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

DEKRA

ENSAYOS Nº 51/LE147

Test report No:
NIE: 65644REM.004

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	Temperature & Humidity logger with internal sensor
(*) Trademark	ELPRO
(*) Model and /or type reference	LIBERO CH
(*) Derived model not tested	LIBERO CL
Other identification of the product	HW Version: V04 SW Version: V9.11 RC31 FCC ID: Z45LIBEROCEHL IC: 9954A-LIBEROCEHL
(*) Features	Bluetooth LE 4.2
Manufacturer	ELPRO-BUCHS AG. Langäulistrasse, 45. 9470 Buchs SG, St. Gallen, Switzerland.
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 2020.11.14 14:17:42 +01'00'
Date of issue	2020-09-28
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.
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.

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 temperature & humidity logger with internal sensor. The LIBERO CH data logger is a device for temperature and relative humidity monitoring using an internal temperature and humidity probe. LIBERO CH saves temperature and humidity measurement values and is able to generate a PDF report when connected to an USB port on your computer. The LIBERO CH data logger features Bluetooth Low Energy (BLE) and usage of liberoAPP.
3. Derived model not tested. These models have been declared by the supplier of the sample as being the same as the model under test.

Date: October 27th, 2020

DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía
Severo Ochoa, 2 & 6
29590 Málaga
Spain

Ref: Declaration of Similarity

To whom it may concern:

We, ELPRO-Buchs AG, located in 9470 Buchs; Switzerland declare under our sole responsibility that the products LIBERO CH and LIBERO CL listed below are electrically and mechanically identical, and the only difference is the type of the digital temperature sensor chip, and that this change doesn´t affect in EMC and Safety Testing.

Type of equipment:	internal temperature or relative humidity data loggers
Trade name:	ELPRO
Models name:	LIBERO CH, LIBERO CL

Because of 100% identical BLE (RF-Part), test results of LIBERO CE with an external temperature sensor remain applicable, valid and representative for the models LIBERO CH and LIBERO CL in case of Full RF Testing as well as RF Exposure Testing.

Type of equipment:	internal or external temperature or relative humidity data loggers
Trade name:	ELPRO
Models name:	LIBERO CE, LIBERO CH, LIBERO CL

And as evidence thereof, I hereby issue this letter in Buchs SG / Switzerland on 2020/10/26.

Authorized Signature by:

27.08.2020

ELPRO-BUCHS AG | Langaeulistrasse 45
9470 Buchs SG | Switzerland
T + 41 81 552 08 08 | www.elpro.com

By:	Dirk Neumann
Title:	CTO – System & SW Dev
Company:	ELPRO-Buchs AG
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e-mail:	dirk.neumann@elpro.com

Department | R&D

20201027_Similarity declaration v3orig.docx | Page 1 / 1

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 of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
65644/005	Temperature & humidity logger	LIBERO CH BLE	---	2020-08-31

Sample **S/02**, conducted emission sample, is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
65644/005	Temperature logger	LIBERO CH BLE	---	2020-08-31

Auxiliary elements used with the sample S/02:

Control Nº	Description	Model	Serial Nº	Date of reception
*7520	Laptop	DELL LATITUDE	301JLQ2	---

* This element is property of DEKRA TC

- Sample S/02 is used to perform the testing according to ANSI 63.4

Test sample description

Ports…… :	Port name and description	Cable				
		Specified length [m]	Attached during test	Shielded		
			☐	☐		
			☐	☐		
			☐	☐		
			☐	☐		
Supplymentary information to the ports…… :	Not provided data					
Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 3Vdc. (CR2450 battery)					
Rated Power .....:	30mWp						
Clock frequencies.....:	Not provided data						
Other parameters .....:	Not provided data						
Software version .....:	V9.11 RC31						
Hardware version .....:	V04						
Dimensions in mm (W x H x D)...:	9.5 x 4.5 x 1.1						
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			
	Not provided data					
Accessories (not part of the test item) .....:	Description	Type	Manufacturer			
			Various			
Documents as provided by the applicant.....:	Description	File name	Issue date			
	Not provided data					

Identification of the client

ELPRO-BUCHS AG.
Langäulistrasse, 45.
9470 Buchs SG, St. Gallen, Switzerland.

