EMC TEST REPORT

No. 2024534STO-101

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Decoration lamp with LED
Type/Model:	J2024 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 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators. Class B equipment.

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

For details, see clause 2 – 4.

Date of issue: December 17, 2020

Tested by: Anna Pogosian

Approved by: Per Granberg

Revision History

Test report no.	Release no.	Date of issue	Description
2024534STO-101	1	December 17, 2020	

Terms, definition and abbreviations

The following terms, definitions and abbreviations may be used throughout the report.

Term/definition/abbreviation	Meaning
AAN	Asymmetrical Artificial Network
AC	Alternating Current
AE	Associated Equipment
AM	Amplitude Modulation
AMN	Artificial Mains Network
AV	Average
BW	Bandwidth
CAV	CISPR Average
CDN	Coupling/Decoupling Network
CM	Common Mode
CMAD	Common Mode Absorption Device
DC	Direct Current
DM	Differential Mode
EM	Electromagnetic
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
EUT	Equipment Under Test
F	Fail
FM	Frequency Modulation
FAR	Fully Anechoic Room
F_X	Highest fundamental frequency generated or used within the EUT, or highest frequency at which it operates
H	Horizontal
HCP	Horizontal Coupling Plane
I_{ref}	Reference Current
ISN	Impedance Stabilizing Network
MU	Measurement Uncertainty
N/A	Not Applicable
P	Pass
PE	Protective Earth
PK	Peak
Pol.	Polarisation
PWHC	Partial Weighted Harmonic Current
QP / QPK	Quasi-Peak
RF	Radio Frequency
RGP	Reference Ground Plane
RH	Relative Humidity
RMS	Root Mean Square
Rx	Receiver / Receiving
SAC	Semi-Anechoic Chamber
THC	Total Harmonic Current
Tx	Transmitter / Transmitting
V	Vertical
VCP	Vertical Coupling Plane

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1. CLIENT INFORMATION

The EUT has been tested by request of

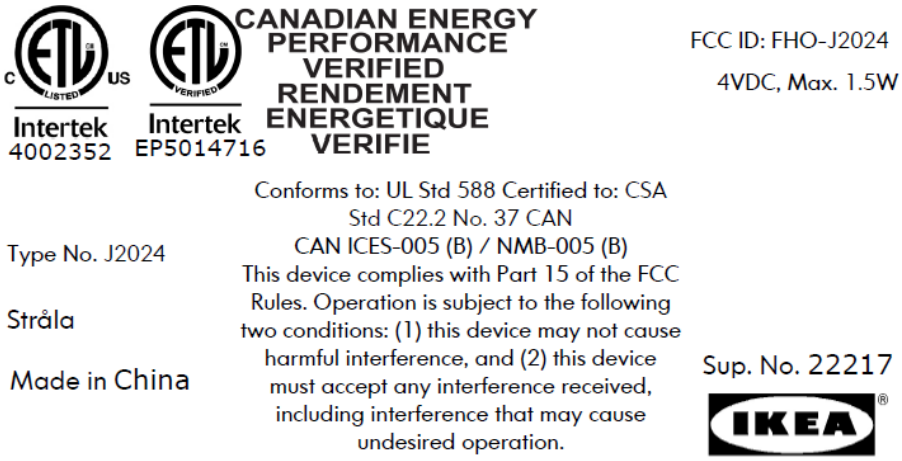
Company	IKEA of Sweden AB
Name of contact	Jianqiu Chen

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Decoration lamp with LED
Type/Model:	J2024 Stråla
Brand name:	IKEA
S/N:	-
Manufacturer:	IKEA of Sweden AB Box 702 343 81 Älmhult Sweden
Installation class:	☐ I ☒ II (LED driver) ☒ III (Luminaire) ☐ N/A
Highest clock frequency, F_X:	< 108 MHz
Software version:	-
Hardware version:	-
Mounting position: (during normal use)	☒ Table-top ☐ Floor-standing ☐ Wall/ceiling ☐ Hand-held ☐ Other:
Supplementary information:	FCC ID: FHO-J2024

