

EMC TEST REPORT

No. 1915744STO-001, Ed. 1

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Lighting chain for indoor use with LED
Type/Model: J1946 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.

For details, see clause 2 – 4.

Date of issue: November 28, 2019

Tested by:


Ann-Christine Norrström

Approved by:


Per Granberg

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Revision History

| Edition | Date | Description | Changes |
|---------|------------------|---------------|---------|
| 1 | October 28, 2019 | First release | |

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1. CLIENT INFORMATION



The EUT has been tested by request of

| | |
|-----------------|-------------------------------------------------------------|
| Company | IKEA of Sweden AB Box 702 SE-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 | J1946 Stråla |
| Brand name | IKEA |
| Serial Number | - |
| Manufacturer | IKEA of Sweden AB |
| Rating | 5 V DC, 0.4 W |
| Class | - |
| Highest clock frequency | <108 MHz |
| Software/Firmware version | - |
| FCC ID | - |

| | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  Intertek ??????? Type No. J1946 Stråla Made in | Conforms to: UL Std 588 Certified to: CSA Std C22.2 No. 37 CAN ICES-005 (B) / NMB-005 (B) 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. | FCC ID: FHO-J1946 5VDC, 0.4W Sup. No.00000  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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 is a lighting chain for indoor use with LED. The EUT was tested in a table-top configuration.

The EUT consists of the following units:

| Units | Type | Serial number |
|----------------|--------------|---------------|
| Lighting chain | J1946 Stråla | - |
| LED-driver | ICPSW5-5NA-1 | - |

The EUT was equipped with the following cables:

| Port | Type | Length [m] | Specifications |
|----------|----------|------------|----------------|
| DC cable | Two-core | 4.0 | - |

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.

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 light on.

3.5 Compliance

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

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 (dB μ V/m) | Field strength at 10 m (dB μ V/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 (dB μ V/m) | Field strength at 10 m (dB μ V/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 17.8 dB at 0.514 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 16.3 dB at 959.100 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: |
| October 25, 2019 | 22 [°C] | 46 [%] |

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.

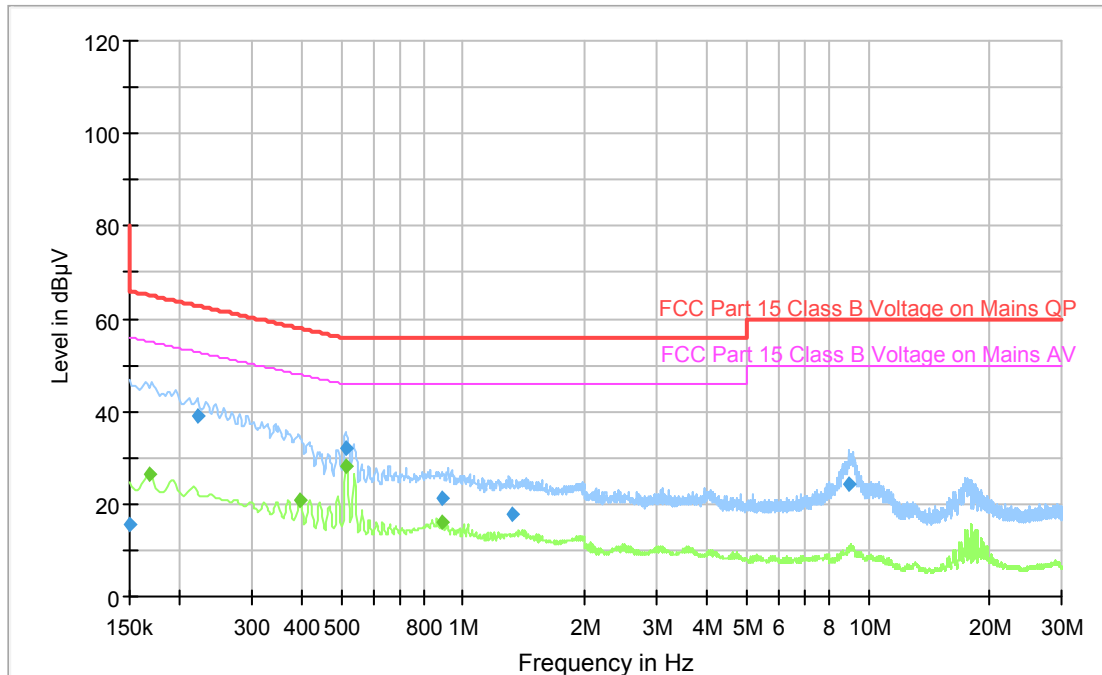
Overview sweeps were performed for each lead.
During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.

