DEKRA Testing and Certification, S.A.U.
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c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

ENSAYOS Nº 51/LE147

Test report No:
NIE: 65644REM.003

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 logger with external PT100 probe
(*) Trademark	ELPRO
(*) Model and /or type reference	LIBERO CE
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 14:17:04 +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.

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 logger with external PT100 probe. The LIBERO CE data logger is a device for temperature monitoring using an external PT100 probe. LIBERO CE saves temperature measurement values and is able to generate a PDF report when connected to a USB port on your computer. The LIBERO CE data logger features Bluetooth Low Energy (BLE) and usage of liberoAPP.

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**, radiated emission sample, is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
65644/002	Temperature logger	LIBERO CE	---	2020-08-31
65644/014	PT100 sensor cable	---	---	2020-08-31

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

Control Nº	Description	Model	Serial Nº	Date of reception
65644/002	Temperature logger	LIBERO CE	---	2020-08-31
65644/014	PT100 sensor cable	---	---	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		
	LIBERO CE Sensor Cable		<3.0m	☒	☐		
				☐	☐		
				☐	☐		
				☐	☐		
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		
	LIBERO CE Sensor Cable		PT100 4 wire		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.003	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 & Humberto Pérez.

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	---
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.		

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)

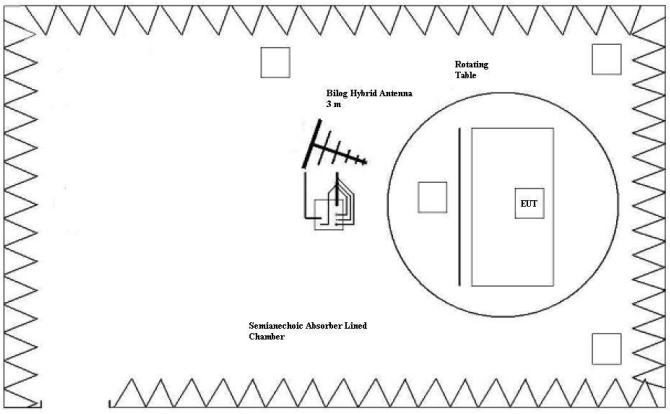
RADIATED EMISSION. ELECTROMAGNETIC FIELD MEASURE

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)

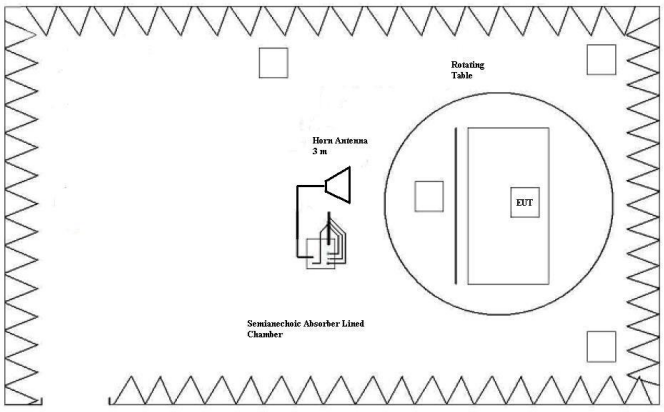
Limits of interference Class B

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.