Input ratings	**Voltage [V]**	**Freq. [Hz]**	**Current [A]**	**Power [W]**	**Coupling**
☒ AC (LED-driver)	100-120	50/60			**L1** ☒ **L2** ☐ **L3** ☐ **N** ☒ **PE** ☐
☐ DC					**V+** ☐ **V-** ☐ **PE** ☐
☒ Battery (Luminaire)	4			1.5	**V+** ☒ **V-** ☒ **PE** ☐
☐ Other:					



Photo/copy of marking/rating plate(s)

2.2 Test set up and EUT photos

Test set up and EUT photos are enclosed in Annex 1 No 2024534STO-102 to this test report.

2.3 Additional information about the EUT

The EUT was supplied by two AA rechargeable batteries. The LED driver: YH-U-040-0120D was used to charge the batteries.

The EUT was tested in a table-top configuration.

2.4 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Manufacturer	Type/Model	S/N
LED-driver	IKEA	YH-U-040-0120D	-

3. TEST SPECIFICATIONS

3.1 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

3.2 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
☐ BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1
☐ 5 m CHAMBER	Semi-anechoic 5 m	2042G-3

3.3 Mode of operation during the test

Mode no.	Supply	Description
1	120 V, 60 Hz	Charging
2	-	Battery-operated

Test	Mode of operation
Conducted continuous emission	1
Radiated emission of EM fields	1, 2

4. TEST SUMMARY

The test has been carried out at the Intertek Semko AB premises in Kista, Sweden.
The results in this report apply only to sample tested.
Result: P – F – N/A

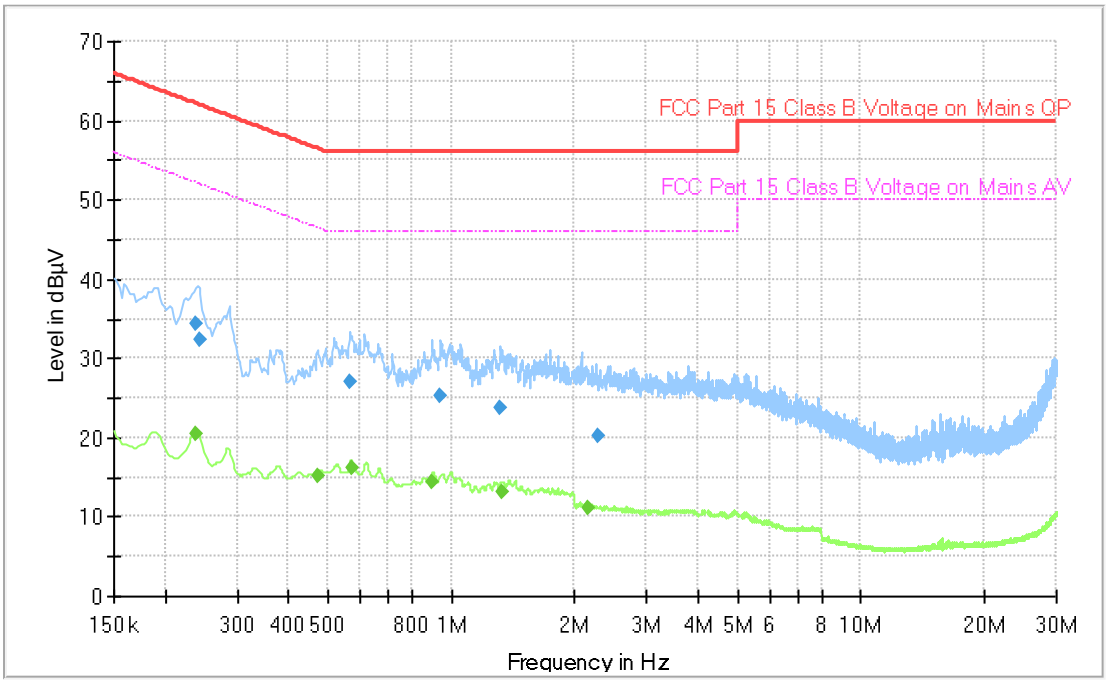
EMISSION TESTS					
Chapter	**Standard(s)**	**Description**	**Port type(s)**	**Note(s)**	**Verdict**
5	FCC Part 15 subpart B	Conducted continuous emission	AC input	-	P
5	ICES-005	Conducted continuous emission	AC input	-	P
6	FCC Part 15 subpart B	Radiated emission of EM fields	Enclosure	(1)	P
6	ICES-005	Radiated emission of EM fields	Enclosure	(1)	P
Supplementary information: (1) Measured value(s) is/are within the measurement uncertainty interval to the limit.					

