

EMC TEST REPORT

No. 1715684STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Lighting chain for outdoor use with LED
Type/Model: J1728 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 CRF Part 15: Radio frequency device, Subpart B: Unintentional radiators. Class B equipment.

ICES-005 Issue 4: Lighting Equipment, Class B.
ICES-005 Issue 5: Lighting Equipment, Class B.

For details, see clause 2 – 4.

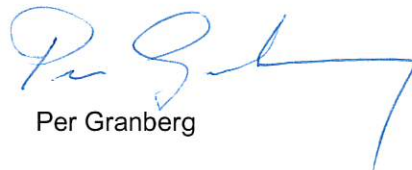
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Revision History

Edition	Date	Description	Changes
1	September 29, 2017	First release	
2	August 28, 2019	Second release	Addition of ICES-005 Issue 5. Clause 2.4 Opinions and interpretations added, page 5. Correcting ratings for luminaire and adding rating plate for luminaire, page 4. Clause 3.4 Test set up and EUT photos added, page 6. Transfer photos into document 1715684STO-001 Annex 1, Ed. 2.

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company	IKEA of Sweden AB Box 702 342 81 Älmhult Sweden
Name of contact	Stefan Backlund Phone +46 (0) 476-88756

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Lighting chain for outdoor use with LED
Type/Model	J1728 Stråla
Brand name	IKEA
Serial Number	--
Manufacturer	IKEA of Sweden AB
Rating input LED driver	100 - 120 V, 50/60 Hz
Rating output LED driver	24 V DC, 0.25 A, 6 W
Rating luminaire	24 V DC, Max 0.02 A, 1.5 W
Class	II
Highest clock frequency	<108 MHz

 Intertek XXXXXXXX	Conforms to: UL Std 588 Certified to: CSA Std C22.2 No. 37 CAN ICES-005 (B) / NMB-005 (B)	Sup. No. 00000 
	Type No. J1728 Stråla Made in	

TYP J1728 NA Version 1

Rating plate of EUT



Rating plate of LED-driver

2.2 Purpose of the test.

The purpose of the tests was to verify that the EUT fulfills the requirements according to FCC Part 15 Subpart B, ICES-005 Issue 4 and ICES-005 Issue 5.

2.3 Additional information about the EUT

The EUT is a lighting chain for outdoor use with LED. The EUT was tested in a tabletop configuration.

The EUT consists of the following units:

Unit	Type
Driver	KMUV-240-060-NA-2
Luminary	J1728 Stråla

2.4 Opinions and interpretations

The change of standard from ICES-005 Issue 4 to ICES-005 Issue 5 does not affect the measurements performed in this report. The tests performed according to ICES-005 Issue 4 fulfils the requirements of ICES-005 Issue 5.

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC Part 15 Subpart B: Radio frequency device, Subpart B: Unintentional radiators.

ICES-005 Issue 4: Lighting Equipment – Limits and methods of measurement, Class B.

ICES-005 Issue 5: Lighting Equipment – Limits and methods of measurement, Class B.

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 and EUT turned on.

3.5 Test set up and EUT photos

EUT photos and test set up photos are in separate document 1910149STO-001 Annex 1.

3.6 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 and 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	33.0	Quasi Peak
216 – 1000	46.0	35.5	Quasi 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))

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 14.9 dB at 0.150 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 10.1 dB at 39.119 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:
2017-09-05	22 [°C]	39 [%]

