EMC TEST REPORT

No. 2020947STO-101

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Luminaire for furniture with LED
Tested Type/Model:	L2006 Missmyra
Manufacturer:	IKEA of Sweden AB
Tested by request of:	IKEA of Sweden AB

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators, Class B equipment

ICES-005 Issue 5: Lighting Equipment Class B (2018).

For details, see clause 2 – 4.

Date of issue: June 11, 2020

Tested by: Lovisa Gibson

Approved by: Per Granberg

Revision History

Test report number	Date	Description	Changes
2010962STO-103	17 April, 2020	First release	-
2020947STO-101	11 June, 2020	First release	Updated marking plate. This document replaces test report 2010962STO-103.

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1. CLIENT INFORMATION

The EUT has been tested by request of

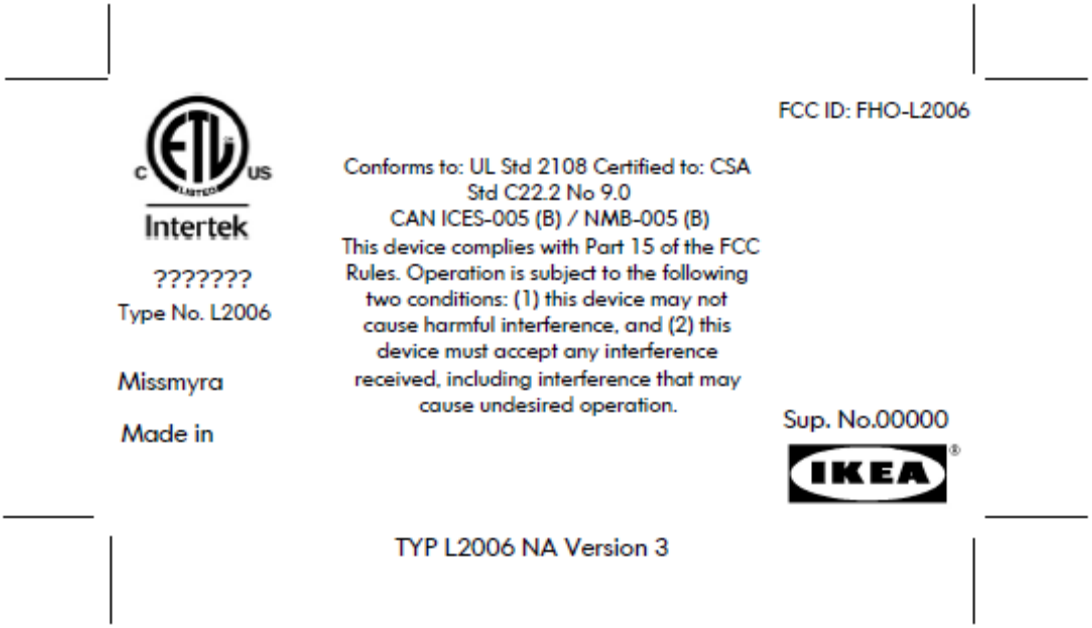
Company	IKEA of Sweden AB Box 702 343 81 Älmhult Sweden
Name of contact	Markus Mauritzon

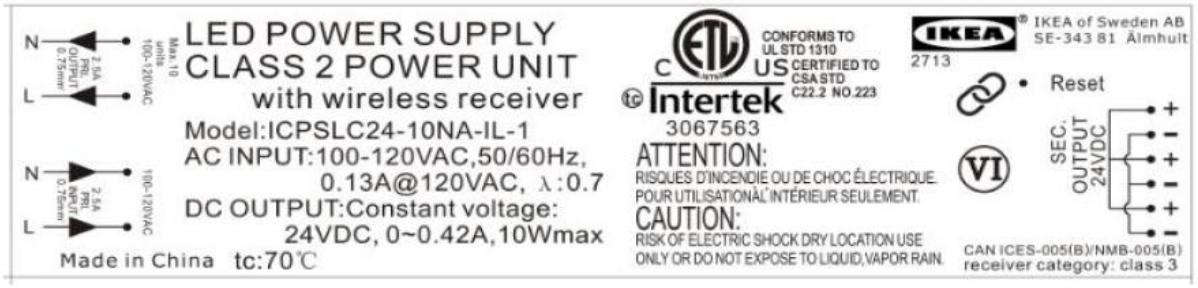
2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Luminaire for furniture with LED
Type/Model	L2006 Missmyra
Brand name	IKEA
Serial number	-
Manufacturer	IKEA of Sweden AB
Rating	Luminaire: 24 V DC, 5.6 W Driver 10 W: AC Input: 100-120 V AC, 50/60 Hz DC Output: 24 V DC, 0-0.42 A, 10 W max Driver 30 W: AC Input: 100-120 V AC, 50/60 Hz DC Output: 24 V DC, 0-1.25 A, 30 W max
Class	Luminaire: III Driver: II
Highest clock frequency	< 108 MHz
FCC ID	FHO-L2006