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

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
October 6, 2020	23	57	Anna Pogosian

Test setup and procedure:	EUT was placed 0.8 m from the AMN /ISN. Overview sweeps were performed for each lead of the cable(s). AE requiring mains power to operate was/were connected to AMN /ISN terminated with 50 Ω, when applicable.		
EUT position:	☒ Table-top (EUT 0.4 m from the RGP) ☐ Floor-standing (EUT 12 mm from the RGP) ☐ Other:		
Tested port type(s):	**Coupling device**	**Measurement uncertainty**	
		Frequency range	**Value**
☒ AC power	☒ AMN	0.15 – 30 MHz	± 3.3 dB
Supplementary information: Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011. The measurement uncertainty is given with a confidence of 95 %.			

5.1 Test results, AC Power input port, Class B, Operating mode 1



Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak

The margin to the limit is at least 20 dB for all frequencies.

Measurement results, Average

The margin to the limit is at least 20 dB for all frequencies.

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

5.2 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	July 2020	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	4623	May 2020	1 year
AMN	Rohde & Schwarz	ESH3-Z5	2728	July 2020	1 year
Cable	Huber + Suhner	RG 223/U	9815	June 2020	1 year
Cable	Suhner	G03232 D-01	9701	June 2020	1 year
Temp/hygro	Chroma	61604	8335	Nov 2020	1 year

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

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
October 7, 2020	20	58	Anna Pogosian

Test setup and procedure:	The EUT was placed on a non-conductive support on the RGP. Overview sweeps were performed with the measurement receiver in max hold mode and the peak detector activated in the frequency range 30 – 1000 MHz. Above 1 GHz, both the peak and average detectors were activated, when applicable. During height scan above 1 GHz the EUT was kept in antennas cone of radiation.
EUT position:	☒ Table-top (EUT 0.8 m from the RGP) ☐ Floor-standing (EUT 12 mm from the RGP) ☐ Other:
Highest measured frequency:	☒ F_X 108 MHz: 1 GHz ☐ 108 MHz < F_X ≤ 500 MHz: 2 GHz ☐ 500 Mhz < F_X ≤ 1 GHz: 5 GHz ☐ F_X > 1 GHz: 5 x F_X up to a max. of 40 GHz ☐ F_X is unknown: 40 GHz

