

EMC TEST REPORT

No. 1915789STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Lighting chain for indoor use with LED
Type/Model: J1938 Stråla
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: November 28, 2019

Tested by:

Ann-Christine Norrström
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Approved by:

Per Granberg
Per Granberg

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Revision History

Edition	Date	Description	Changes
1	October 29, 2019	First release	
2	November 28, 2019	First release	The report was updated according to order number 1918434. Changed distance from 30 cm to 60 cm between between lamps in the chain. Clause 2.4 Opinions and interpretations added.

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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 Jianqiu Chen

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment Lighting chain for indoor use with LED
Type/Model J1938 Stråla
Brand name IKEA
Serial Number -
Manufacturer IKEA of Sweden AB
Rating Luminaire: 5 V DC, 0.3 W, Class III
LED-driver: Input: 100 – 240 V; 50/60 Hz, Max 0.2 A, 7 W
Output: 5 V DC, Max 1 A, 5 W, Class II
Class II/III
Highest clock frequency < 108 MHz
Software/Firmware version -
FCC ID -

 Type No. J1938 Stråla Made in	Conforms to: UL Std 588 Certified to: CSA Std C22.2 No. 37 CAN ICES-005 (B) / NMB-005 (B)	FCC ID: FHO-J1938 5VDC, 0.3W
	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.	
	Sup. No.00000 	
	TYP J1938 NA Version 1	

Rating plate (draft)

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 is a seasonal lighting chain for indoor use with LED.

The EUT was tested in a tabletop configuration.

The EUT was equipped with the following cables:

Port	Type	Length [m]	Specifications
DC Mains up to chain	Two-core	3.85	
DC chain	Two-core	13,4	

2.4 Opinions and interpretations

According to the manufacturer, The length between LED-lamps in the lighting chain are modified from 30 cm to 60 cm.

The difference is considered not to imply different EMC-characteristics when compared to the tested version. Therefore, the type with 60 cm between the LED's is not tested, but considered to have the same EMC-characteristics as the tested type with 30 cm.

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 #
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 the light on.

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 15.0 dB at 0.533 MHz See clause 5.4.	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 16.1 dB at 957.090 MHz See clause 6.5.	PASS

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

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
September 26, 2019	22 [°C]	22 [%]

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

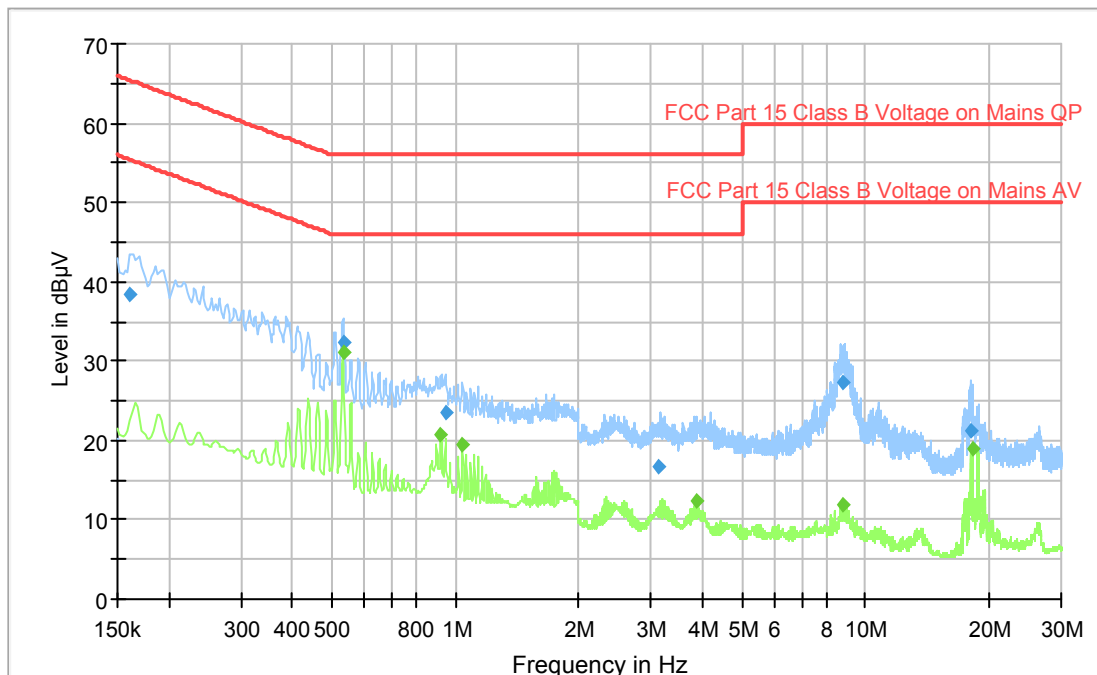
in the frequency range 150 kHz to 30 MHz