Rating plates





2.2 Test set up and EUT photos

Test set up and EUT photos are enclosed in Annex 1 No. 2020947STO-102 to this report.

2.3 Additional information about the EUT

The EUT was tested in a tabletop configuration.
The EUT was equipped with the following cable:

Port	Type	Length [m]	Specifications
DC power cable	-	3,5	-

2.4 Peripheral Equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as a part of the testing and evaluation of the EUT.

Units	Type	Serial number
LED driver	ICPSLC24-30NA-IL-1	-
LED driver	ICPSLC24-10NA-IL-1	-

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators.
ICES-005 Issue 5: Lighting Equipment (2018).

Test methods:

ANSI C63.4:2014: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Additions, deviations and exclusions from standard and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is an FCC listed test site with site registration number 90913
Intertek Semko AB is an FCC accredited conformity assessment body with designation number SE0002
Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.
The EUT was tested with maximum and minimum lighting.

3.5 Compliance

The EUT shall comply with the emission limits according to the standards as listed below

Conducted emission requirements:
The EUT shall meet the limits for the standards.
Reference: 47 CFR §15.107
ICES-005, section 5.5.2

Limits for conducted emission according to FCC and ICES-005

Class B

Frequency range [MHz]	Limits [dBµV]	
	Quasi-Peak	Average
0.15 – 0.50	66 – 56	56 – 46
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Radiated Emission requirements:
The EUT shall meet the limits for the standards.
Reference: 47 CFR §15.109
ICES-005, section 5.5.2

Limits for radiated emission according to FCC

Class B

Frequency range [MHz]	Field strength at 3 m (dBµV/m)	Field strength at 10 m (dBµV/m)	Detector
30 – 88	40.0	29.5	Quasi Peak
88 – 216	43.5	33.1	Quasi Peak
216 – 960	46.0	35.6	Quasi Peak
960 – 1000	54.0	43.5	Quasi Peak
Above 1000	54.0 / 74.0	43.5 / 63.5	Average / Peak

The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit.
(i.e. an extrapolation factor of 20 dB/decade according to §15.31(f)(1))

Limits for radiated emission according to ICES-005

Class B

Frequency range [MHz]	Field strength at 3 m (dBµV/m)	Field strength at 10 m (dBµV/m)	Detector
30 – 88	40.0	29.5	Quasi Peak
88 – 216	43.5	33.1	Quasi Peak
216 – 1000	46.0	35.6	Quasi Peak
30 – 88	40.0	29.5	Quasi Peak

4. TEST SUMMARY

The results in this report apply only to sample tested:
Result: Pass – Fail – N/A= Not applicable

Standard	Description	Result
	Emission	
FCC Part 15 subpart B **ICES-005**	**Conducted continuous emission in the frequency range 0.150 – 30 MHz, AC Power input port** The EUT complies with the Class B limits. The margin to the limit was at least 9.4 dB at 150.000 MHz See clause 5.4 – 5.7.	**PASS**
FCC Part 15 subpart B **ICES-005**	**Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz** The EUT complies with the Class B limits. The margin to the limit was at least 2.4 dB at 43.140 MHz The measurement result is within the measurement uncertainty. See clause 6.5 – 6.8.	**PASS**
FCC Part 15 subpart B **ICES-005**	**Radiated emission of electromagnetic fields in the frequency range 1.0 – X.0 GHz** Not applicable. Clock frequency is below 108 MHz.	**N/A**

5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
Mars 24, 2020	22 [°C]	18 [%]

5.2 Test setup and test procedure

The test method is in accordance with ANSI C63.4.

The EUT was connected to the power via Artificial Mains Networks (AMN).

The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.

