EMC TEST REPORT

No. 2109489STO-103

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Decoration lamp with LED
Type/Model:	J2120 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. (2018)

For details, see clause 2 – 4.

Date of issue: December 15, 2021

Tested by: Ann-Christine Norrström

Approved by: Anders Lindström

Revision History

Test report no.	Release no.	Date of issue	Description
2109489STO-103	1	December 15, 2021	

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
AMN	Artificial Mains Network
ANSI	American National Standards Institute
AV	Average
BW	Bandwidth
CAV	CISPR Average
CFR	Code of Federal Regulations
CISPR	Comité international spécial des perbutations radioélectriques
CM	Common Mode
CMAD	Common Mode Absorption Device
DC	Direct Current
DM	Differential Mode
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
F	Fail
FAR	Fully Anechoic Room
FCC	Federal Communications Commission
F_X	Highest fundamental frequency generated or used within the EUT, or highest frequency at which it operates
ICES	Interference-Causing Equipment Standard
H	Horizontal
I_{ref}	Reference Current
ISN	Impedance Stabilizing Network
MU	Measurement Uncertainty
N/A	Not Applicable
P	Pass
PE	Protective Earth
PK	Peak
Pol.	Polarisation
QP / QPK	Quasi-Peak
RBW	Resolution Bandwidth
RF	Radio Frequency
RGP	Reference Ground Plane
RH	Relative Humidity
RMS	Root Mean Square
Rx	Receiver / Receiving
SAC	Semi-Anechoic Chamber
Tx	Transmitter / Transmitting
V	Vertical
VBW	Video Bandwidth

CONTENTS

Page

1. CLIENT INFORMATION

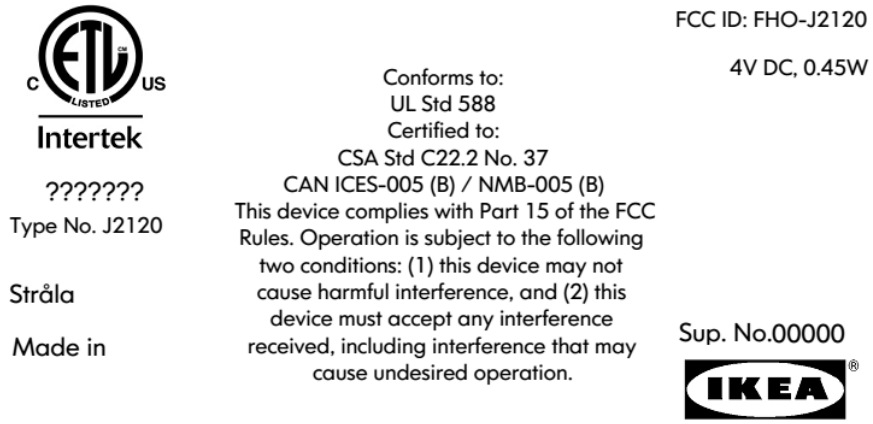
The EUT has been tested by request of

Company	IKEA of Sweden AB
Name of contact	Jianqiu Chen
Client observer	-

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Decoration lamp with LED								
Type/Model:	J2120 Stråla								
Brand name:	IKEA								
S/N:	-								
Manufacturer:	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden								
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:									
Input ratings	**Voltage [V]**	**Freq. [Hz]**	**Current [A]**	**Power [W]**	**Coupling**				
☒ AC*	220-240	50-60	0.05	4.2	**L1** ☒	**L2** ☐	**L3** ☐	**N** ☒	**PE** ☐
☒ DC	4			0.45	**V+** ☒	**V-** ☒			**PE** ☐
☐ Battery					**V+** ☐	**V-** ☐			**PE** ☐
☐ Other:									
Supplemenary information:	* LED-driver								



Lamp

LED-driver

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 to this test report.

2.3 Additional information about the EUT

The EUT was tested in table-top configuration.

The EUT consists of the following units:

Unit	Type desigation	Description
Lamp	J2120 Stråla	-

The EUT has the following ports:

Port type	Port name	Length [m]	Shielded
AC I/O			
☒ AC power input	*AC-mains plug	-	☐
☐ AC power output			☐
DC I/O			
☒ DC power input	DC cord	2.10	☐
☐ DC power output			☐
Signal/control I/O			
☐ Signal/control			☐
☐ Telecom/network			☐
Supplementary information: * Port of LED-driver			

The EUT ports were connected according to the following:

Port name	Cable type	Connected to
AC	Plug-in	LED driver
DC	Two-core	Lamp

2.4 Associated/auxiliary equipment

Auxiliary

Equipment needed for correct operation of the EUT and is part of the system under test.