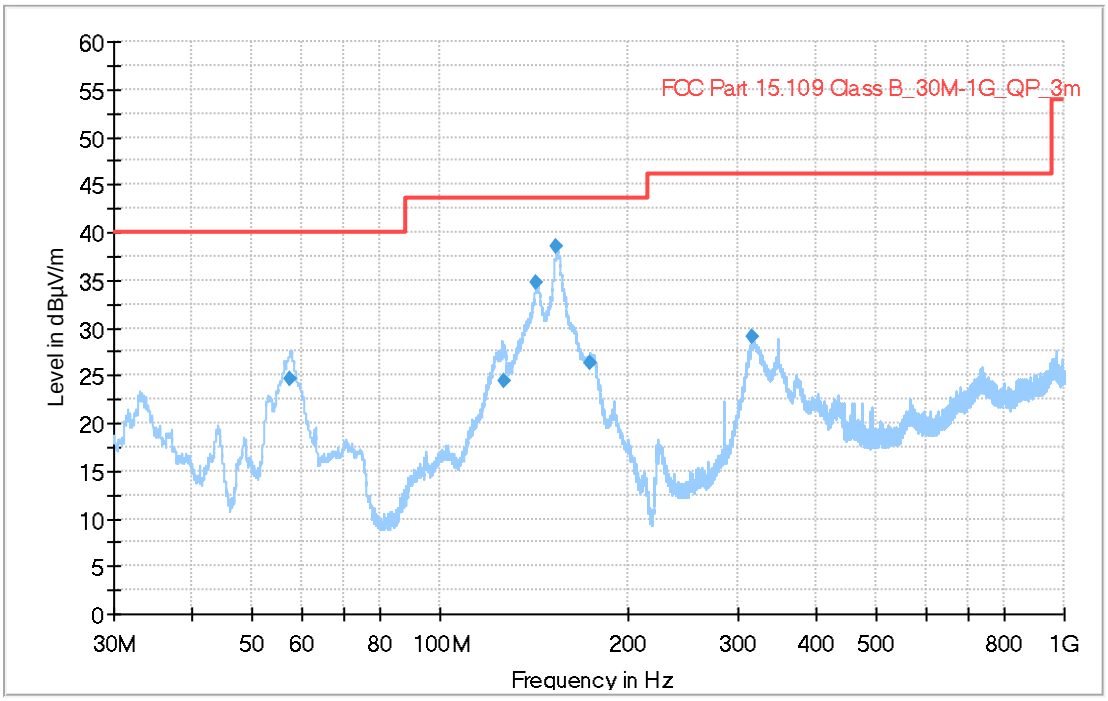
Frequency range:	Measuring distance	Measurement uncertainty
☒ 30 to 1000 MHz	3 m	± 5.1 dB
☐ 30 to 1000 MHz	10 m	± 5.0 dB
☐ 1.0 to 18 GHz	3 m	± 4.5 dB
☐ 18 to 26 GHz	3 m	± 4.8 dB
☐ 26 to 40 GHz	3 m	± 5.7 dB

Supplementary information: Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011. The measurement uncertainty is given with a confidence of 95 %.

Test	Freq. [MHz]	Meas. angle [°]	Antenna			RBW [kHz]			VBW [kHz]
			Type	Height	Pol.	QP	PK	AV	PK
Preview	30 – 1000	0 – 359	Bilog	1 – 4 m	V and H	-	120	-	1000
Final						120	-	-	-
Preview	1000 – 40000	0 – 359	Horn	1 – 4 m		-	1000	-	3000
Final						-	1000	1000	-

Measurement distance [m]	Frequency [MHz]	Limits [dBµV/m]		
		QP	PK	AV
Limits, FCC, Class A				
☐ 3 / ☐ 10	30 – 88	49.6 / 39.1	-	-
	88 – 216	54.0 / 54.0	-	-
	216 – 960	56.9 / 56.9	-	-
	960 – 1000	60.0 / 49.5	-	-
☐ 3 / ☐ 10	Above 1000	-	80.0 / 69.5	60.0 / 49.5
Limits, FCC, Class B				
☒ 3 / ☐ 10	30 – 88	40.0 / 29.5	-	-
	88 – 216	43.5 / 33.1	-	-
	216 – 960	46.0 / 35.6	-	-
	960 – 1000	54.0 / 43.5	-	-
☐ 3 / ☐ 10	Above 1000	-	74.0 / 43.5	54.0 / 63.5
Limits, ICES-005 Class A				
☐ 3 / ☐ 10	30 – 88	49.5 / 39.1	-	-
	88 – 216	54.0 / 43.5		
	230 – 1000	56.9 / 46.4	-	-
Limits, ICES-005, Class B				
☒ 3 / ☐ 10	30 – 88	40.0 / 29.5	-	-
	88 – 216	43.5 / 33.1	-	-
	230 – 1000	46.0 / 35.6	-	-