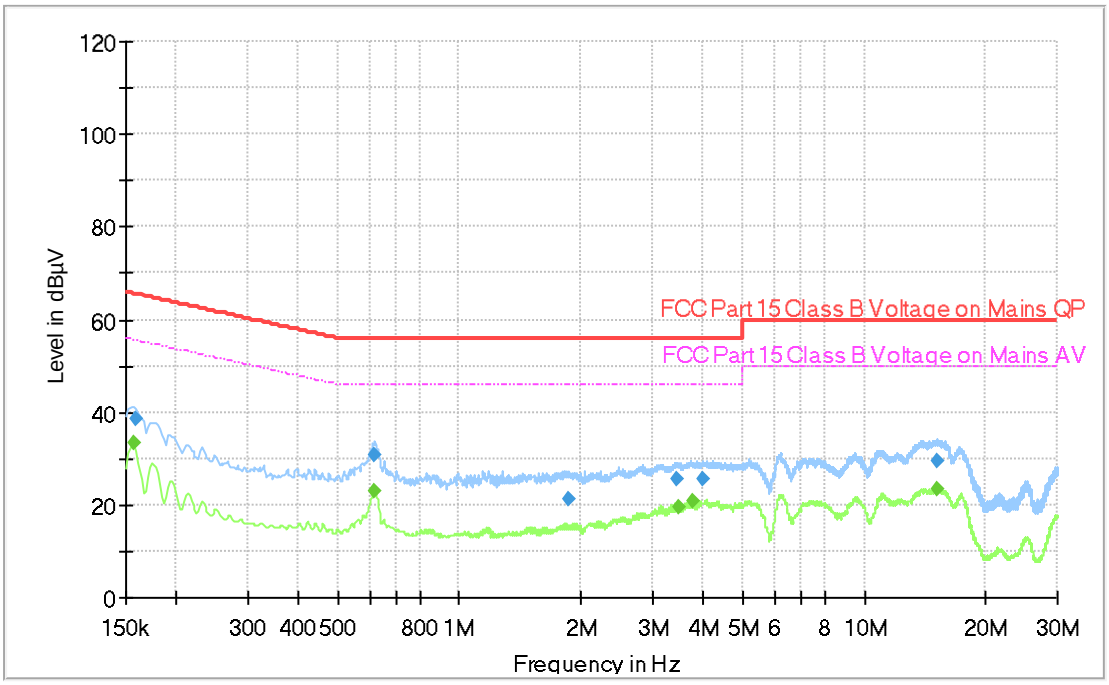
Overview sweeps were performed for each lead.
During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.

5.3 Measurement uncertainty

Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz ± 3.3 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011.
The measurement uncertainty is given with a confidence of 95 %.

5.4 Test results, AC Power input port, Class B, 30W, Maximum light



Diagram, Peak and Average overview sweep

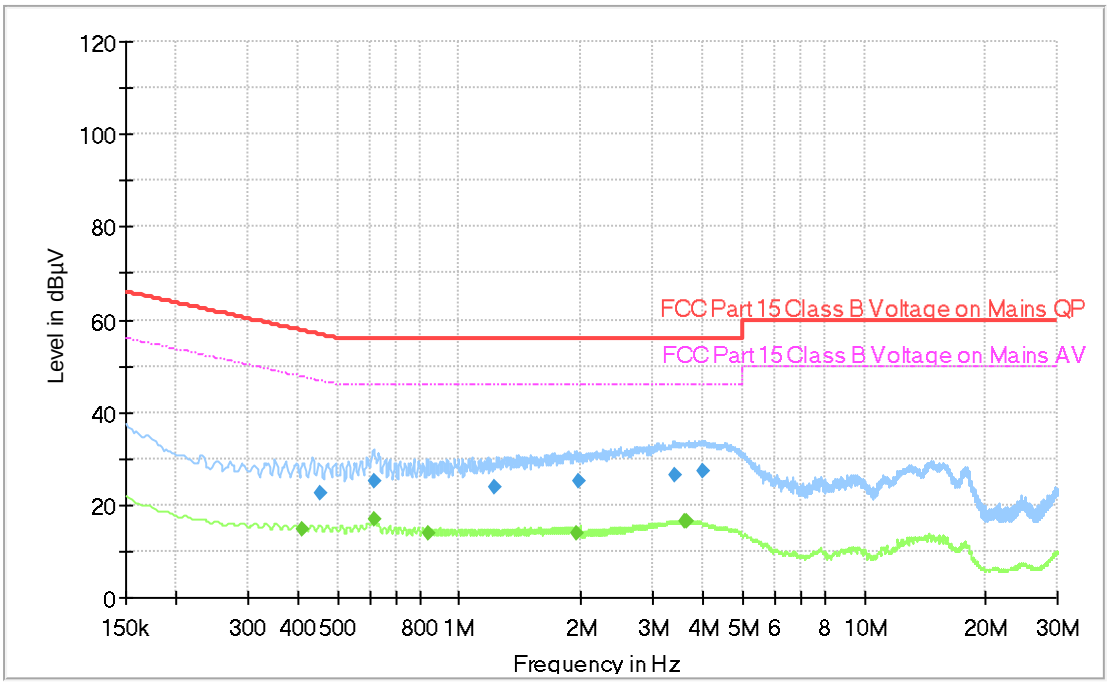
Measurement results, Quasi-peak, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

