

EMC TEST REPORT

No. 1908179STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Table standing luminaire with LED
Type/Model: B2001 Storhaga
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:

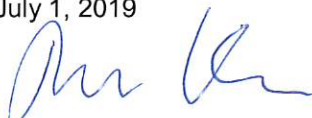
FCC 47 CFR Part 15: Radio frequency device, Subpart B: Unintentional radiators.
Class B equipment.

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

For details, see clause 2 – 4.

Date of issue: July 1, 2019

Tested by:



Therese Kennerberg



Olle Calderon

Approved by:



Per Granberg

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Revision History

Edition	Date	Description	Changes
1	April 17, 2019	First release	
2	July 1, 2019	Second release	New rating effect from 2.3 W to 3.5 W, page 4 and removed pictures of EUT and test set-up to an separate annex.

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1. CLIENT INFORMATION

The EUT has been tested by request of

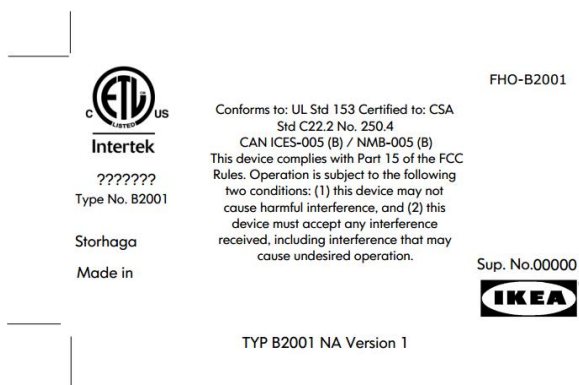
Company IKEA of Sweden AB
Box 702
343 81 Älmhult
Sweden

Name of contact Carl Zhang

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Table standing luminaire with LED
Type/Model	B2001 Storhaga FCC ID: FHO-B2001
LED driver	ICPSW5-5NA-1
Brand name	IKEA
Serial Number	EMC01
Manufacturer	IKEA of Sweden
Rating	Luminaire: 5 V DC, Max 3.5 W LED driver input: 100 – 240 V, 50/60 Hz, Max 0.2 A, 7 W LED driver output: 5 V DC, Max 1 A, 5 W
Class	Luminaire: III LED driver: II



EUT rating plate



LED-drive rating plate

2.2 Test set up and EUT photos

Test set up and EUT photos are enclosed in Annex 1 to this test report.

2.3 Additional information about the EUT

The EUT was tested in a tabletop configuration.
The EUT consists of the following units:

Units	Type	Serial number
Luminaire	B2001 Storhaga	
LED driver	ICPSW5-5NA-1	

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC 47 CFR Part 15: Radio frequency device, 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 standards 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 a FCC listed test site with site registration number 90913
Intertek Semko AB is a 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 #
5 m CHAMBER	Semi-anechoic 5 m	2042G-3

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.

During the conducted emission test, the EUT was tested with its internal dimmer set to maximum and minimum luminosity respectively.

During the radiated emission test, the internal dimmer of the EUT set to maximum.

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 5.5.3

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	33.0	Quasi Peak
216 – 960	46.0	35.5	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

4. TEST SUMMARY

The results in this report apply only to sample tested:

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 14.3 dB at 0.497 MHz See clause 5.4-5.5.	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 3.6 dB at 958.420 MHz. The measured value is within the measurement uncertainty interval to the limit. See clause 6.5-6.6.	PASS

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

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
April 10, 2019	22 [°C]	16 [%]