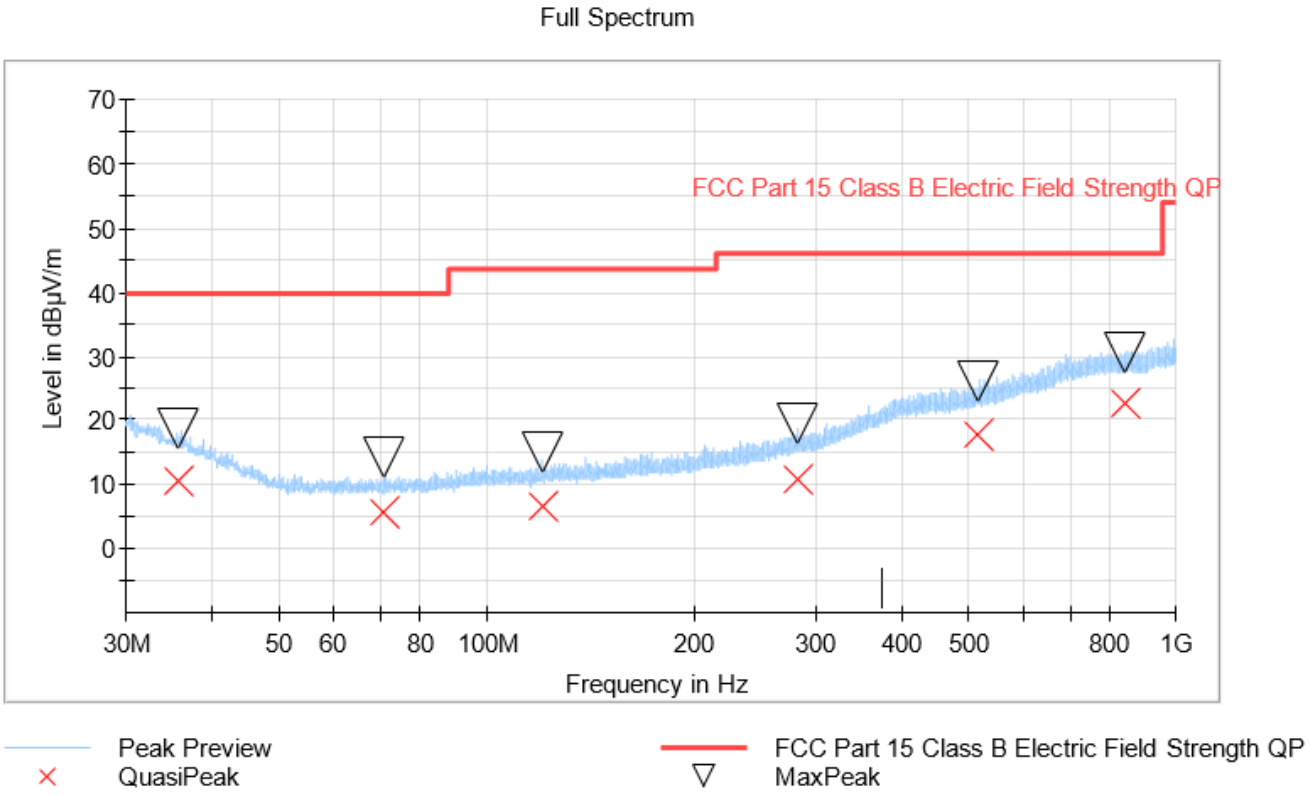
Setup for measurements > 1GHz.

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.003
Company:	ELPRO-BUCHS AG
Sample:	S/01
Operation mode:	OM#01
Description:	EUT ON. Measuring the ambient temperature. Power supply: Internal Battery.(1x CR2450)



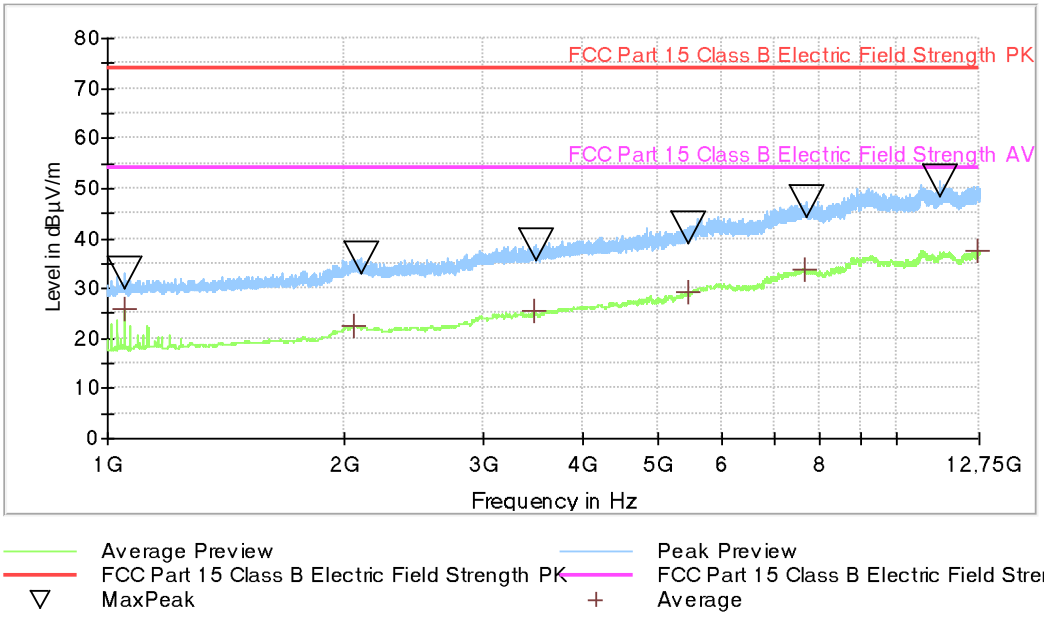
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)
35.871000	6.42	14.49	380.0	V	153.0
71.064000	1.31	10.09	328.0	H	34.0
120.851000	2.38	10.61	172.0	H	55.0
283.608000	6.78	15.15	324.0	H	114.0
518.468000	13.49	21.90	124.0	V	161.0
841.277000	18.37	26.34	259.0	V	296.0