5.2 Test set-up 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

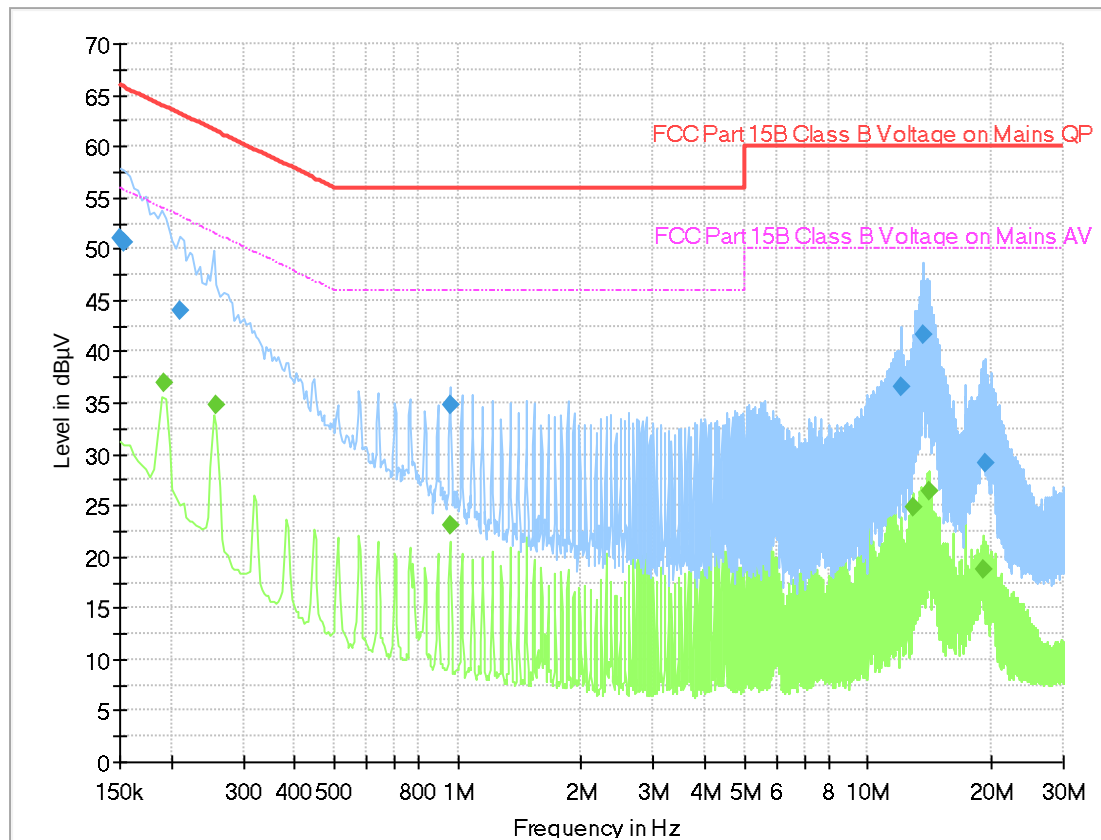
Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz

± 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

Frequency [MHz]	Quasi Peak [dBµV]	Limit [dBµV]	Line	Margin [dB]
0.150	51.1	66.0	N	14.9
0.153	50.6	65.8	N	15.2
0.211	44.0	63.2	N	19.2
0.960	34.9	56.0	N	21.1
12.081	36.7	60.0	N	23.3
13.679	41.6	60.0	L1	18.4

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

Measurement results, Average, Class B

Frequency [MHz]	Average [dBµV]	Limit [dBµV]	Line	Margin [dB]
0.192	37.0	54.0	L1	17.0
0.256	34.8	51.6	N	16.8
0.960	23.0	46.0	N	23.0
12.856	24.8	50.0	L1	25.2
14.066	26.4	50.0	N	23.6
19.117	18.8	50.0	L1	31.2

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 - 9	--	--	--
Receiver	Rohde & Schwarz	ESCI	12741	07-2017	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32798	07-2017	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	5875	07-2017	1 year
Coaxial cable	SUHNER	RG 223/U	9784	08-2017	1 year
Coaxial cable	Bedeia	RG223	39024	08-2017	1 year
Multimeter	GOSSSEN METRAWATT	Metra Hit 16S	7725	06-2017	1 year

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

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2017-09-08	23 [°C]	40 [%]

6.2 Test set-up and test procedure

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

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 set-up:

Test receiver set-up:

Preview test:

Final test:

30 – 1000 MHz

Peak,

RBW 120 kHz

VBW 1 MHz

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

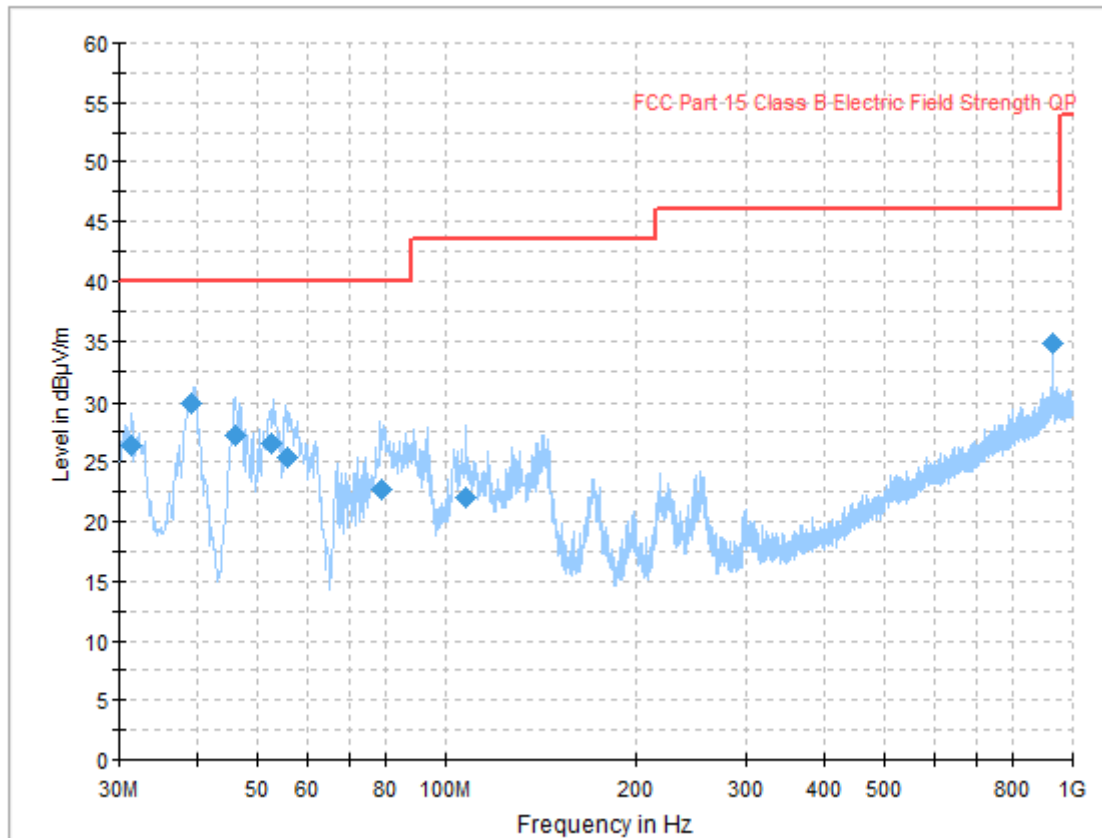
Uncertainty for the frequency range 30 to 1000 MHz at 3 m

± 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, Class B



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

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Quasi Peak [dBµV/m]	Limit [dBµV/m]	Pol	Margin [dB]
31.323	26.4	40.0	V	13.6
39.119	29.9	40.0	V	10.1
45.952	27.2	40.0	V	12.8
52.626	26.6	40.0	V	13.4
55.591	25.4	40.0	V	14.6
926.433	34.8	46.0	H	11.2

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 - 9	--	--	--
Measurement Receiver	Rohde & Schwarz	ESIB26	32286	07-2017	1 year
Antenna	Rohde & Schwarz	HL562	32310	03-2017	1 year
Rotary joint	Spinner	BN 835027	31807	04-2017	1 year
Control platform	Rohde & Schwarz	OSP130	32298	07-2017	1 year
Measurement cable	Rosenberger	UFB311A	39053	04-2017	1 year
Measurement cable	Radiall	SHF8M	9989	07-2017	1 year
Measurement cable	Radiall	SHF8M	9997	07-2017	1 year
Measurement cable	Radiall	SHF8M	39117	07-2017	1 year