Measurement results, Average, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

5.5 Test results, AC Power input port, Class B, 30W, Minimum light



Diagram, Peak and Average overview sweep

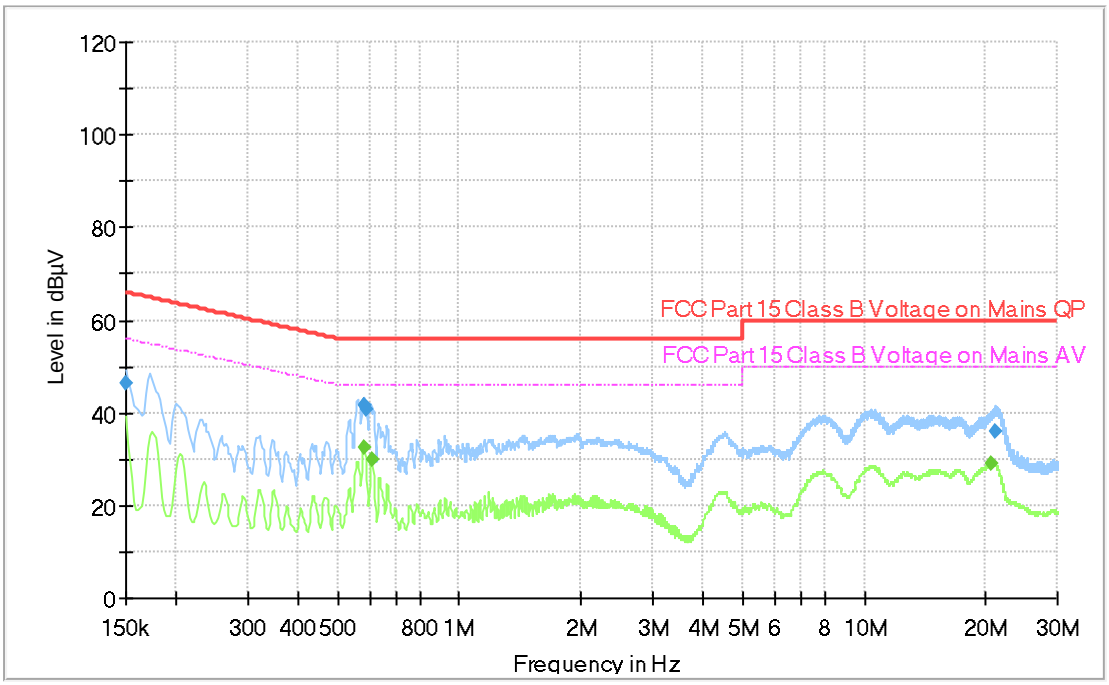
Measurement results, Quasi-peak, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

Measurement results, Average, Class B

All measured disturbances have a margin of more than 20 dB to the limits.