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-08-31
Date (finish)	2020-09-01

Document history

Report number	Date	Description
65644REM.004	2020-09-28	First release

List of equipment used during the test

Control Number	Description	Model	Manufacturer	Next Calibration
0246	HORN ANTENNA 1-18GHz	11966E	HEWLETT PACKARD	2021-10-13
0482	SEMIANECHOIC ABSORBER LINED CHAMBER 1	11.BS	IRSA	---
0549	CAMARA CONDUCIDA	-	IRSA	---
3545	USB TEMPERATURE AND HUMIDITY SENSOR	HUMIDIPROBE	PICO TECHNOLOGY	2021-04-22
5705	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2021-05-19
7746	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-07-23
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 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: Alejandro Marín & Raúl Alfaya.

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	---
Supplymentary 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.		

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:

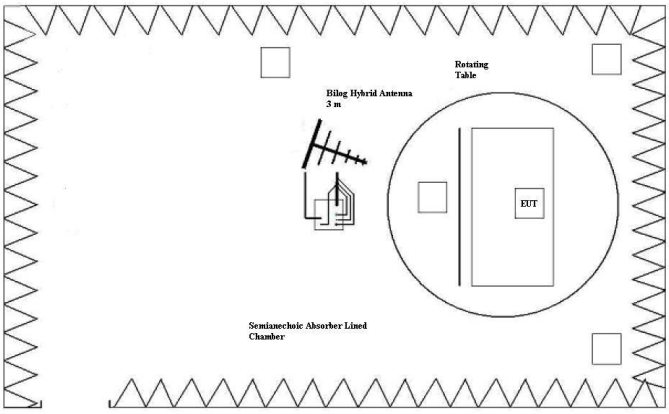
OPERATION MODE	DESCRIPTION
OM#01	EUT ON. Measuring the ambient temperature. Power supply: Internal Battery.(1x CR2450)
OM#02	EUT ON. Dumping the measurements on PC. Transfering data to PC according to ANSI 63.4. Power supply: 5 Vdc (via USB through a laptop supplied by 115 Vac, 60 Hz)

RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

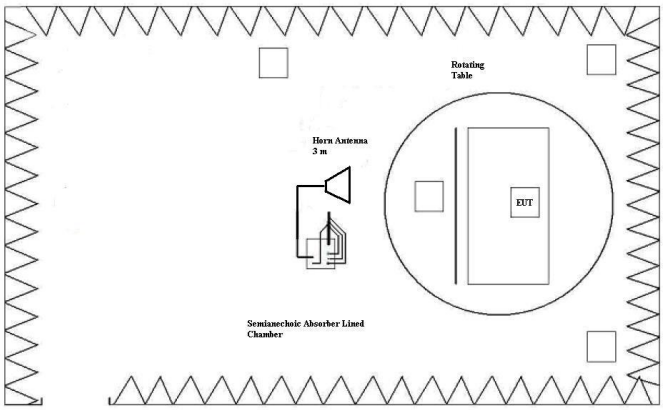
LIMITS:	Product standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)
	Test standard:	FCC CFR 47, Part 15, Subpart B (10-1-19 Edition) & ICES-003 Issue 6 (Updated 2019-04)

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.

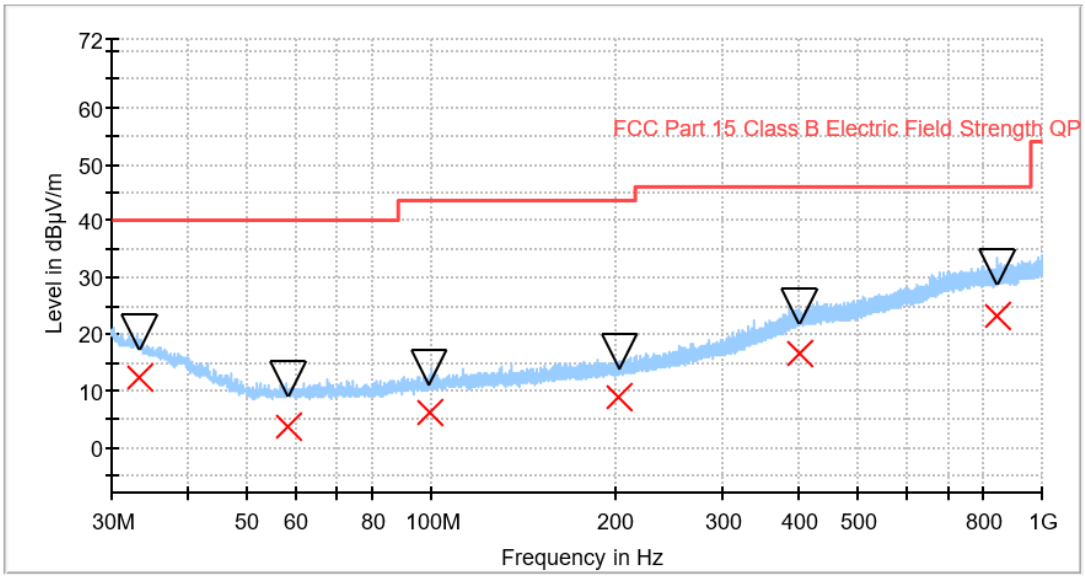
TESTED SAMPLE:	S/01
TESTED OPERATION MODES:	OM#01 & OM#02
TEST RESULTS:	CRmmnnRRPP: CR, Radiated Condition; mm: Sample number; nn: Operation mode; RR: Range; PP: Polarization.