Radiated Emission. CR0101HR

Project:	65644REM.003
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

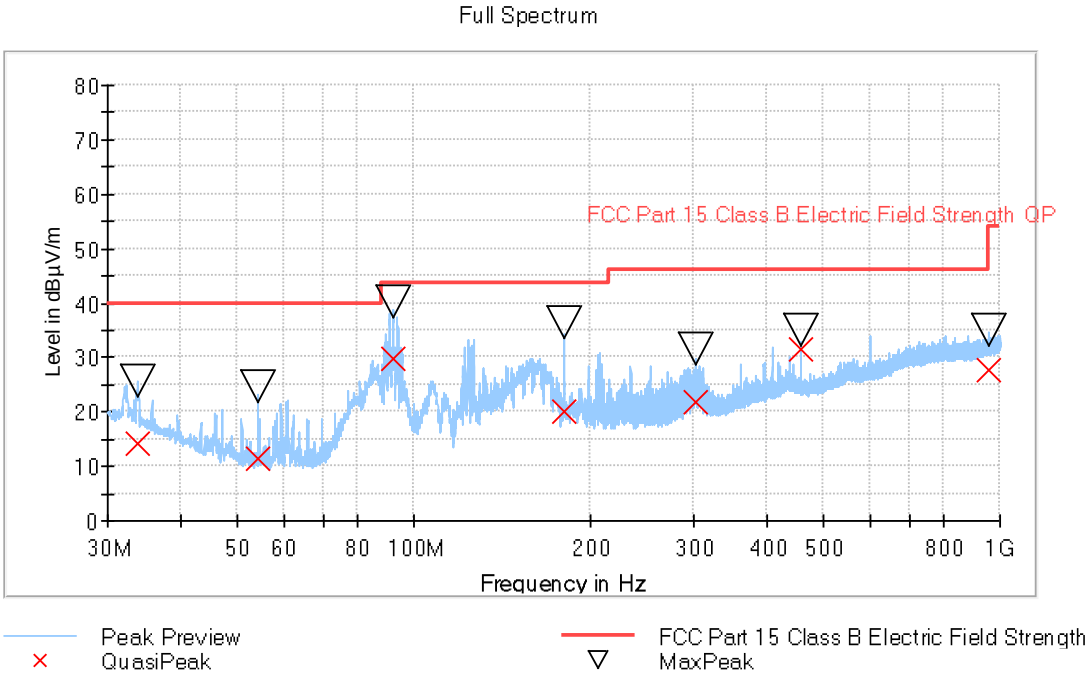


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1050.000000	---	25.96	53.97	28.01
1050.000000	32.87	---	73.97	41.10
2049.600000	---	22.72	53.97	31.25
2097.600000	35.96	---	73.97	38.01
3475.600000	---	25.35	53.97	28.62
3489.200000	38.82	---	73.97	35.15
5451.600000	42.18	---	73.97	31.79
5457.600000	---	29.33	53.97	24.64
7648.400000	---	33.79	53.97	20.18
7711.200000	47.21	---	73.97	26.76
11358.000000	51.35	---	73.97	22.62
12689.600000	---	37.54	53.97	16.43

Radiated Emission. CR0102LR

Project:	65644REM.003
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)



