emission. CR0101LR

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. BLE OFF. Power supply: 5Vdc

Full Spectrum



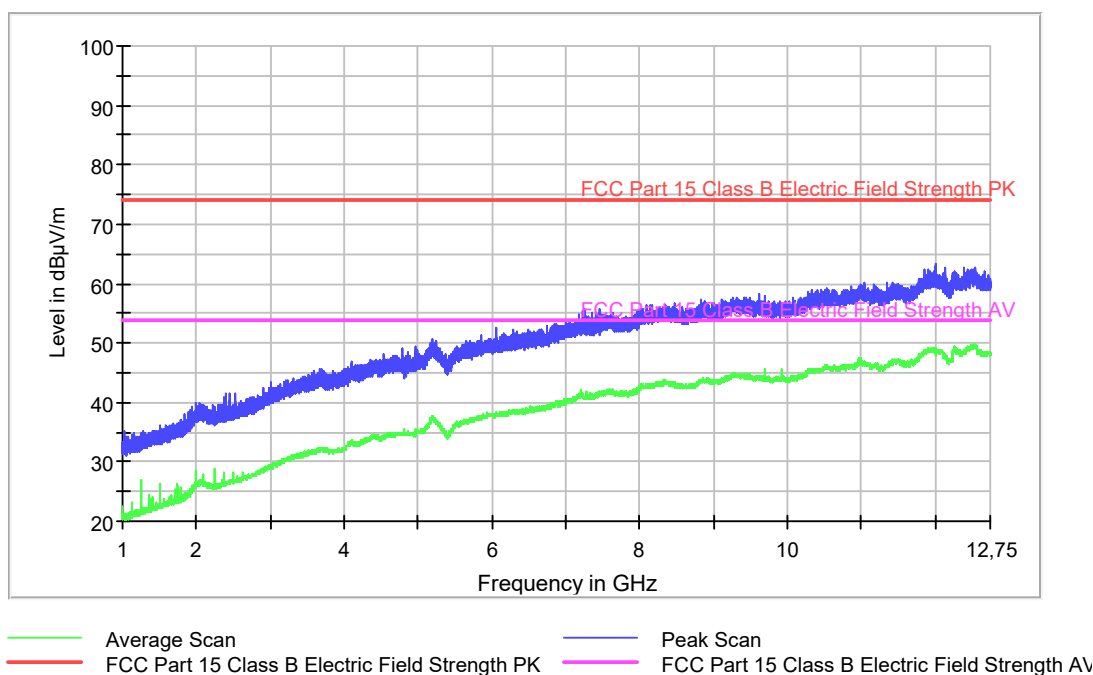
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.672000	9.73	17.82	30.27	136.0	H	321.0	17.1
180.048000	16.04	26.83	23.96	157.0	H	32.0	14.1
250.000000	37.86	38.57	9.14	121.0	V	351.0	16.2
500.012000	31.41	33.54	15.59	167.0	H	94.0	24.1
625.014000	31.82	34.33	15.18	127.0	H	86.0	26.8
875.023000	33.87	36.80	13.13	100.0	H	78.0	29.5

Radiated Emission. CR0101HR PH

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. BLE in IDLE mode. Horizontal polarization.