5.6 Test results, AC Power input port, Class B, 10W, Maximum light



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B

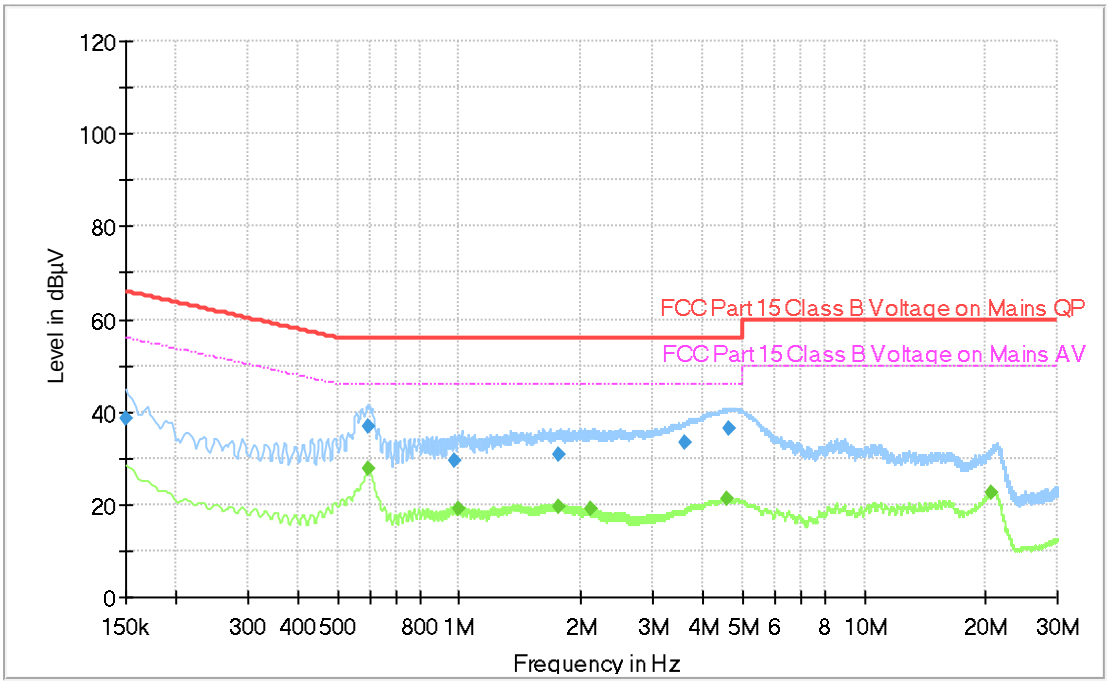
Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.150	46.6	66.0	L	9.4
0.579	41.8	56.0	L	14.2
0.582	41.5	56.0	L	14.5
0.587	40.7	56.0	L	15.3
21.111	35.8	60.0	L	24.2

Measurement results, Average, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.580	32.5	46.0	L	13.5
0.607	30.1	46.0	L	15.9
20.596	29.1	50.0	L	20.9

Result [dBµV] = Analyser reading [dBµV] + cable loss [dB] + LISN insertion loss [dB]

5.7 Test results, AC Power input port, Class B, 10W, Minimum light



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.150	38.4	66.0	L	27.6
0.598	36.9	56.0	L	19.1
0.974	29.6	56.0	L	26.4
1.752	30.6	56.0	L	25.4
3.586	33.3	56.0	L	22.7
4.641	36.3	56.0	L	19.7

Measurement results, Average, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.598	27.9	46.0	L	18.1
0.994	19.0	46.0	L	27.0
1.752	19.7	46.0	L	26.3
2.112	19.0	46.0	L	27.0
4.580	21.0	46.0	L	25.0
20.591	22.4	50.0	L	27.6

Result [dBµV] = Analyser reading [dBµV] + cable loss [dB] + LISN insertion loss [dB]

5.8 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Test receiver	Rohde & Schwarz	ESU8	12866	06-2019	1 year
Cable	Suhner	G03232 D-01	9701	06-2019	1 year
Power unit	Chroma	61604	31757	-	-
Cable	Suhner	RG 223/U	9815	06-2019	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	4623	03-2019	1 year + 1 month
Artificial Mains Network	Rohde & Schwarz	ESH3-Z5	2728	06-2019	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 1 GHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
April 6, 2020	20 [°C]	33 [%]

6.2 Test setup and test procedure

The test method is in accordance with ANSI C63.4.

The EUT was set up according to the standard.

The EUT was placed on an insulating support 0.8 m above the turntable which is part of the reference ground plane.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz.