6.1 Test results, 30 – 1000 MHz, FCC, Class B, Operating mode 1



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak

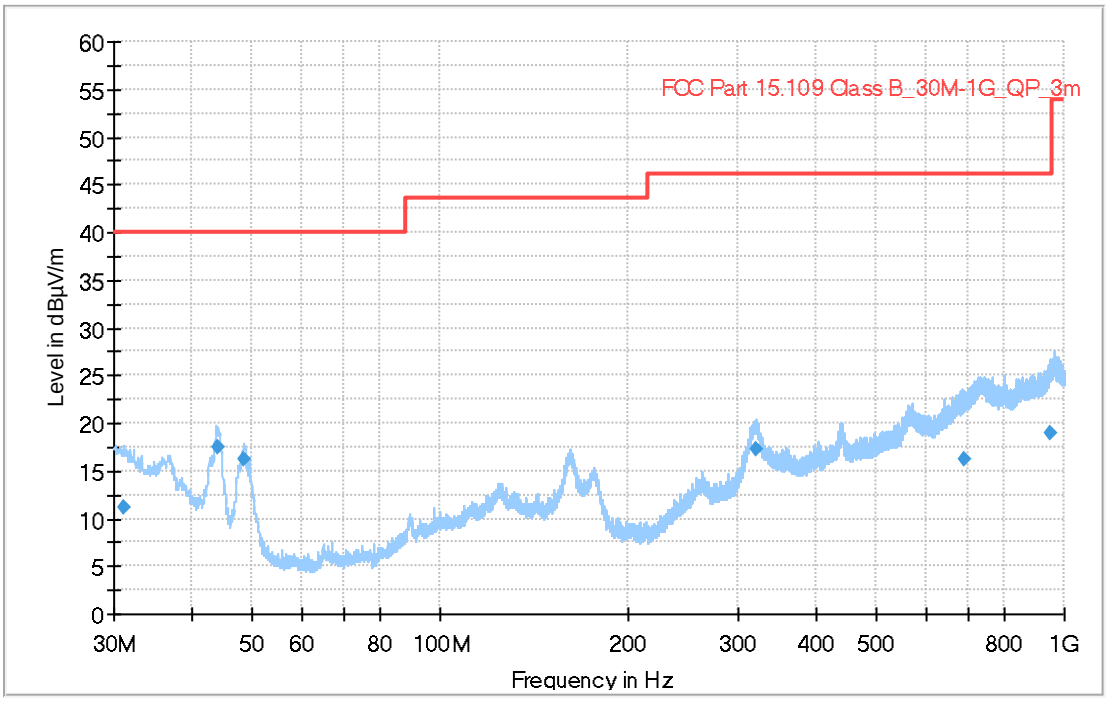
Frequency (MHz)	QuasiPeak	Limit (dBµV/	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth
57.570	24.59	40.00	15.41	1000.0	120.0	122.0	V	307.0
126.180	24.48	43.52	19.04	1000.0	120.0	100.0	V	262.0
142.860	34.67	43.52	8.85	1000.0	120.0	104.0	V	284.0
153.780	38.43	43.52	**5.10***	1000.0	120.0	105.0	V	284.0
174.330	26.21	43.52	17.31	1000.0	120.0	100.0	V	242.0
316.140	29.04	46.02	16.98	1000.0	120.0	100.0	V	-33.0

***** The measured result is below the limit by a margin less than the measurement 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 the specification limit.

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

The EUT also fulfils the limit for ICES-005, see limit table, page 14.

6.2 Test results, 30 – 1000 MHz, FCC, Class B, Operating mode 2



Diagram, Peak and Average overview sweep

The margin to the limit is at least 20 dB for all frequencies.

Measurement results, Quasi-peak

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

The EUT also fulfils the limit for ICES-005, see limit table, page 14.

6.3 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Preamplifier	Semko	AM1331	7992	06-2020	06-2021
Test receiver	Rohde & Schwarz	ESW 44	33890	07-2020	07-2021
Cable	Rosenberger	LA5-S003-10000	39163	06-2020	06-2021
Cable	Huber+Suhner	Sucoflex 106	39122	04-2020	04-2021
cable	Rosenberger	LA5-S003-8500	39148	04-2020	04-2021
Antenna Bilog	Teseq	CBL 6111D	34200	03-2020	03-2023
Termo/hygro	Vaisala	HMI 41	31215	06-2020	06-2021