

EMC TEST REPORT

No. 1907854STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Wall mounted luminaire with LED
Type/Model: V2002 Duggregn
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.

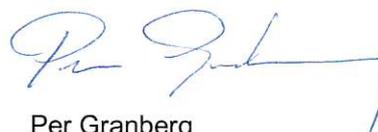
Date of issue: August 28, 2019

Tested by:


Ann-Christine Norrström


Anna Näslund

Approved by:


Per Granberg

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Revision History

Edition	Date	Description	Changes
1	May 21, 2019	First release	
2	August 28, 2019	Second release	The report was updated according to order number 1914612. Editorial change of test report with enclosed Annex 1.

CONTENTS

	Page
1. Client Information	4
2. Equipment under test (EUT).....	4
2.1 Identification of the EUT	4
2.2 Test set up and EUT photos	4
2.3 Additional information about the EUT	5
3. Test Specifications	6
3.1 Standards	6
3.2 Additions, deviations and exclusions from standards and accreditation	6
3.3 Test site	6
3.4 Mode of operation during the test	6
3.5 Compliance	7
4. Test Summary	8
5. Conducted continuous disturbances	9
5.1 Operating environment.....	9
5.2 Test setup and test procedure	9
5.3 Measurement uncertainty.....	9
5.4 Test results, AC Power input port, Class B, Light on.....	10
5.5 Test results, AC Power input port, Class B, Stand by	11
5.6 Test equipment	11
6. Radiated rf Emission in the frequency-range 30 MHz – 1000 MHz	12
6.1 Operating environment.....	12
6.2 Test setup and test procedure	12
6.3 Test conditions	13
6.4 Measurement uncertainty.....	13
6.5 Test results, 30 – 1000 MHz, Class B, Light on.....	14
6.6 Test results, 30 – 1000 MHz, Class B, Stand by	15
6.7 Test equipment	16

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	Carl Zhang

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Wall mounted luminaire with LED
Type/Model	V2002 Duggregn
Brand name	IKEA
Serial Number	-
Manufacturer	IKEA of Sweden AB
Rating	Luminaire: 24 V DC, 1.6W LED-driver: Input:100-240 V AC, 50/60Hz 0.05 A, 4 W Output: 24 V DC, Max 3 W
Class	-
Software version	-
Highest clock frequency	< 108 MHz

Rating plate

 cETLus Intertek ??????? Type No. V2002 Duggregn Made in	Conforms to: UL Std 153 Certified to: CSA Std C22.2 No. 250.4 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 V2002 24VDC, Max. 1.6W Sup. No.00000 
--	---	---

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 was tested in a tabletop configuration.
The EUT consists of the following units.

Units	Type	Serial number
Led-lamp	V2002 Duggregn	-
Led-driver	ICPSW24-3-2	-

The EUT was equipped with the following cables:

Port	Type	Length [m]	Specifications
AC-port	LED-driver	-	
DC-port	Two-core	1.9	

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 #
BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.

Two operating modes were tested, light on and light off (stand by mode).

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 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 15.3 dB at 0.150 MHz See clause 5.4-5.5.	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 6.0 dB at 30.120 MHz See clause 6.5-6.6.	PASS

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

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
May 22, 2019	26 [°C]	45 [%]

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.