6.3 Test conditions

Test setup: **30 – 1000 MHz**
Test receiver set-up:
Preview test: Peak, RBW 120 kHz VBW 1 MHz
Final test: Quasi-Peak, RBW 120 kHz

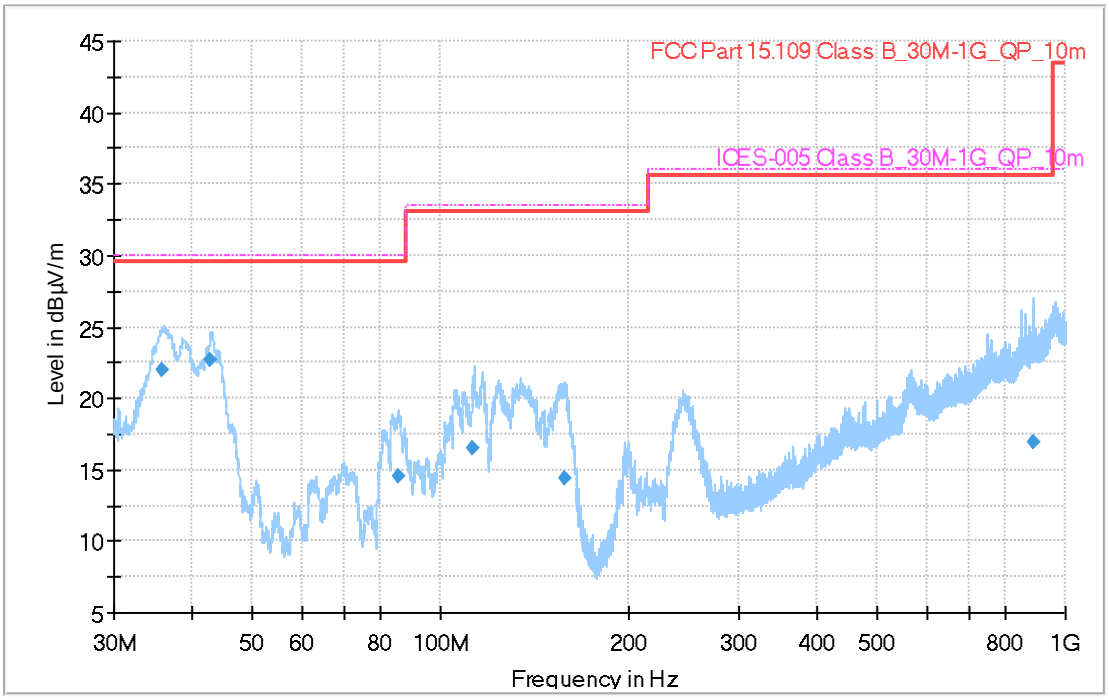
Measuring distance: 10 m
Measuring angle: 0 – 359°
Antenna
Height above ground plane: 1 – 4 m
Polarisation: Vertical and Horizontal
Type: Bilog

6.4 Measurement uncertainty

Measurement uncertainty for radiated disturbance
Uncertainty for the frequency range 30 to 1000 MHz at 10 m ± 5,0 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011.
The measurement uncertainty is given with a confidence of 95 %.

6.5 Test results, 30 – 1000 MHz, FCC and ICES-005, Class B, 30 W, Maximum light



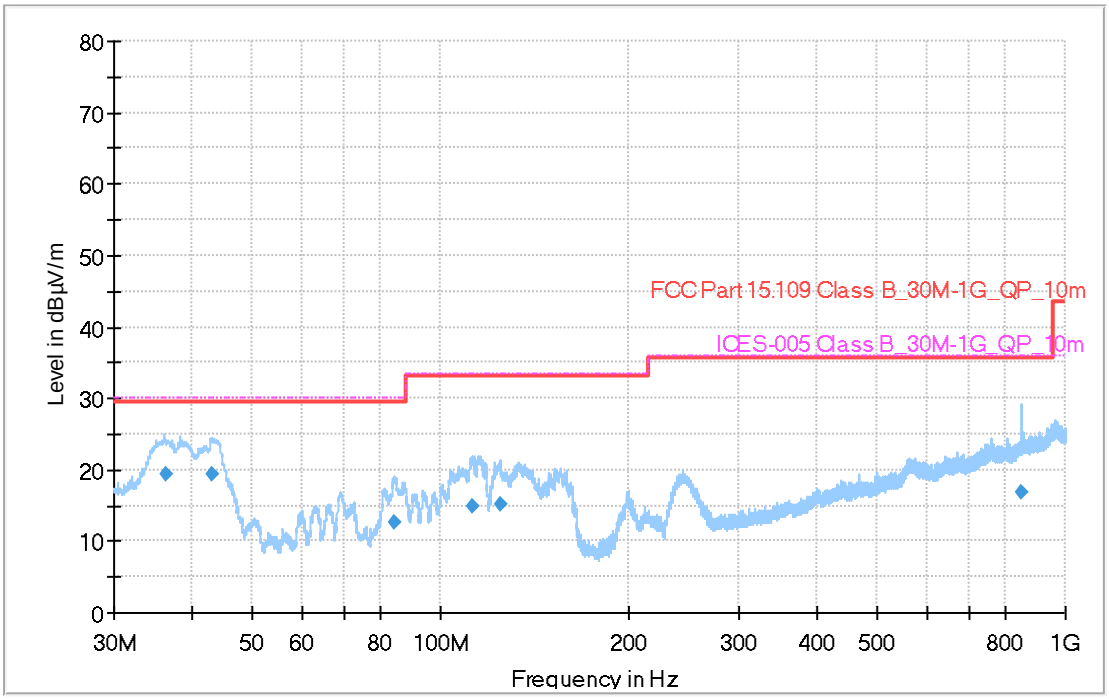
Diagram, Peak overview sweep, 30 – 1000 MHz at 10 m distance.