CRmmnnRRPP	Description	Result
CR0101LR	Range: 30 MHz - 1000 MHz.	P
CR0101HR	Range: 1 GHz – 12,75 GHz.	P
CR0102LR	Range: 30 MHz - 1000 MHz.	P
CR0102HR	Range: 1 GHz – 12,75 GHz.	P

Radiated Emission. CR0101LR

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Measuring the ambient temperature. Power supply: Internal Battery.(1x CR2450)

Full Spectrum



Peak Preview
QuasiPeak
FCC Part 15 Class B Electric Field Strength QP
MaxPeak

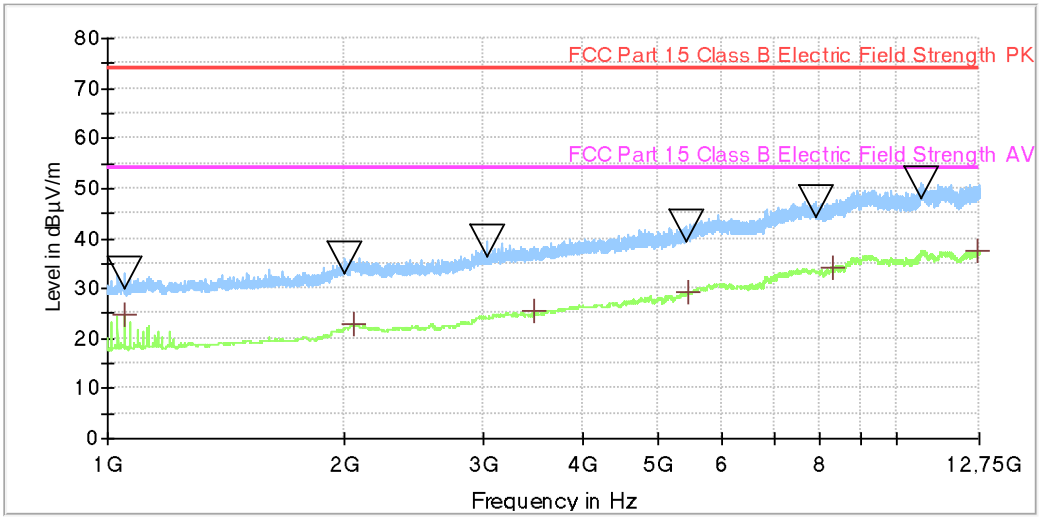
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
33.296000	8.81	16.88	183.0	H	32.0
58.403000	0.23	8.72	268.0	H	325.0
99.538000	2.73	10.87	340.0	V	2.0
202.348000	5.42	13.48	180.0	H	302.0
399.715000	13.29	21.55	259.0	V	248.0
842.083000	19.56	28.20	100.0	V	108.0

Radiated Emission. CR0101HR

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Measuring the ambient temperature. Power supply: Internal Battery.(1x CR2450)