RE FCC Part 15 ClassB 1-12,75 GHz



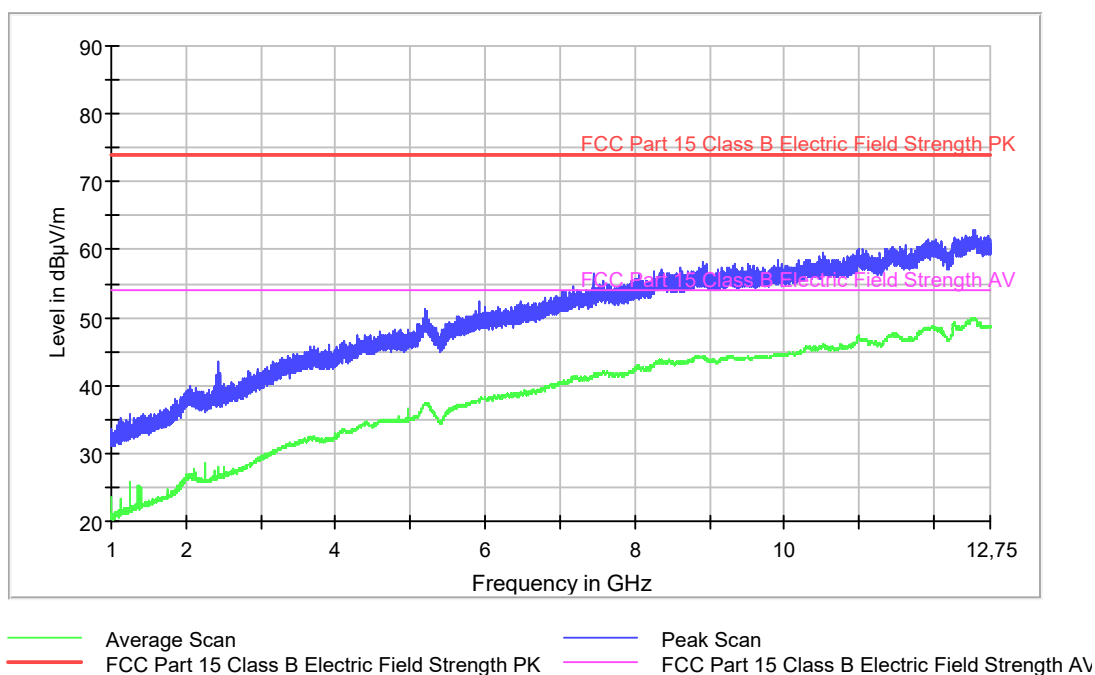
Subrange Maxima

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
2000.000000	39.9	28.5
3308.400000	43.9	30.9
4494.000000	47.3	33.6
5200.000000	50.5	37.5
6853.200000	53.3	39.8
7259.200000	55.8	40.6
8839.200000	57.2	43.8
10332.000000	59.0	45.5
11339.600000	60.1	46.1
12000.800000	63.3	48.8

Radiated Emission. CR0101HR PV

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. BLE in IDLE mode. Vertical polarization.

RE FCC Part 15 ClassB 1-12,75 GHz



Subrange Maxima

Frequency (MHz)	PK+ CLRWR (dBµV/m)	AVG CLRWR (dBµV/m)
2052.000000	39.9	26.9
3285.600000	44.1	31.0
4384.400000	47.4	34.3
5184.000000	51.3	37.3
6805.200000	52.9	39.6
7440.000000	56.6	41.7
8906.800000	58.0	44.3
10182.000000	58.6	44.8
11440.000000	60.5	47.5
12549.600000	62.8	49.9

CONTINUOUS CONDUCTED EMISSION

LIMITS:	Product standard :	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Secs. 15.107; ICES-003 Issue 6 (January 2016, updated April 2019)
	Test standard :	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition), Secs. 15.107; ICES-003 Issue 6 (January 2016, updated April 2019)

CLASS B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-19 Edition), Secs. 15.107 & ICES-003 Issue 6 (January 2019), in the frequency range 0,15 to 30 MHz, for Class A equipment was:

Frequency range (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

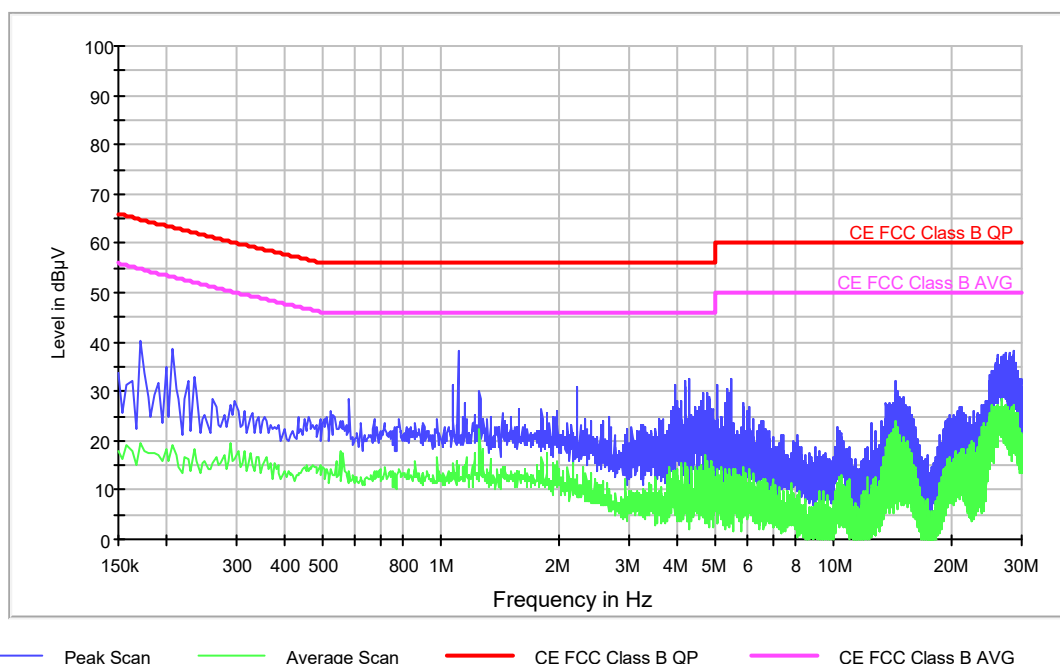
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#01 & OM#02
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	DESCRIPTION	RESULT
CC01010N	Range: 150kHz – 30MHz. Neutral wire noise.	P
CC0101L1	Range: 150kHz – 30MHz. Phase wire noise.	P
CC01020N	Range: 150kHz – 30MHz. Neutral wire noise.	P
CC0102L1	Range: 150kHz – 30MHz. Phase wire noise.	P

