EMC TEST REPORT

No. 2019068STO-101

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Surface-mounted luminaire with LED
Type/Model:	T1920 Raksta
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 devices, Subpart B: Unintentional radiators, Class B Equipment.

ICES-005 Issue 5: Lighting Equipment Class B (2018).

For details, see clause 2 – 4.

Date of issue: May 25, 2020

Tested by: Madeleine Bengtsar — Madeleine Bengtsar

Approved by: Per Granberg

Revision History

Test report number	Date	Description	Changes
2019068STO-101	May 25, 2020	First release	-

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1. CLIENT INFORMATION

The EUT has been tested by request of

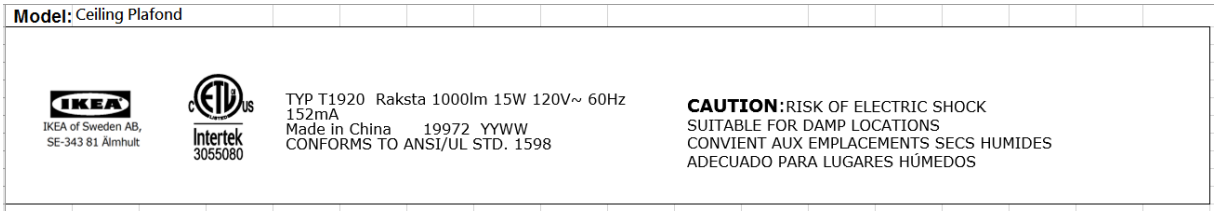
Company	IKEA of Sweden AB Box 702 343 81 Älmhult Sweden
Name of contact	Markus Mauritzon

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Surface-mounted luminaire with LED
Type/Model	T1920 Raksta
Brand name	IKEA
Serial number	-
Manufacturer	IKEA of Sweden AB
Rating	120 V AC, 60 HZ, 152 mA, 15 W
Class	I
Highest clock frequency	< 108 MHz

Rating plate



2.2 Test set up and EUT photos

Test set up and EUT photos are enclosed in Annex 1 No 2019068STO-103 to this test report.

2.3 Additional information about the EUT

The EUT was tested in a tabletop standing configuration.

The EUT was equipped with the following cables:

Port	Type	Length [m]	Specifications
AC power cable	Three core	0.8	

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators.

ICES-005 Issue 5: Lighting Equipment (2018).

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 standard 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 an FCC listed test site with site registration number 90913
Intertek Semko AB is an 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.
The EUT was tested with lights 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 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

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 – 960	46.0	35.6	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 7.2 dB at 4.844 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 3.8 dB at 33.930 MHz The measurement result is within the measurement uncertainty. See clause 6.5.	**PASS**
FCC Part 15 subpart B **ICES-005**	**Radiated emission of electromagnetic fields in the frequency range >1.0 GHz** Not Applicable. The highest clock frequency of the EUT is below 108 MHz.	**N/A**

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

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
March 18, 2020	23 [°C]	21 [%]

5.2 Test setup and test procedure

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

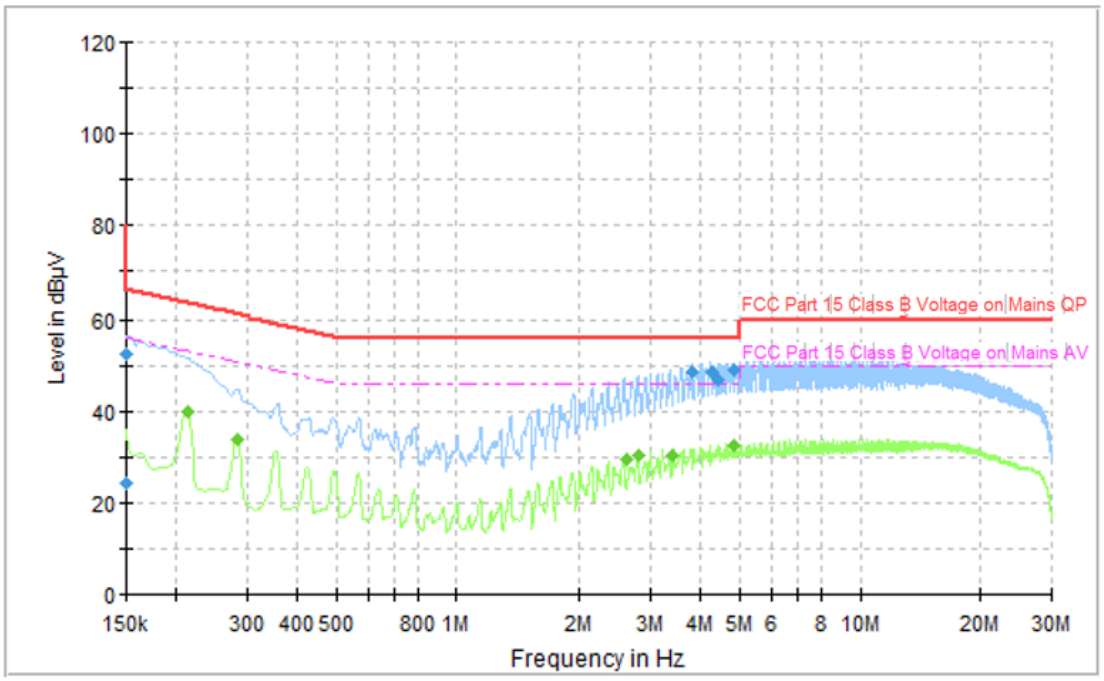
The EUT was connected to the power via Artificial Mains Networks AMN.
The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.
Overview sweeps were performed for each lead.
During the tests the EUT was operated 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