5.2 Test setup and test procedure

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

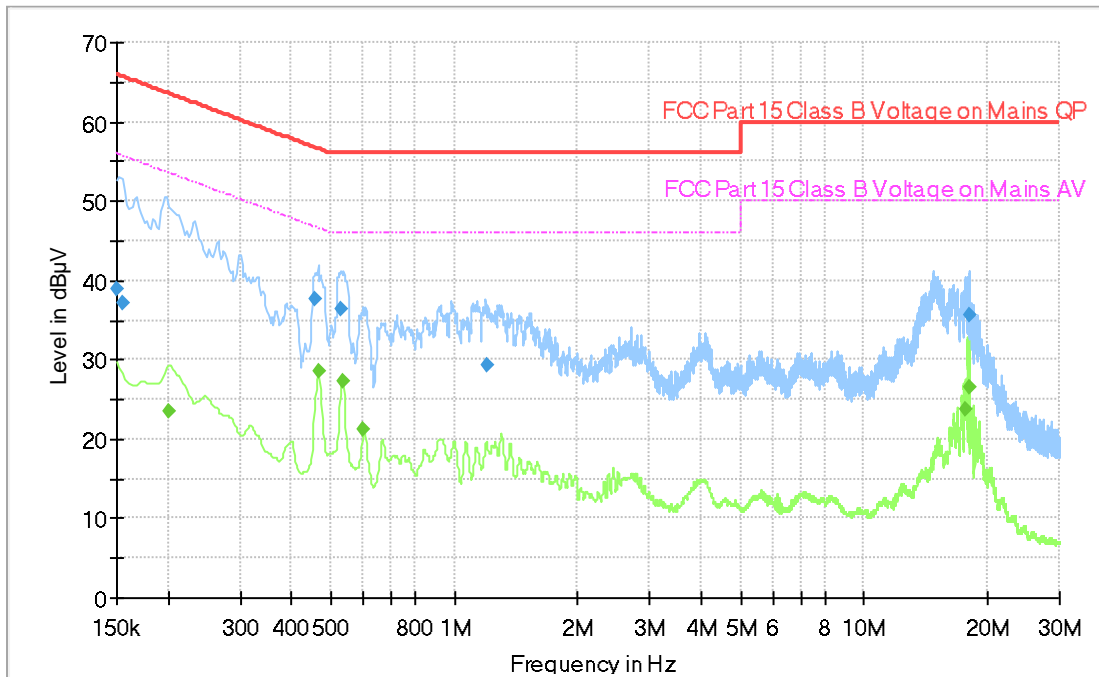
The EUT was connected to the power via Artificial Mains Networks AMN.
 The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.
 Overview sweeps were performed for each lead.
 During the tests the EUT was operated 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, Maximum luminosity



Diagram, Peak and Average overview sweep, Maximum luminosity

Measurement results, Quasi-peak, Class B

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.458	37.6	56.7	N	19.1
0.530	36.5	56.0	L	19.5

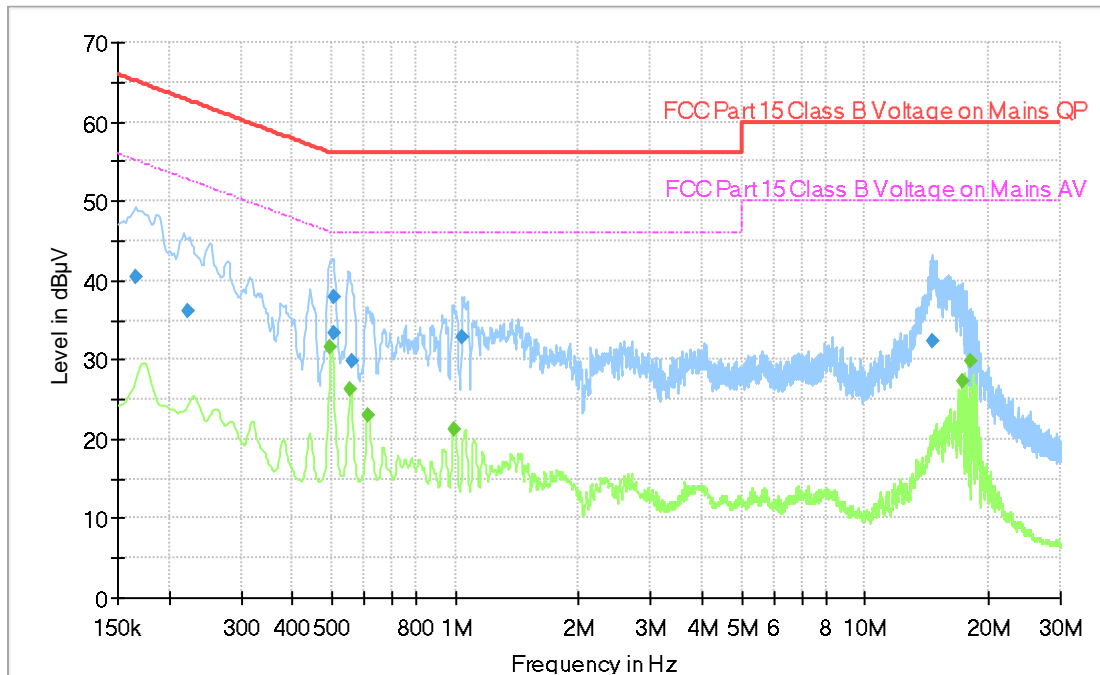
Measurement results, Average, Class B

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.465	28.5	46.6	L	18.1
0.533	27.3	46.0	L	18.7