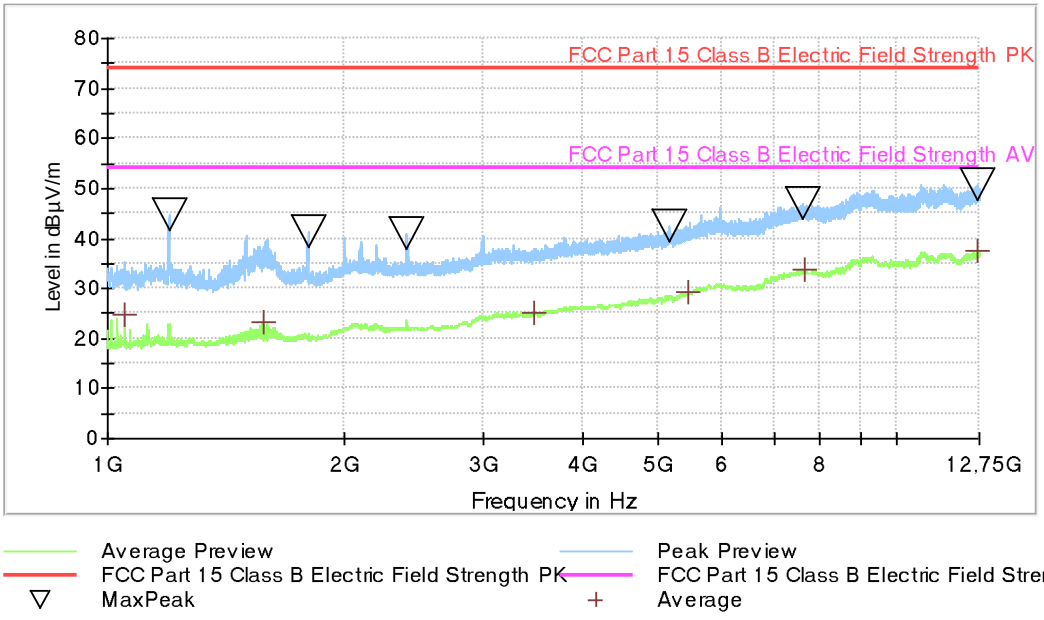
Maximizations

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.702000	14.22	25.50	40.00	25.78	142.0	V	50.0	16.7
54.042000	11.51	24.59	40.00	28.49	400.0	H	46.0	10.2
92.265000	29.62	40.30	43.52	13.90	100.0	V	349.0	11.5
179.962000	20.09	36.30	43.52	23.43	121.0	V	111.0	14.1
303.149000	21.88	31.56	46.00	24.12	100.0	H	282.0	18.1
455.970000	31.52	35.11	46.00	14.48	175.0	V	97.0	23.6
960.004000	27.83	34.97	53.97	26.14	152.0	V	153.0	30.2

Radiated Emission. CR0102HR

Project:	65644REM.003
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)

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1050.000000	---	24.85	53.97	29.12
1198.800000	44.82	---	73.97	29.15
1578.400000	---	23.12	53.97	30.85
1794.800000	41.49	---	73.97	32.48
2393.200000	41.03	---	73.97	32.94
3472.800000	---	25.20	53.97	28.77
5148.800000	42.36	---	73.97	31.61
5456.400000	---	29.33	53.97	24.64
7624.800000	46.79	---	73.97	27.18
7648.000000	---	33.68	53.97	20.29
12654.000000	50.69	---	73.97	23.28
12688.400000	---	37.45	53.97	16.52

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.