Conducted Emission. CC01010N

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. BLE unpaired, RX mode. Power supply: 5Vdc (through an AC/DC adapter powered 115Vac, 60Hz). Neutral wire noise

EC FCC Class B ESPI CC



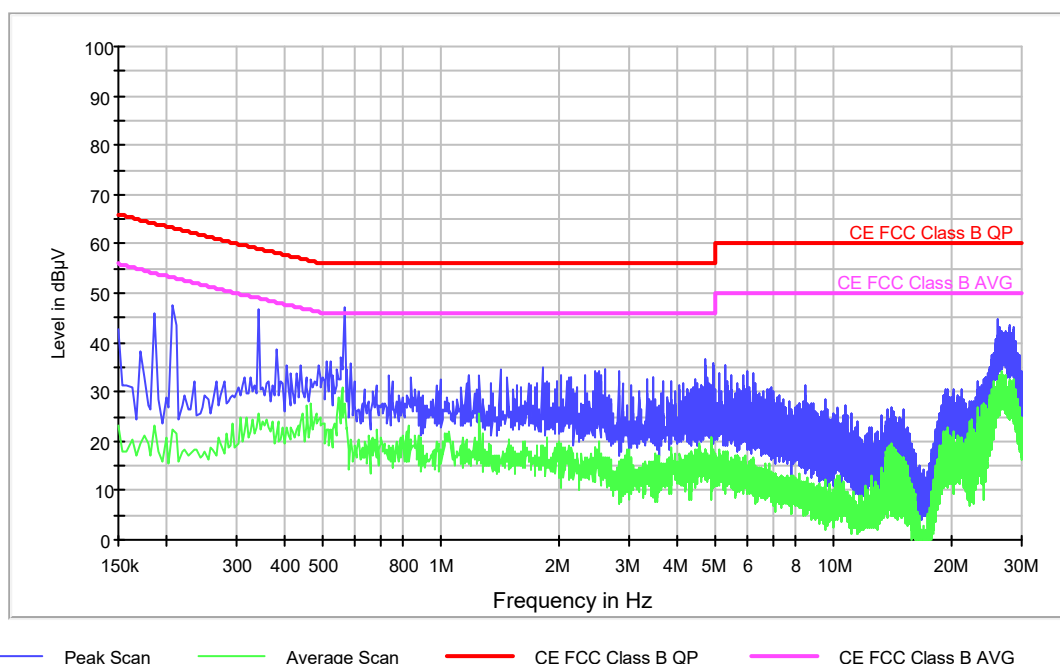
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.170000	40.4	19.4
0.262000	28.6	15.3
0.582000	28.4	13.8
1.102000	38.0	14.8
1.250000	30.2	22.3
2.206000	31.0	11.3
4.286000	32.6	11.1
6.198000	24.6	10.5
14.250000	31.9	24.0
28.566000	38.1	26.9

Conducted Emission. CC0101L1

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#01
Description: EUT ON. BLE unpaired, RX mode. Power supply: 5Vdc (through an AC/DC adapter powered 115Vac, 60Hz). Phase wire noise

EC FCC Class B ESPI CC



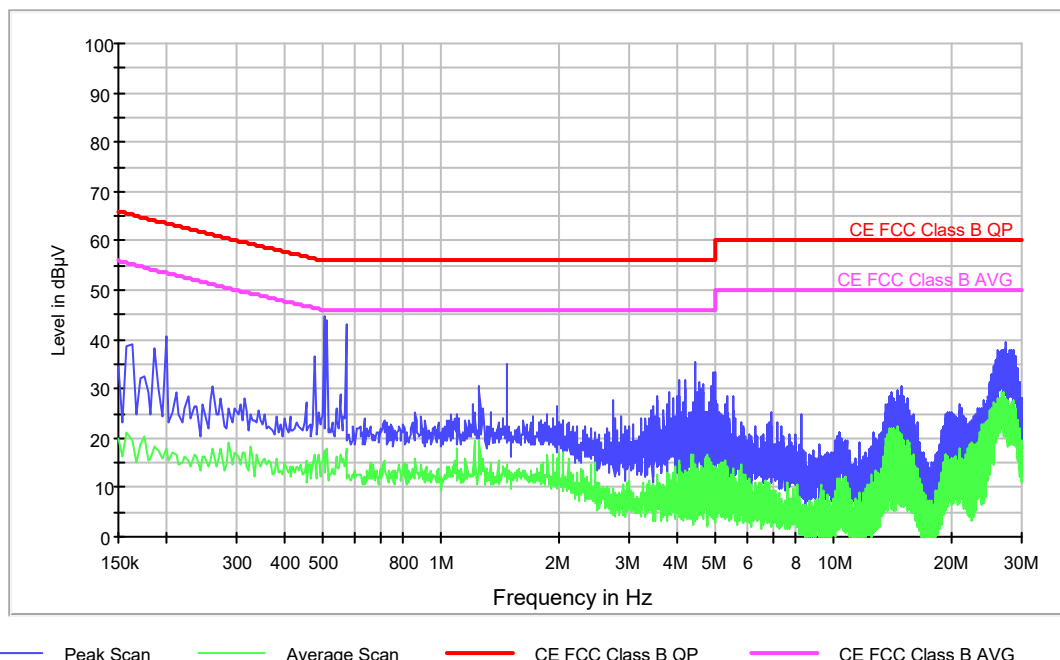
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.206000	47.7	22.5
0.342000	46.9	25.8
0.566000	47.2	27.7
1.166000	33.4	17.5
1.802000	35.1	19.3
2.614000	34.4	16.6
4.674000	36.8	18.2
6.230000	33.7	14.8
10.698000	27.1	9.1
26.110000	44.8	30.8