Full Spectrum



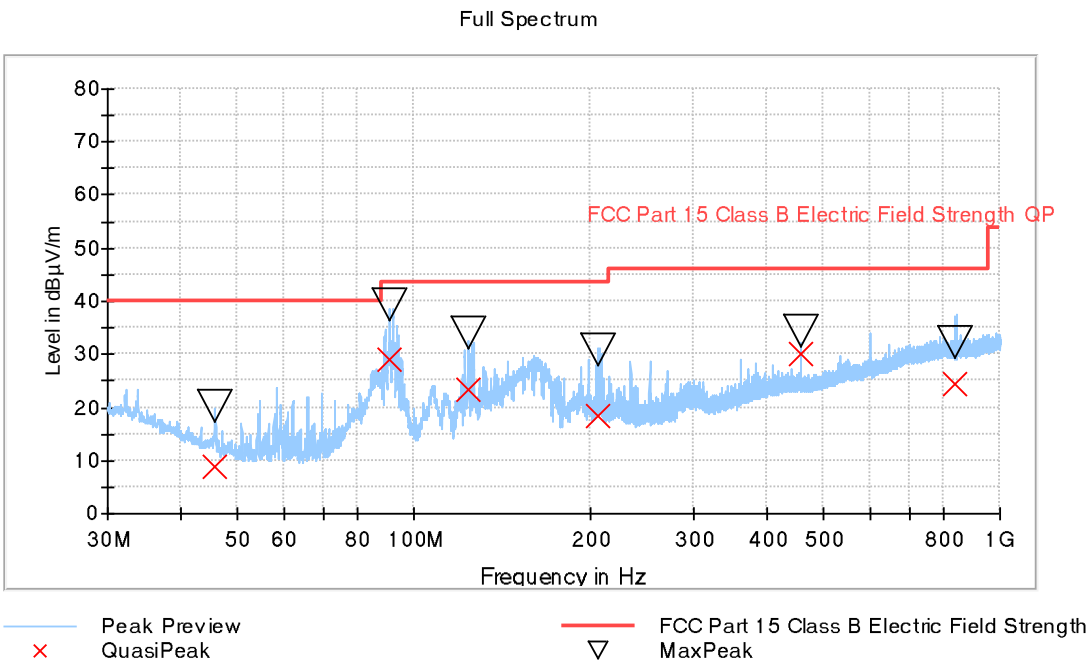
Average Preview
Peak Preview
FCC Part 15 Class B Electric Field Strength PK
FCC Part 15 Class B Electric Field Strength
MaxPeak
Average

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1050.000000	---	24.92	53.97	29.05
1050.400000	33.10	---	73.97	40.87
2001.600000	36.14	---	73.97	37.83
2048.800000	---	22.82	53.97	31.15
3024.400000	39.26	---	73.97	34.71
3475.200000	---	25.39	53.97	28.58
5423.200000	42.54	---	73.97	31.43
5456.400000	---	29.28	53.97	24.69
7915.600000	47.47	---	73.97	26.50
8314.000000	---	34.14	53.97	19.83
10771.200000	51.17	---	73.97	22.80
12692.400000	---	37.66	53.97	16.31

Radiated Emission. CR0102LR

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/01
Operation mode:	OM#02
Description:	EUT ON. Dumping the measurements on PC. Transfering data to PC according to ANSI 63.4. Power supply: 5 Vdc (via USB through a laptop supplied by 115 Vac, 60 Hz)