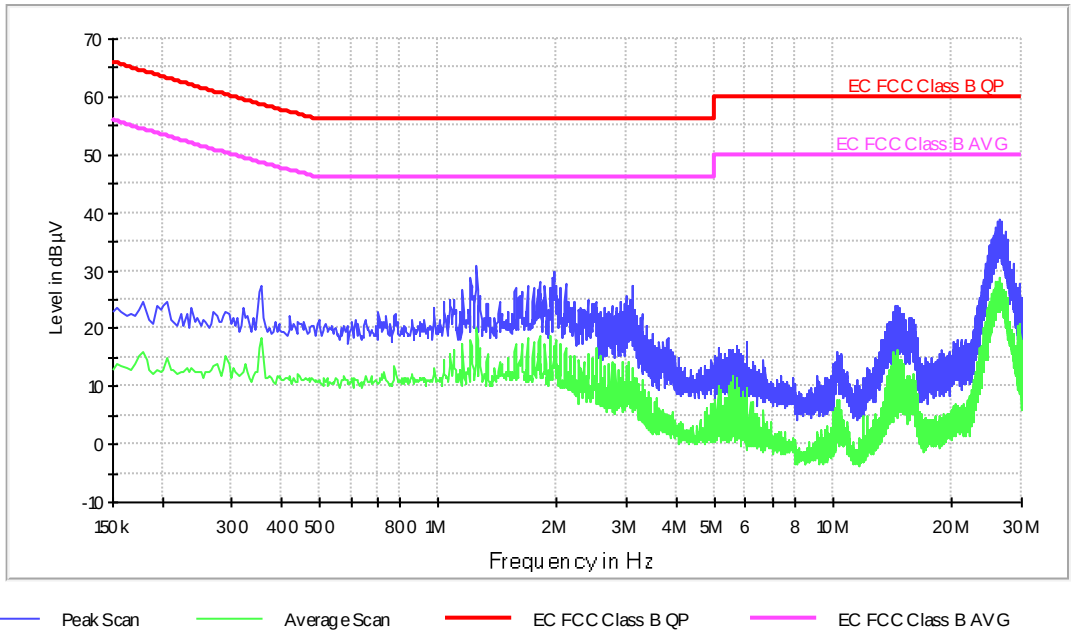
TESTED SAMPLES:	S/02
TESTED OPERATION MODES:	OM#02
TEST RESULTS:	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

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

Conducted Emission. CC01020N

Project:	65644REM.003
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



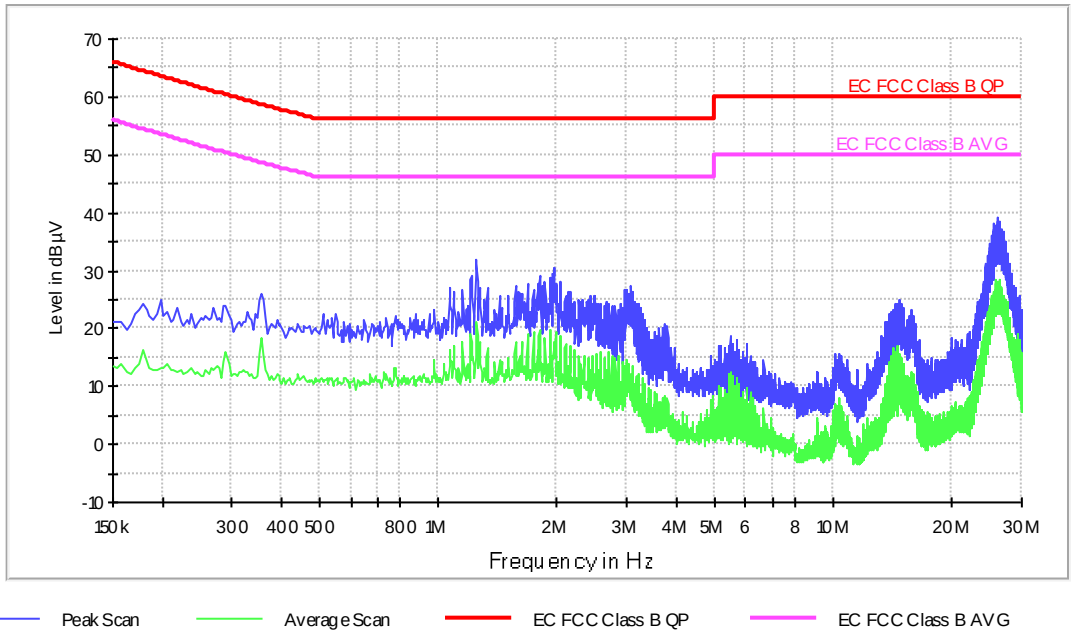
Subrange Maxima

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.178000	24.8	16.0
0.358000	27.3	18.4
0.706000	22.8	10.4
1.246000	30.9	18.2
1.250000	30.9	20.1
3.094000	27.2	11.0
3.810000	18.3	4.9
10.198000	15.9	6.4
14.398000	23.9	15.4
26.286000	39.0	27.6

Conducted Emission. CC0102L1

Project:	65644REM.003
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)
0.198000	24.9	13.3
0.358000	26.0	18.3
0.510000	22.6	10.9
1.246000	31.9	19.5
1.250000	31.3	21.1
3.082000	27.3	12.2
3.722000	20.7	6.5
10.350000	15.6	7.9
14.622000	24.8	15.7
26.114000	39.1	28.0