Conducted Emission. CC01020N

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#02
Description: EUT ON. BLE unpaired, TX mode. Power supply: 5Vdc (through an AC/DC adapter powered 115Vac, 60Hz). Neutral wire noise

EC FCC Class B ESPI CC



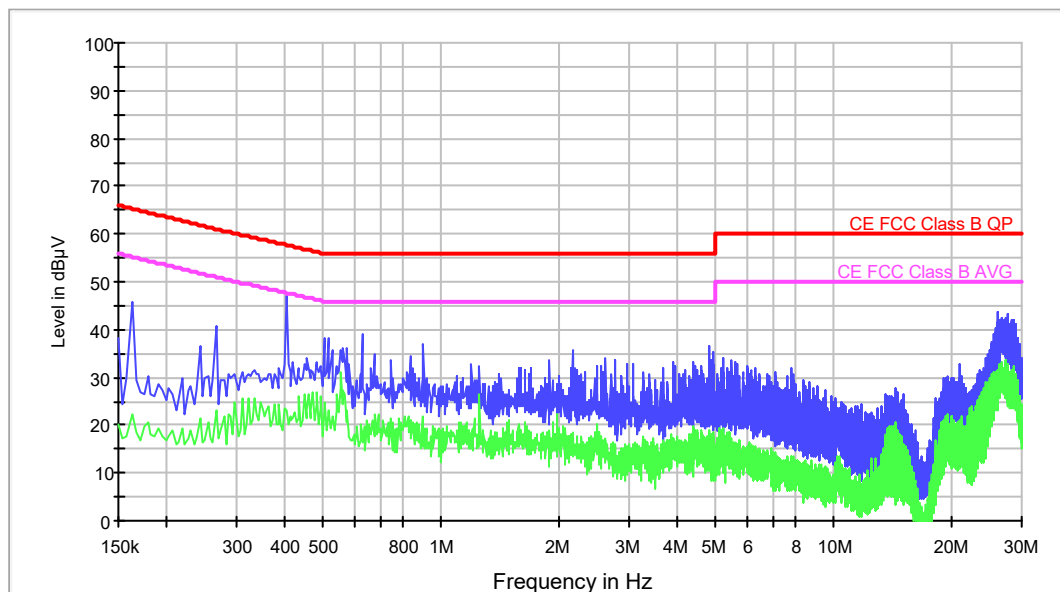
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBμV)	Average-ClearWrite (dBμV)
0.198000	40.5	18.1
0.262000	30.6	17.8
0.502000	44.8	17.6
1.246000	30.7	19.4
1.466000	34.9	14.8
3.534000	28.3	12.7
4.442000	35.5	12.8
6.922000	25.2	8.3
14.846000	30.6	19.3
27.430000	39.5	28.0

Conducted Emission. CC0102L1

Project: 64734REM.001
Company: HALTIAN PRODUCTS OY
Sample: S/01
Operation mode: OM#02
Description: EUT ON. BLE unpaired, TX mode. Power supply: 5Vdc (through an AC/DC adapter powered 115Vac, 60Hz). Phase wire noise

EC FCC Class B ESPI CC



— Peak Scan — Average Scan — CE FCC Class B QP — CE FCC Class B AVG

Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.162000	46.0	22.1
0.402000	46.9	22.9
0.626000	39.2	17.8
0.898000	37.1	17.2
1.886000	33.5	19.0
2.150000	35.6	18.3
4.790000	36.4	19.1
7.806000	32.0	13.5
14.254000	27.8	17.8
26.110000	43.5	31.5