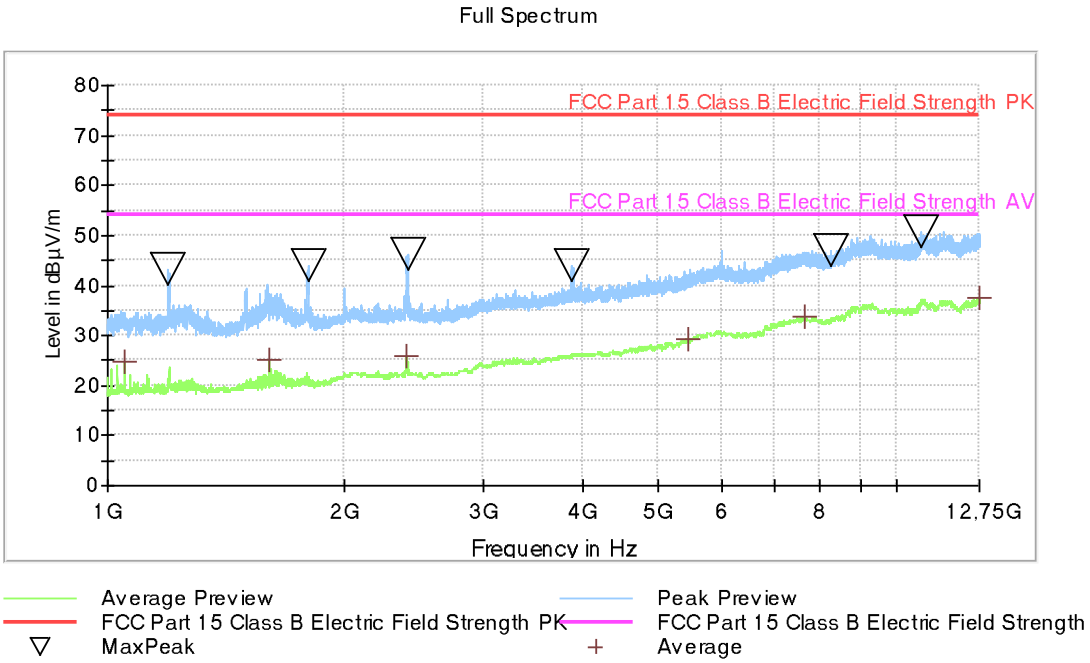


Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)
45.606000	8.86	20.25	40.00	31.14	H	9.0
90.769000	28.86	39.32	43.52	14.66	H	0.0
123.728000	23.25	33.98	43.52	20.27	V	204.0
206.255000	18.41	30.95	43.52	25.11	V	12.0
455.977000	29.99	34.19	46.00	16.01	H	79.0
837.852000	24.34	32.22	46.00	21.66	H	242.0

Radiated Emission. CR0102HR

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/01
Operation mode:	OM#02
Description:	EUT ON. Dumping the measurements on PC. Transfering data to PC according to ANSI 63.4. Power supply: 5 Vdc (via USB through a laptop supplied by 115 Vac, 60 Hz)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1050.000000	---	24.83	53.97	29.14
1194.400000	43.14	---	73.97	30.83
1603.600000	---	25.12	53.97	28.85
1796.400000	44.10	---	73.97	29.87
2391.600000	---	26.08	53.97	27.89
2399.600000	46.30	---	73.97	27.67
3885.200000	43.81	---	73.97	30.16
5454.400000	---	29.25	53.97	24.72
7648.000000	---	33.66	53.97	20.31
8280.400000	46.91	---	73.97	27.06
10780.400000	50.79	---	73.97	23.18
12734.800000	---	37.39	53.97	16.58

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

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)

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 (04-2019) & Subpart C (10-1-19 Edition). Sec. 15.207, in the frequency range 0,15 to 30 MHz, for Class B equipment was:

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

*Decreases with the logarithm of the frequency.

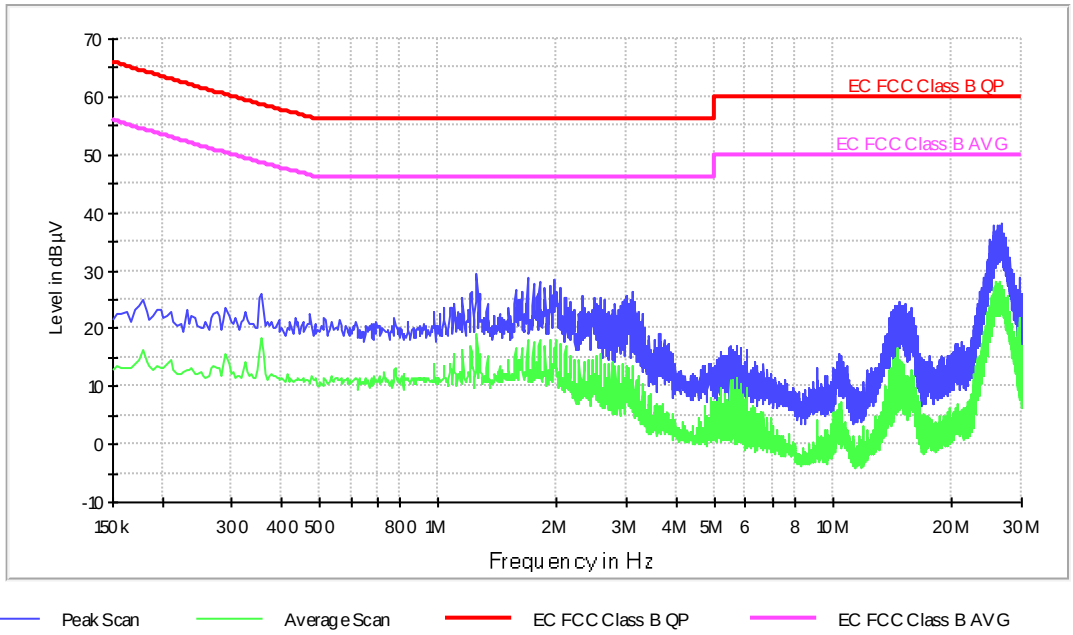
TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	**DESCRIPTION**	**RESULT**
CC01020N	Neutral wire noise.	P
CC0102L1	Phase wire noise.	P