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

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

5.5 Test results, AC Power input port, Class B, Minimum luminosity



Diagram, Peak and Average overview sweep, Minimum luminosity

Measurement results, Quasi-peak, Class B

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.503	37.9	56.0	L	18.1

Measurement results, Average, Class B

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.497	31.7	46.0	L	14.3
0.553	26.2	46.0	L	19.8

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

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

5.6 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - v10.50.00	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	07-2018	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	07-2018	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32455	07-2018	1 year
Coaxial cable	Huber+Suhner	RG 213/U	9815	07-2018	1 year
Coaxial cable	Suhner	G03232 D-01	9701	07-2018	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 12, 2019	21 [°C]	18 [%]

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.

Measurements were performed on the worst-case EUT dimmer setting, according to clause 3.4.

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

6.4 Measurement uncertainty

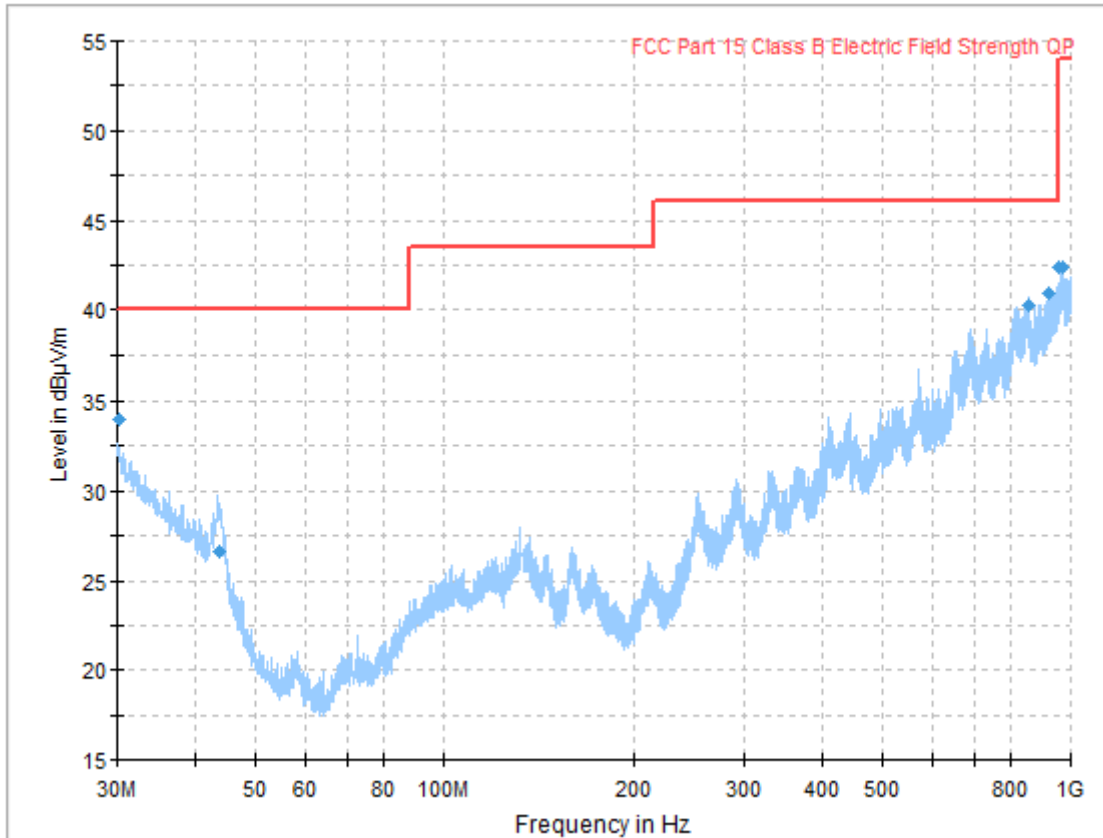
Measurement uncertainty for radiated disturbance

 Uncertainty for the frequency range 30 to 1000 MHz at 3 m ± 5.1 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, Class B