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
35.940	21.9	29.5	V	7.6
42.870	22.7	29.5	V	6.8
85.380	14.5	29.5	V	15.0
112.590	16.6	33.0	V	16.4
158.220	14.4	33.0	V	18.6
887.250	17.0	35.6	V	18.6

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.6 Test results, 30 – 1000 MHz, FCC and ICES-005, Class B, 30 W, Minimum light



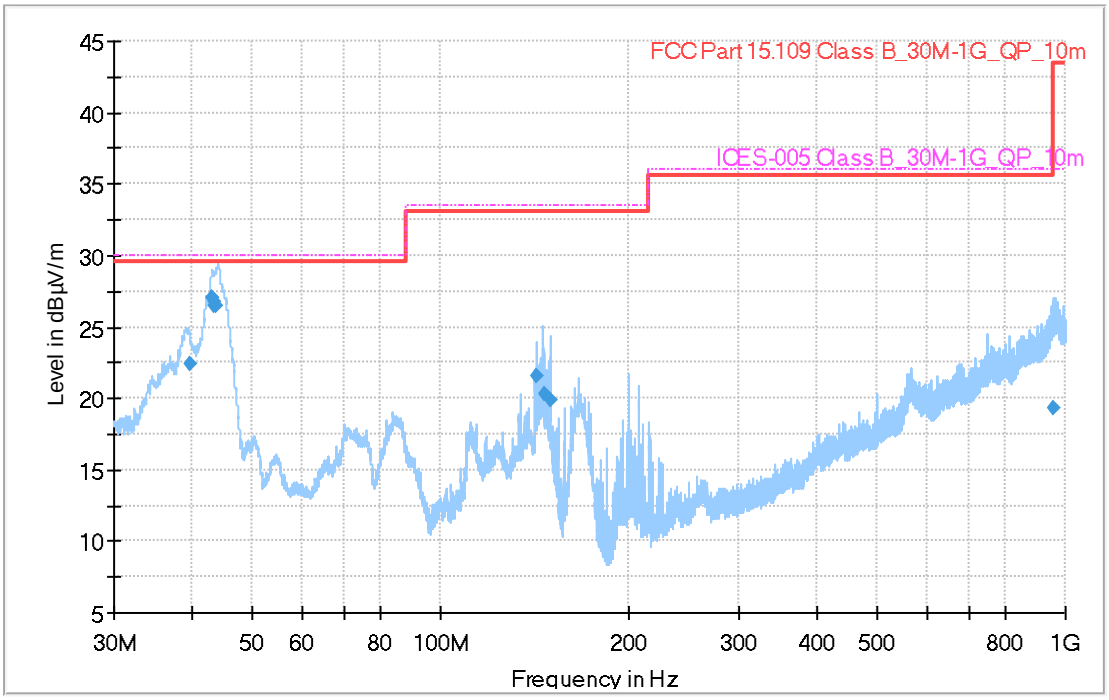
Diagram, Peak overview sweep, 30 – 1000 MHz at 10 m distance.

