

EMC TEST REPORT

No. 1812503STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: LED Module
Type/Model: LED1803E13
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: September 3, 2019

Tested by:


Daniel Moraeus

Approved by:


Per Granberg

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Revision History

Edition	Date	Description	Changes
1	2018-09-04	First release	
2	2019-09-03	Second release	<p>The report was updated according to order number 1914459.</p> <p>Standard issue ICES-005 Issue 5 is added as there are no differences compared to ICES-005 Issue 4 that affect the tests performed</p> <p>Clause 2.4 Opinions and interpretations added.</p>

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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 Jörgen Skoog

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment LED Module
Type/Model LED1803E13
Brand name IKEA AB
Serial Number -
Manufacturer IKEA of Sweden AB
Rating 120 V AC, 50/60 Hz, 11 W
Class -
Highest clock frequency < 108 MHz

2.2 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.

2.3 Additional information about the EUT

The EUT was tested in a tabletop configuration.

The EUT consists of the following units:

Unit	Type	Serial number
LED Module	LED1803E13	-

The EUT was tested with the following cables

Port	Type	Length [m]	Specifications
AC input	Two-core	0.8	-

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 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 #
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.

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 [dB μ V]	
	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 (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))

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 29.4 dB at 0.280 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 10.9 dB at 903.084 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:
2018-08-17	24 [°C]	53 [%]

5.2 Test set-up and test procedure

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

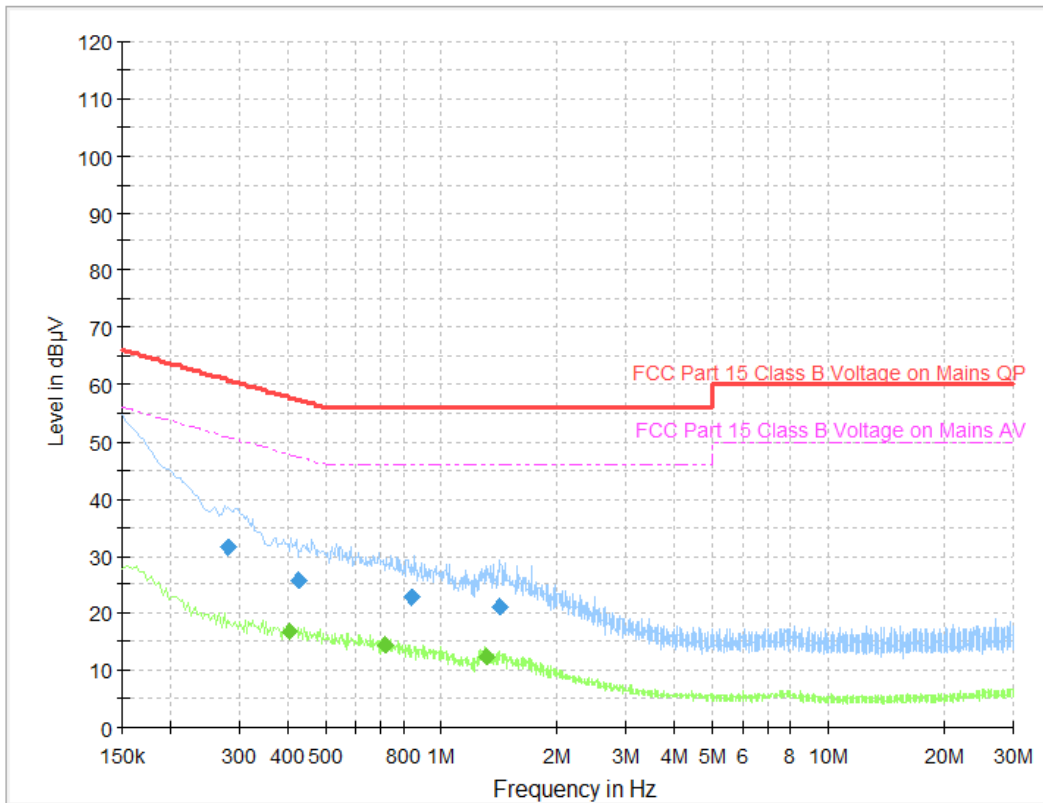
The EUT was connected to the power via Artificial Mains Networks AMN.
 The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.
 Overview sweeps were performed for each lead.
 During the tests the EUT was operated 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]
0.280	31.4	60.8	N	29.4
0.428	25.9	57.3	L	31.4
0.835	22.8	56.0	L	33.2
1.417	21.1	56.0	L	34.9