Frequency [MHz]	Result [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.150	52.5	66.0	L	13.5
3.827	48.7	56.0	L	7.3
4.265	48.3	56.0	N	7.7
4.400	46.9	56.0	L	9.1
4.844	48.8	56.0	N	7.2

All other 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]
0.213	39.7	53.1	N	13.4
0.285	33.8	50.7	L	16.9
2.605	29.6	46.0	N	16.4
2.819	30.1	46.0	L	15.9
3.399	30.3	46.0	L	15.7
4.848	32.5	46.0	L	13.5

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 - Version	--	--	--
Receiver	Rohde & Schwarz	ESU8	12866	06-2019	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	06-2019	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	4623	05-2020	1 year
Cable	Suhner	G03232 D-01	9701	06-2019	1 year
Cable	Suhner	RG 223/U	9815	06-2019	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 1 GHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
May 20, 2020	21 [°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

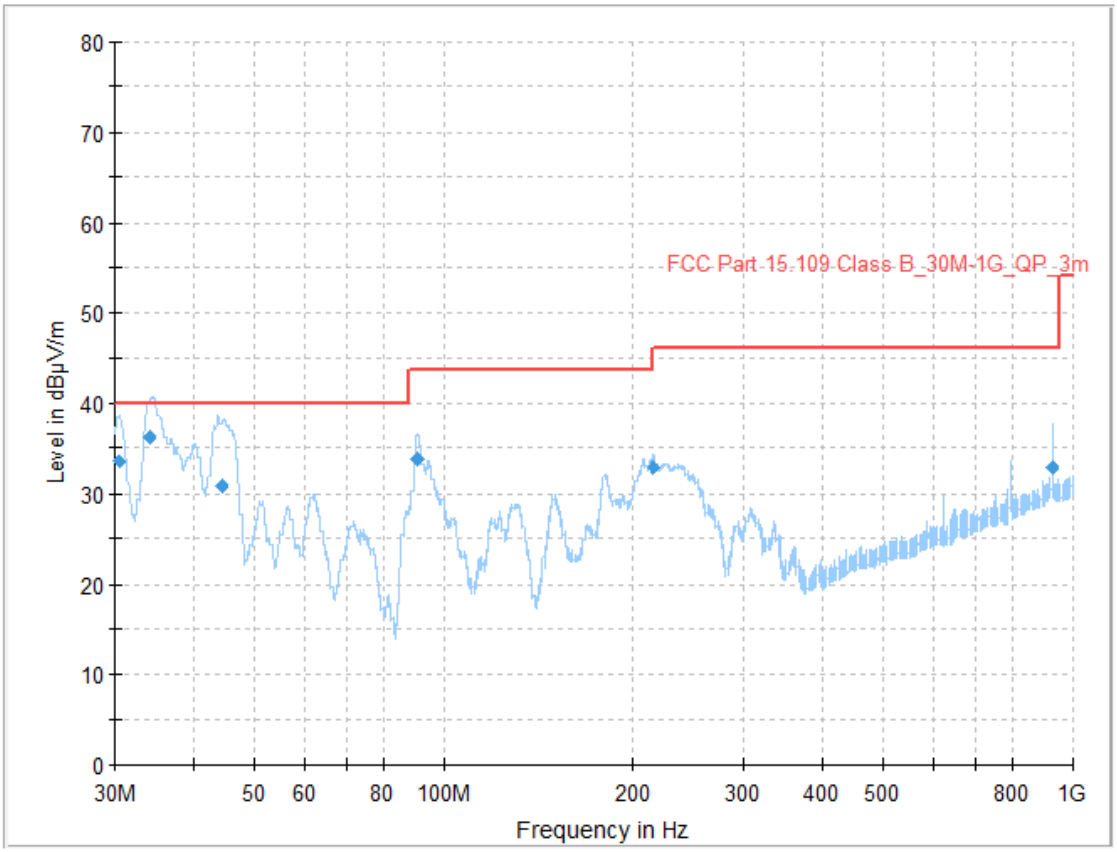
Test setup:	**30 – 1000 MHz**		
Test receiver set-up:			
Preview test:	Peak,	RBW 120 kHz	VBW 1 MHz
Final test:	Quasi-Peak,	RBW 120 kHz	
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Bilog		

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, FCC &ICES-005, Class B



Diagram, Peak and Average overview sweep

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
30.360	33.5	40.0	V	6.5
33.930	36.2	40.0	V	3.8*
44.430	30.8	40.0	V	9.2
90.720	33.8	43.5	V	9.7
215.580	32.9	43.5	V	10.6
929.260	32.8	46.0	H	13.2

* The measured result is below the limit by a margin less than the measured uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance is more probable than non-compliance with specification limit.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

The EUT also fulfil the limit of ICES-005, see limit table, clause 3.5 Compliance in this report.

6.6 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW 44	33950	06-2019	1 year
Antenna	Rohde & Schwarz	HL562	32310	05-2019	3 years
Measurement cable	Radiall	SHF8M	9987	08-2019	1 year
Measurement cable	Suhner	Sucoflex 104	39003	09-2019	1 year
Measurement cable	Rosenberger	UFB311A	39053	04-2020	1 year
Temperature meter	Vaisala	HM41	32403	09-2019	1 year