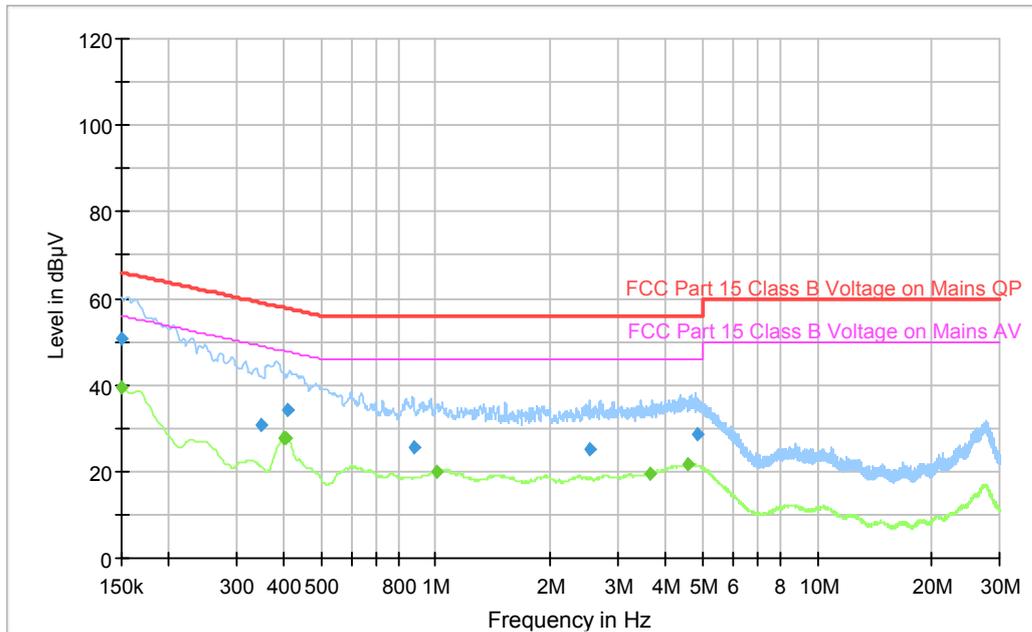
5.3 Measurement uncertainty

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, Light on



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B, Light on

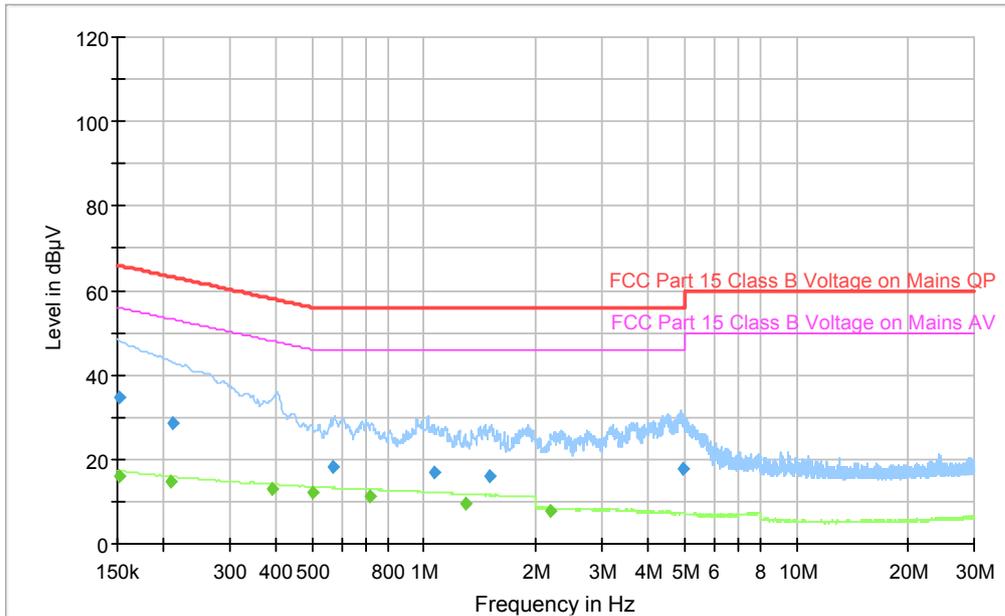
Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.150	50.7	66.0	L	15.3

Measurement results, Average, Class B, Light on

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.150	39.2	56.0	N	16.8

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

5.5 Test results, AC Power input port, Class B, Stand by



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B, Stand by

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

Measurement results, Average, Class B, Stand by

All 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]

5.6 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32	--	--	--
Receiver	Rohde & Schwarz	ESU8	12866	2018-07-05	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	2018-07-09	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32455	2018-07-04	1 year
Termo/Hygro	Vaisala	HMI41	8335	2018-11-27	1 year
Cable	SUHNER	G03232 D-01	9701	2018-08-01	1 year
Cable	HUBER+SUHNER	RG 213/U	9815	2018-07-27	1 year
Cable	RADIALL	SFH8M	39195	2018-10-26	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 1000 MHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
May 09, 2019	22 [°C]	26 [%]

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

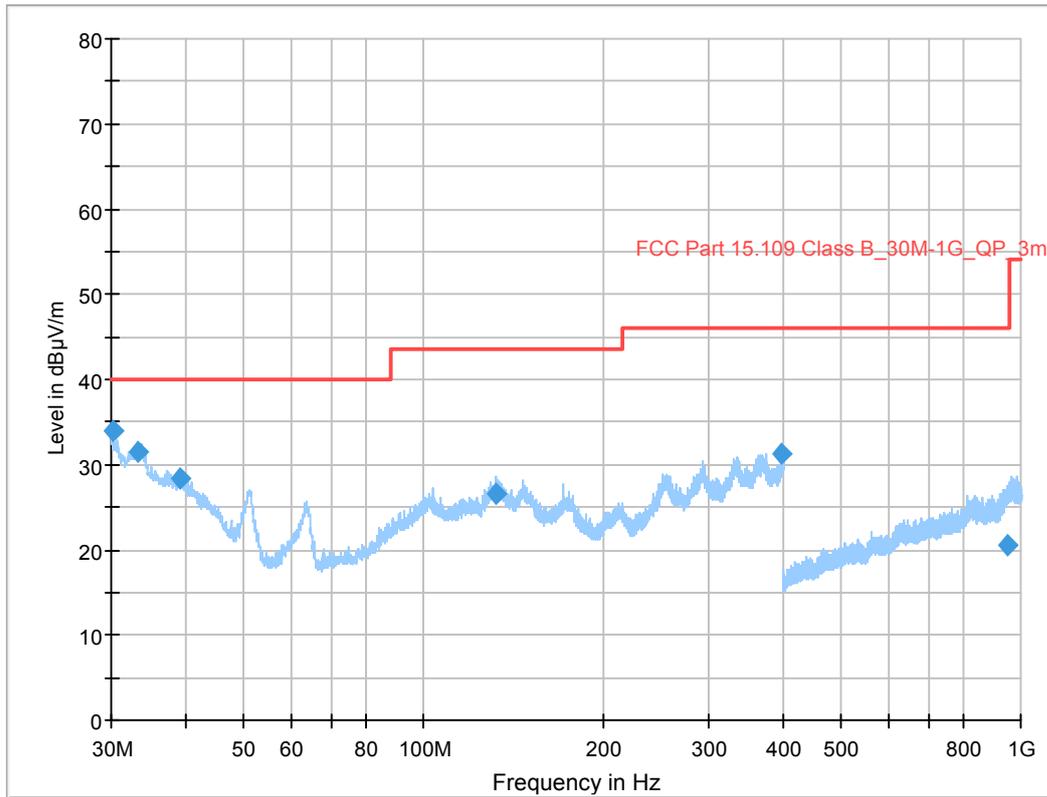
Test setup:	30 – 1000 MHz		
Test receiver set-up:			
Preview test:	Peak,	RBW 120 kHz	VBW 1 MHz
Final test:	Quasi-Peak,	RBW 120 kHz	
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Bilog		