Conducted Emission. CC01020N

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/02
Operation mode:	OM#02
Description:	EUT ON. Dumping the measurements on PC. Transfering data to PC according to ANSI 63.4. Power supply: 5 Vdc (via USB through a laptop supplied by 115 Vac, 60 Hz). Neutral wire noise.

Full Spectrum



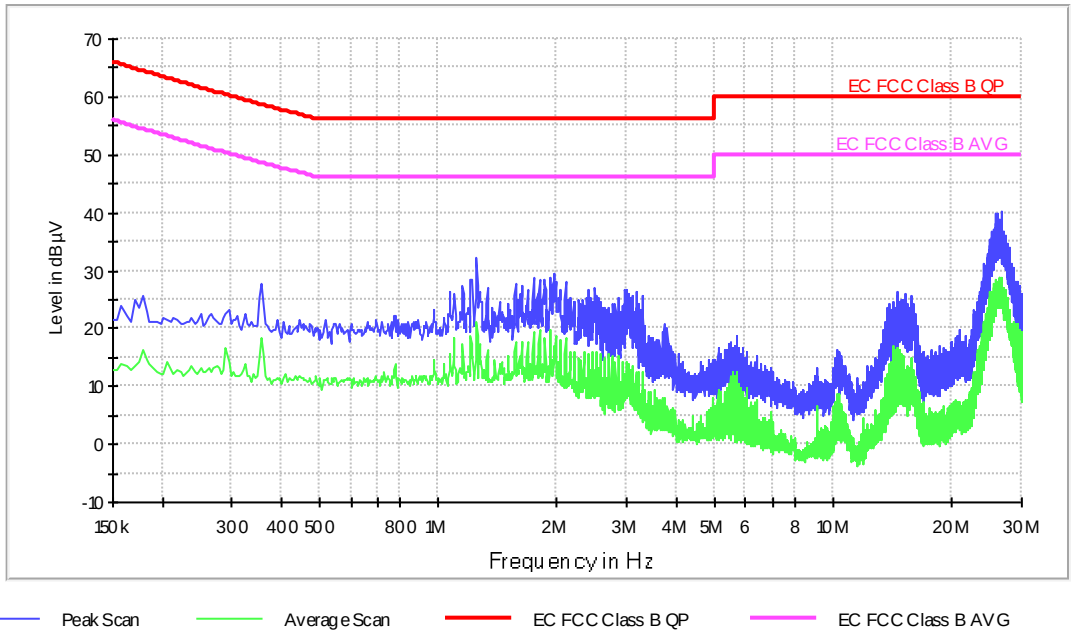
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.178000	24.9	16.3
0.358000	25.9	18.3
0.474000	22.7	10.6
1.246000	28.7	17.2
1.250000	29.5	19.2
3.098000	26.3	12.5
3.630000	19.2	6.5
10.350000	15.5	6.9
14.698000	24.6	14.4
26.738000	38.0	26.1

Conducted Emission. CC0102L1

Project:	65644REM.004
Company:	ELPRO-BUCHS AG
Sample:	S/02
Operation mode:	OM#02
Description:	EUT ON. Dumping the measurements on PC. Transfering data to PC according to ANSI 63.4. Power supply: 5 Vdc (via USB through a laptop supplied by 115 Vac, 60 Hz). Phase wire noise.

Full Spectrum



Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.178000	25.8	16.2
0.358000	27.6	18.3
0.446000	21.5	11.9
1.246000	31.9	18.1
1.250000	32.1	21.0
2.498000	26.9	12.8
3.722000	20.7	6.9
10.274000	16.3	8.8
14.474000	26.2	16.8
26.674000	40.1	27.0