

EMC TEST REPORT

No. 1818652STO-001, Ed. 3

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: LED-module
Tested Type/Model: LED1804E25
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 4: Lighting Equipment, Class B.
ICES-005 Issue 5: Lighting Equipment, Class B.

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	2018-12-21	First release	
2	2019-08-22	Second release	The report was updated according to order number 1914045. Standard issue ICES-005 Issue 5 is added as there are no differences compared to ICES-005 Issue 4 that affect the tests performed
3	2019-11-28	Third release	Clause 2.4 Opinions and interpretations added. The report was updated according to order number 1918816. Test set up and EUT photos are now enclosed in Annex 1 to this test report.

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1. CLIENT INFORMATION

The EUT has been tested by request of

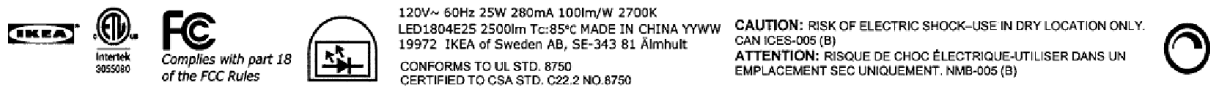
Company IKEA of Sweden AB
Box 702
343 81 Älmhult
Sweden

Name of contact Jörgen Skoog

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment LED-module
Type/Model LED1804E25
Brand name IKEA
Serial Number -
Manufacturer IKEA of Sweden AB
Rating 120 V, 60 Hz, 25 W, 280 mA
Class -
Highest clock frequency < 108 MHz
Software version -



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 Purpose of the test

The purpose of the tests was to verify that the EUT fulfills the requirements according to FCC 47 CFR Part 15, ICES-005 Issue 4 and ICES-005 Issue 5.

2.4 Additional information about the EUT

The EUT was tested in a tabletop configuration.

The EUT was tested with the following cables

Port	Type	Length [m]	Specifications
AC-mains	Two core	0,8	

2.5 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 47 CFR Part 15: Radio frequency device, Subpart B: Unintentional radiators.

ICES-005 Issue 4: Lighting Equipment.

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 supplied with 120 V, 60 Hz.

The EUT was tested with in 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 4.5.1

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 4.5.2

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 – 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))

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 7.1 dB at 0.161 MHz See clauses 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 9.1 dB at 68.255 MHz See clauses 6.5.	PASS

5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0,009 to 30 MHz

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2018-12-06	22 [°C]	29 [%]

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

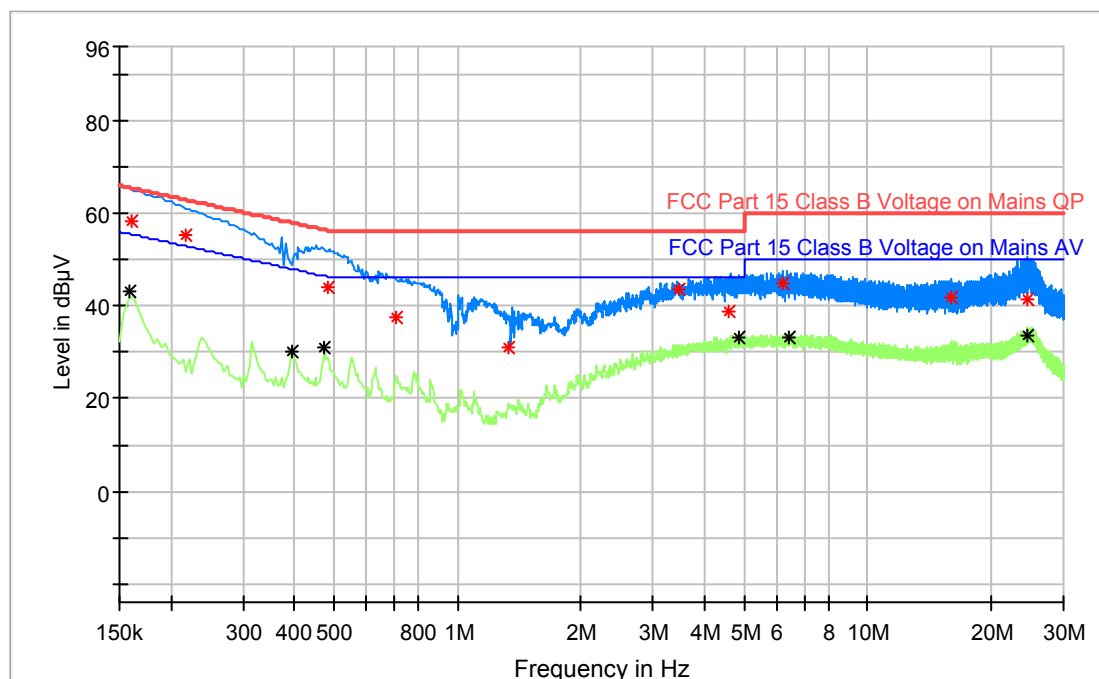
Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz