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, Light on



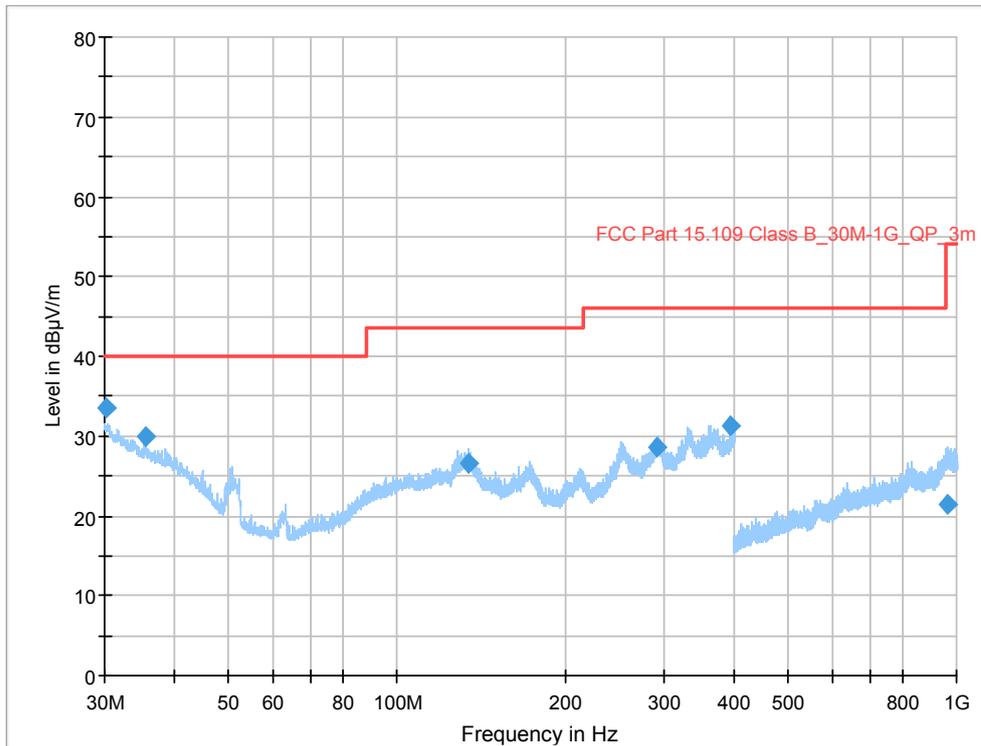
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, Class B, Light on

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
30.120	34.0	40.0	V	6.0
33.210	31.6	40.0	V	8.4
39.270	28.3	40.0	V	11.7
132.180	26.6	43.5	V	16.9
398.040	31.2	46.0	V	14.8

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

6.6 Test results, 30 – 1000 MHz, Class B, Stand by



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

Measurement results, Quasi Peak, Class B, Stand by

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
30.240	33.4	40.0	H	6.6
35.520	29.9	40.0	H	10.1
133.860	26.7	43.5	H	16.8
292.500	28.7	46.0	V	17.3
394.200	31.2	46.0	H	14.8

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]

6.7 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW 44	34030	March, 2019	1 year
Antenna Ultralog	R&S	HL562	30711	January, 2018	3 years
Antenna mast	Maturo GM BH	TAM 4.0-E	32376	-	-
Coaxial cable	Rosenberger	UFB311A	39055	April, 2019	1 year
Coaxial cable	Radiall	SHF8M	9975	August, 2018	1 year
Coaxial cable	Radiall	LMR400UF	9976	August, 2018	1 year
Termo/Hygro	Vaisala	HM41	32927	August, 2018	1 year