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
36.450	19.4	29.5	V	10.1
43.050	19.3	29.5	V	10.2
84.600	12.5	29.5	V	17.0
112.650	14.8	33.0	V	18.2
124.440	15.1	33.0	V	17.9
852.480	16.9	35.6	V	18.7

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.7 Test results, 30 – 1000 MHz, FCC and ICES-005, Class B, 10 W, Maximum light



Diagram, Peak overview sweep, 30 – 1000 MHz at 10 m distance.

Measurement results, Quasi Peak, Class B

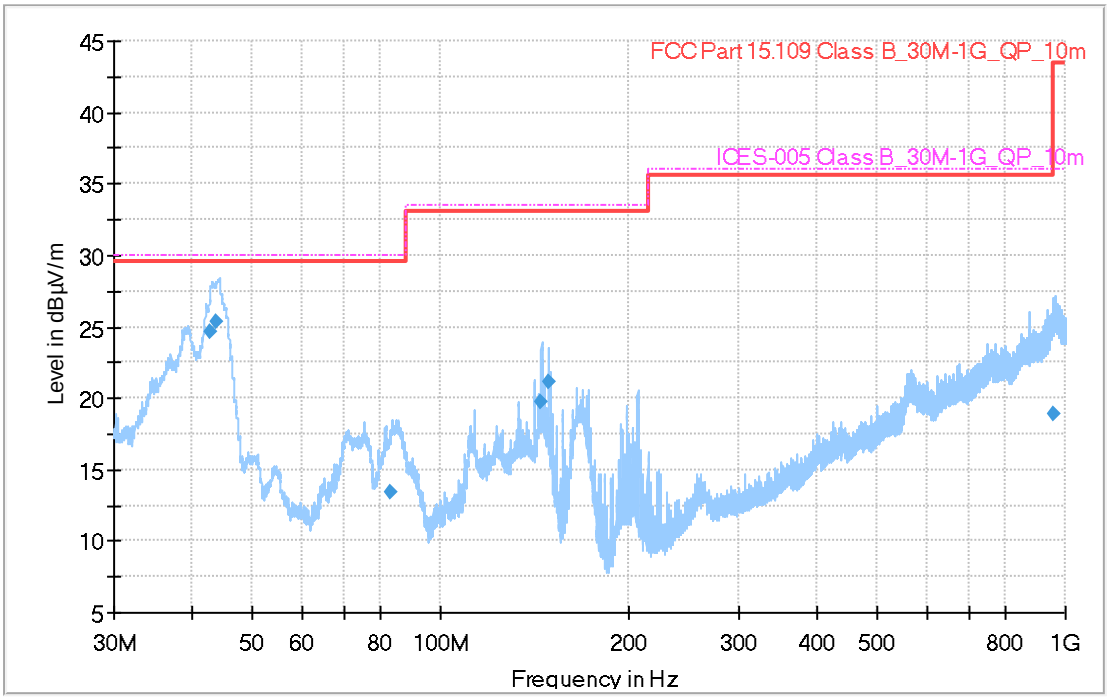
Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
39.600	22.4	29.5	V	7.1
43.140	27.1	29.5	V	2.4*
43.170	27.0	29.5	V	2.5*
43.320	26.8	29.5	V	2.7*
43.500	26.5	29.5	V	3.0*
43.650	26.5	29.5	V	3.0*

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

All measured disturbances have a margin of more than 20 dB to the limits.

* The measured result is below the limit by a margin less than the measured uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance is more probable than non-compliance with specification limit.

6.8 Test results, 30 – 1000 MHz, FCC and ICES-001 Group 1, Class B, 10 W, Minimum light



Diagram, Peak overview sweep, 30 – 1000 MHz at 10 m distance.

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
42.780	24.7	29.5	V	4.8*
43.620	25.3	29.5	V	4.2*
83.340	13.4	29.5	V	16.1
144.840	19.7	33.1	V	13.4
148.830	21.1	33.1	V	12.0
954.090	18.8	35.6	V	16.8

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

* The measured result is below the limit by a margin less than the measured uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance is more probable than non-compliance with specification limit.

6.9 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Pre-amplifier	SEMKO	AM1331	S7992	24/4/2019	1 year
Cable	Rosenberger	LA5-S003-8500	39148	1/4/2020	1 year
Bilog antenna	Teseq	CBL 6111D	34200	18/3/2020	3 years
Measurement receiver	ROHDE & SCHWARZ	ESW 44	33890	28/6/2019	1 year