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] |
|-----------------|---------------|--------------|----------|-------------|
| 0.514 | 28.2 | 46.0 | L1 | 17.8 |

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]

5.5 Test equipment

| Equipment type | Manufacturer | Model | Inv. No. | Last Cal. date | Cal. interval |
|----------------------|-----------------|-------------|----------|----------------|---------------|
| Measurement software | Rohde & Schwarz | EMC32 - | -- | -- | -- |
| Receiver | Rohde & Schwarz | ESU 8 | 12866 | 06-2019 | 1 year |
| AMN / LISN | Rohde & Schwarz | ESH3-Z5 | 2728 | 06-2019 | 1 year |
| Cable | Suhner | G03232 D-01 | 9701 | 06-2019 | 1 year |
| Cable | Huber+Suhner | RG 223/U | 9815 | 06-2019 | 1 year |
| Transient protection | Rohde & Schwarz | ESH3-Z2 | 4623 | 03-2019 | 1 year |

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHz – 1 GHz

6.1 Operating environment

| | | |
|------------------|--------------|--------------------|
| Date of test: | Temperature: | Relative Humidity: |
| October 09, 2019 | 20 [°C] | 35 [%] |

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

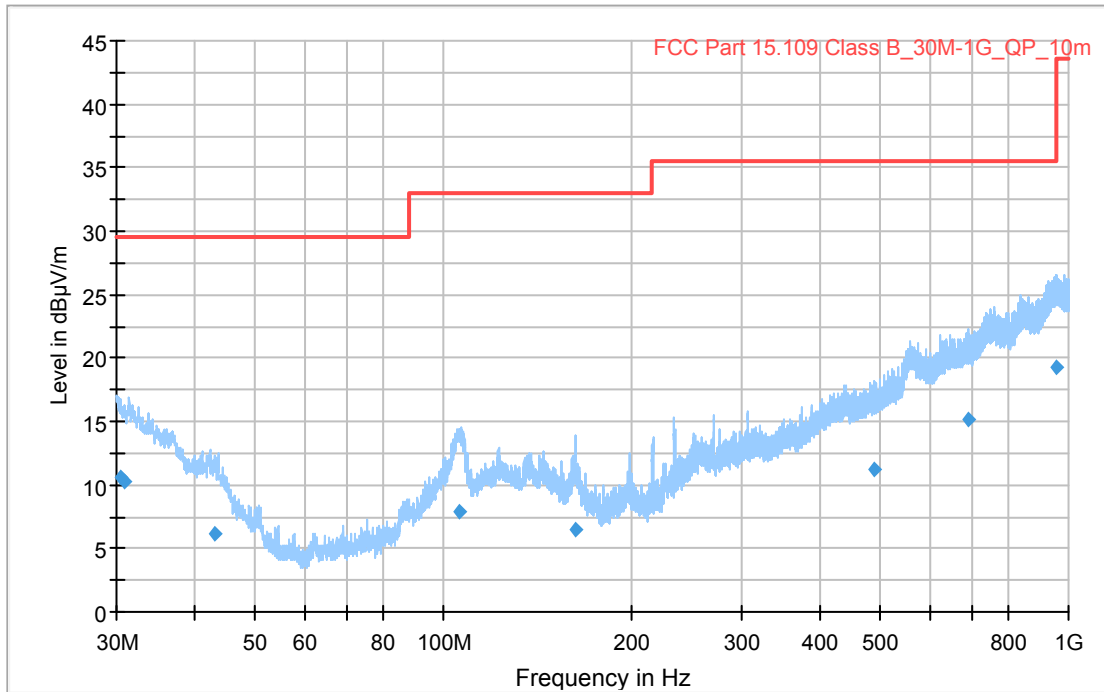
Measurement uncertainty for radiated disturbance

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] |
|-----------------|-----------------|----------------|------------------|-------------|
| 30.390 | 10.6 | 29.5 | H | 18.9 |
| 30.990 | 10.3 | 29.5 | H | 19.2 |
| 959.100 | 19.3 | 35.6 | H | 16.3 |

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 - V10.50.40 | -- | -- | -- |
| Measurement Receiver | Rohde & Schwarz | ESW44 | 33890 | 06-2019 | 1 years |
| Antenna | Chase | CBL 6111A | 971 | 09-2017 | 3 years |
| Pre-amplifier | SEMKO | AM1331 | 7992 | 04-2019 | 1 year |
| Measurement cable | Huber & Suhner | Sucoflex 106 | 39122 | 03-2019 | 1 year |
| Measurement cable | Rosenberger | LA5-S003-7000 | 39162 | 04-2019 | 1 year |
| Measurement cable | Rosenberger | LA5-S003-7000 | 39163 | 04-2019 | 1 year |