± 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



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

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.533	31.0	46.0	L	15.0

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 equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	June 2019	1 year
AMN	Rohde & Schwarz	ESH3-Z5	2728	June 2019	1 year
Cable	Suhner	G03232 D-01	9701	June 2019	1 year
Cable	Huber Suhner	RG 223/U	9815	June 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:
September 20, 2019	20 [°C]	36 [%]

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

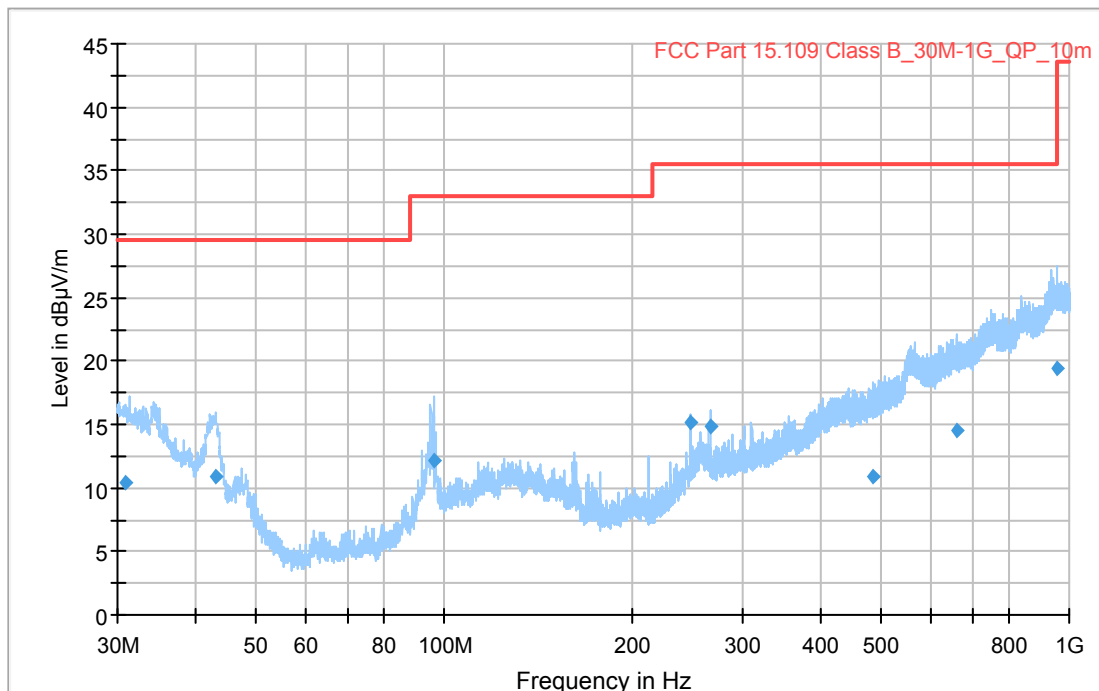
Measurement uncertainty for radiated disturbance

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, Class B



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]
30.810	10.4	29.5	V	19.1
42.990	10.8	29.5	V	18.7
957.090	19.5	35.6	V	16.1

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

The EUT also fulfil the limit for ICES-005, see limit table, clause 3.5 Compliance in this test report.

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

6.6 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - Version	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW 44	33890	June 2019	1 year
Antenna	Chase	CBL 611 1A	971	September 2017	3 years
Preamplifier	SEMKO	AM1331	7992	April 2019	1 year
Measurement cable	Huber + Suhner	Sucoflex 106	39122	March 2019	1 year
Measurement cable	Rosenberger	LA5-S003-7000 (UFB293C)	39162	April 2019	1 year
Measurement cable	Rosenberger	(UFB293C) LA5-003-1000 0	39163	April 2019	1 year