Measurement results, Average, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.405	16.7	47.8	N	31.1
0.714	14.4	46.0	N	31.6
1.303	12.5	46.0	L	33.5

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 – V9.25	--	--	--
Receiver	Rohde & Schwarz	ESCI	12741	07-2018	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	5875	07-2018	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32798	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:
2018-09-03	21 [°C]	56 [%]

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		

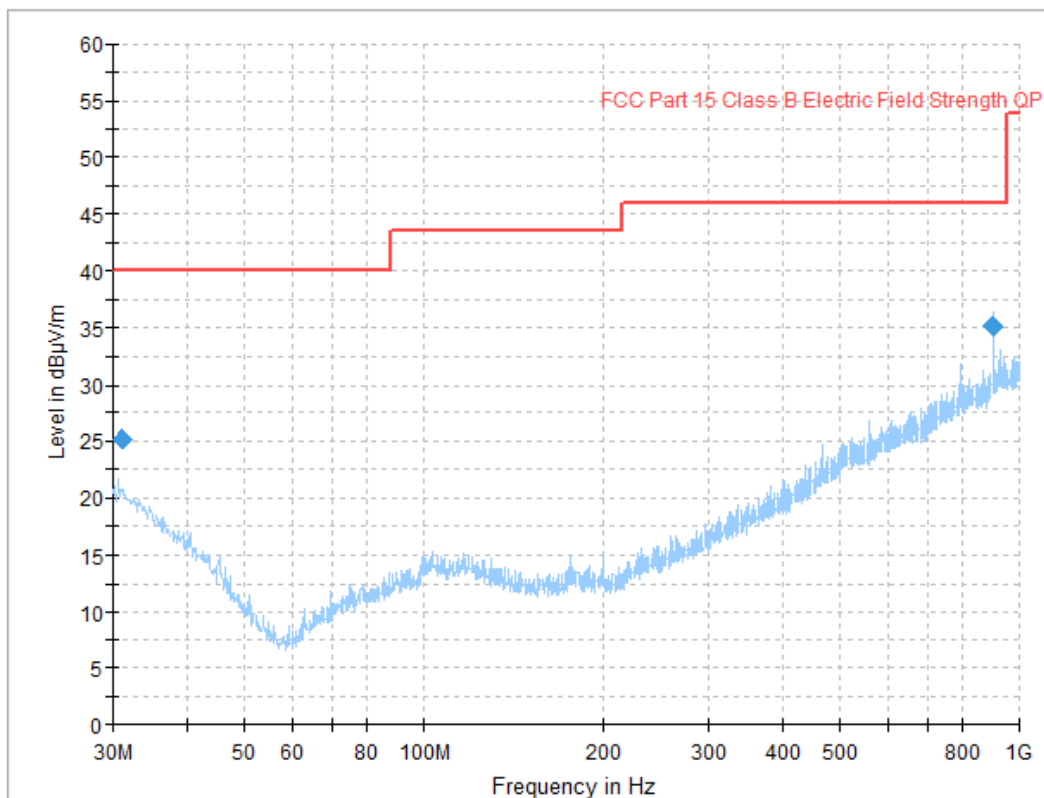
6.4 Measurement uncertainty

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]
31.140	25.2	40.0	H	14.8
903.084	35.1	46.0	V	10.9

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

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 -9.12.10	--	--	--
Antenna Ultralog	Rohde & Schwarz	HL562	32310	2018-04-10	1 year
Antenna mast	Maturo GmbH	AM 4.0	32377	-	
Coaxial cable	Rosenberger	UFB311A	39053	2018-03-29	1 year
Coaxial cable	Rohde & Schwarz	LMR400UF	9988	2018-08-06	1 year
Control unit	Maturo GmbH	MATURO GMBH	32390	-	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	32456	2018-07-24	1 year
Measurement receiver	Rohde & Schwarz	ESIB26	32286	2018-07-06	1 year
Transmitter, temp and moisture	Vaisala	HMI 41	32403	2018-08-02	1 year