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

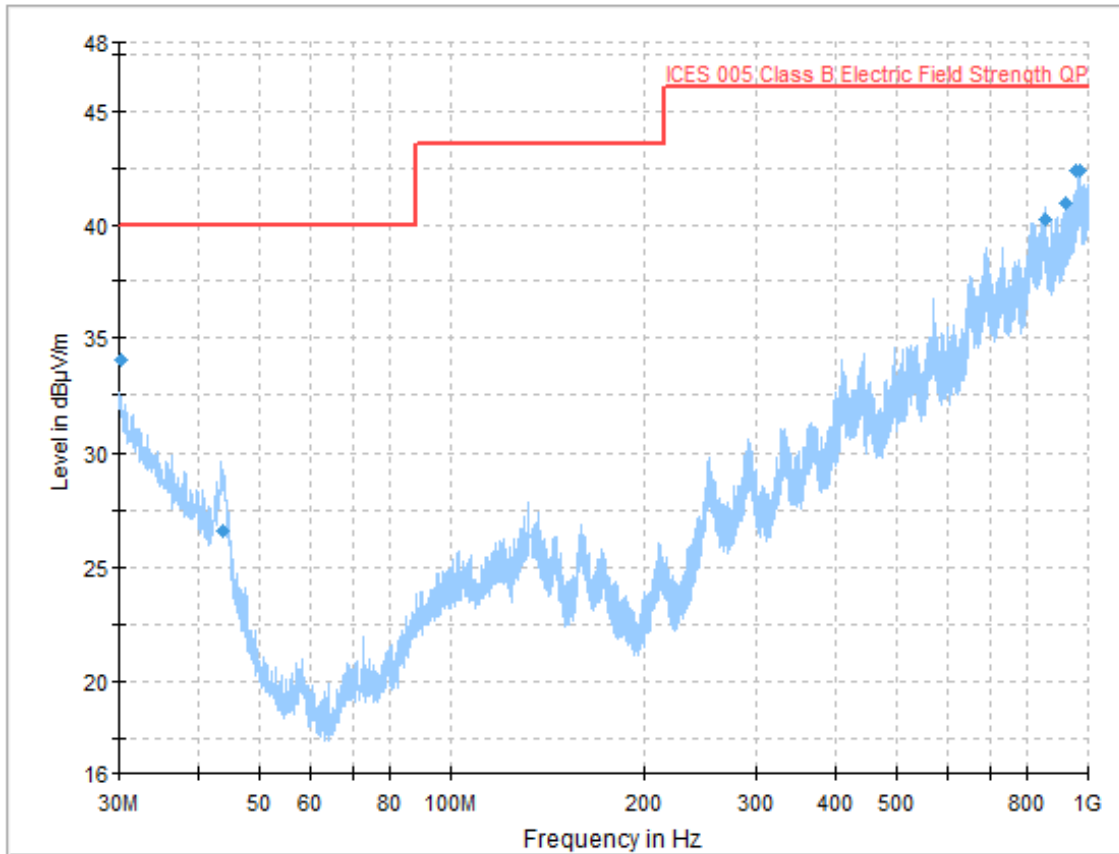
Measurement results, Quasi Peak, FCC, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
30.330	34.0	40.0	H	6.0
43.590	26.7	40.0	V	13.3
853.720	40.2	46.0	V	5.8
920.320	41.0*	46.0	H	5.0*
958.420	42.4*	46.0	V	3.6*
972.940	42.4	54.0	V	11.6

*The measured result is below the limit by a margin less than the measurement 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 the specification limit.

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

6.6 Test results, 30 – 1000 MHz, ICES-005, Class B



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, ICES-005, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
30.330	34.0	40.0	H	6.0
43.590	26.7	40.0	V	13.3
853.720	40.2	46.0	V	5.8
920.320	41.0*	46.0	H	5.0*
958.420	42.4*	46.0	V	3.6*
972.940	42.4*	46.0	V	3.6*

*The measured result is below the limit by a margin less than the measurement 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 the specification limit.

$$\text{Result [dB}\mu\text{V/m]} = \text{Analyser reading [dB}\mu\text{V]} + \text{Antenna factor [1/m]} - \text{Amplifier gain [dB]} + \text{Cable loss [dB]}$$

6.7 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last date	Cal.	Cal. interval
Measurement software	Rohde&Schwarz	EMC32 - 10.15.00	--	--		--
Measurement Receiver	Rohde&Schwarz	ESW 44	33950	08-2018		1 year
Antenna	Rohde&Schwarz	HL562	32310	04-2018		1 year
Measurement cable	Bedea	RG223	39035	01-2019		1 year
Measurement cable	Radiall	SHF8M	9997	08-2018		1 year
Measurement cable	Suhner	Sucoflex 104	39033	09-2018		1 year
Measurement cable	Suhner	Sucoflex 104	39003	09-2018		1 year