± 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]	Level [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.161	58.3	65.4	N	7.1
0.217	55.1	62.9	N	7.8
0.481	44.1	56.3	L	12.2
0.705	37.5	56.0	N	18.5
3.453	43.4	56.0	L	12.6
4.609	38.9	56.0	L	17.1
6.201	44.7	60.0	L	15.3
16.021	41.8	60.0	N	18.2
24.489	41.5	60.0	N	18.5

Measurement results, Average, Class B

Frequency [MHz]	Level [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.158	43.0	55.6	N	12.6
0.393	30.3	48.0	L	17.7
0.473	31.2	46.5	L	15.3
4.865	33.3	46.0	L	12.7
6.437	33.3	50.0	L	16.7
24.501	33.8	50.0	N	16.2

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 - V10.01.0	--	--	--
Measurement Receiver	Rohde & Schwarz	ESCI	12804	07-2018	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32455	07-2018	1 year
Artificial mains network	Rohde & Schwarz	ESH3-Z5	2728	07-2018	1 year
Measurement cable	Suhner	RG 58	9728	01-2018	1 year
Measurement cable	Suhner	G03232D-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:
2018-12-11	21 [°C]	30 [%]

6.2 Test set-up and test procedure

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

The EUT was set up in order to emit maximum disturbances.

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:	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

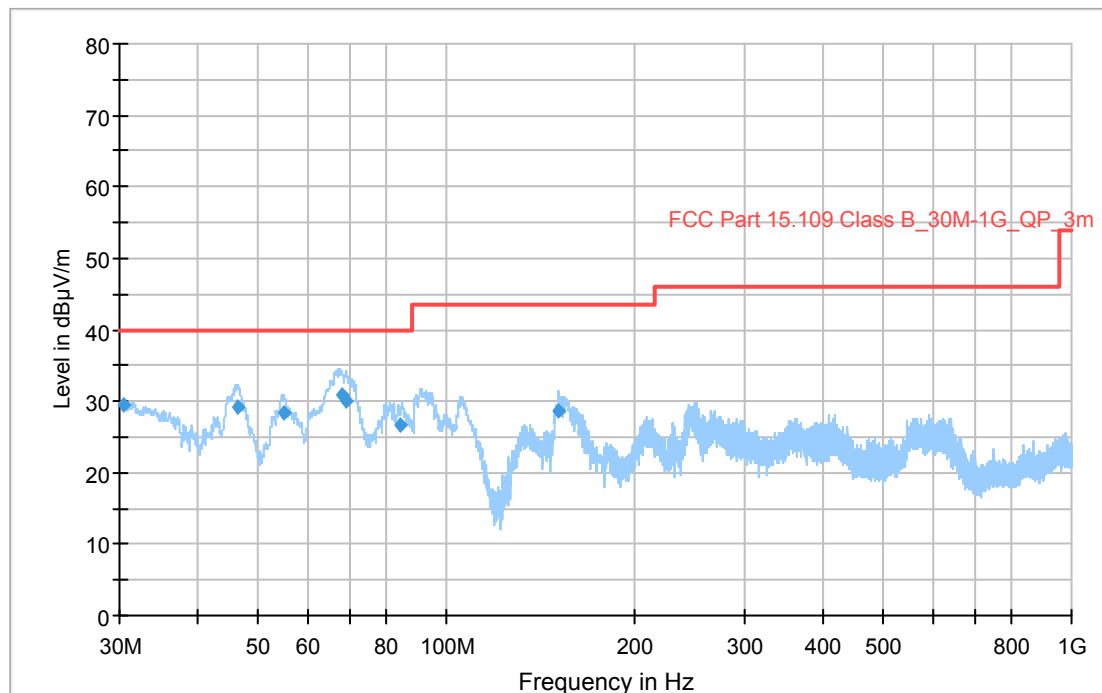
Measurement uncertainty for radiated disturbance

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, Class B



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

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
30.390	29.4	40.0	V	10.6
46.419	29.2	40.0	V	10.8
55.151	28.4	40.0	V	11.6
68.255	30.9	40.0	V	9.1
68.835	29.9	40.0	V	10.1
84.205	26.7	40.0	V	13.3
151.421	28.8	43.5	V	14.7

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 - V10.01.0	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW44	33890	02-2018	1.5 years
Antenna	Chase	CBL 6111A	971	09-2017	3 year
Pre-amplifier	SEMKO	AM1331	7992	10-2018	1 year
Measurement cable	Huber & Suhner	Sucoflex 106	39122	31-12-2017	1 year
Measurement cable	Rosenberger	LA5-S003-7000	39162	10-2018	1 year
Measurement cable	Rosenberger	LA5-S003-7000	39163	10-2018	1 year