Equipment	Manufacturer	Type/Model	S/N
LED-driver	IKEA	KMW-040-030-NA-3	-

2.5 Decision rule

The statements of conformity are reported as:
Passed – When the measured values are within the specified limits.
Failed – When one or more measures values are outside the specified limits.

3. TEST SPECIFICATIONS

3.1 Additions, deviations and exclusions from standards and accreditation

The following editions of basic standards were applied instead of the standards referenced in FCC 47 CFR Part 15 and ICES-005:

Referenced	Applied
ANSI C63.4-2014	ANSI C63.4-2014
CISPR 15:2015	CISPR 15:2018

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 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 #
☒ 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 AC/4 V DC	Light on
2	120 V AC/4 V DC	Stand by

Test	Mode of operation
Conducted continuous emission	1,2
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	ANSI C63.4	Conducted continuous emission	AC input	-	P
6	ANSI C63.4	Radiated emission of EM fields	Enclosure	-	P
Supplementary information:					

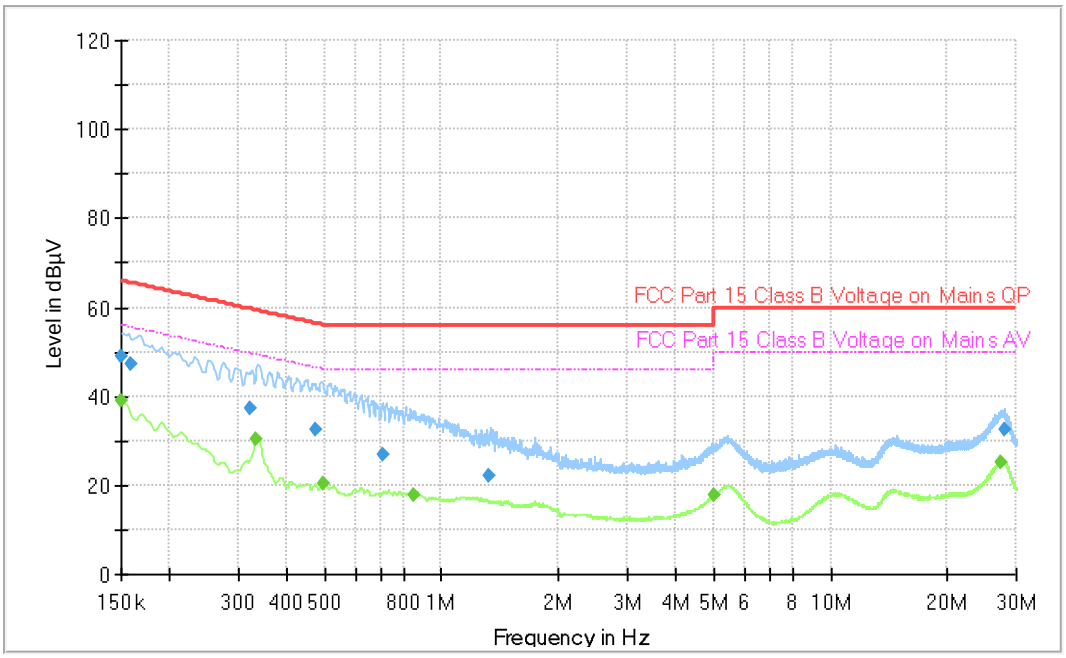
5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
December 10, 2021	21	27	Ann-Christine Norrström

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 %.			

Port	**Frequency [MHz]**	**Voltage limits [dBµV] (2)**	
		QP	**AV**
Limits FCC Part 15 subpart B and ICES-005			
☐ AC power input Class A	0.15 – 0.50	79	66
	0.50 – 30.0	73	60
☒ AC power input Class B	0.15 – 0.50	66 – 56 (1)	56 – 46 (1)
	0.50 – 5.00	56	46
	5.00 – 30.0	60	50
Supplementary information: (1) The limits decrease linearly with the logarithm of the frequency. (2) At transitional frequencies the lower limit applies.			

5.1 Test results, AC Power input port, Class B, Mode 1



Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak, Mode 1

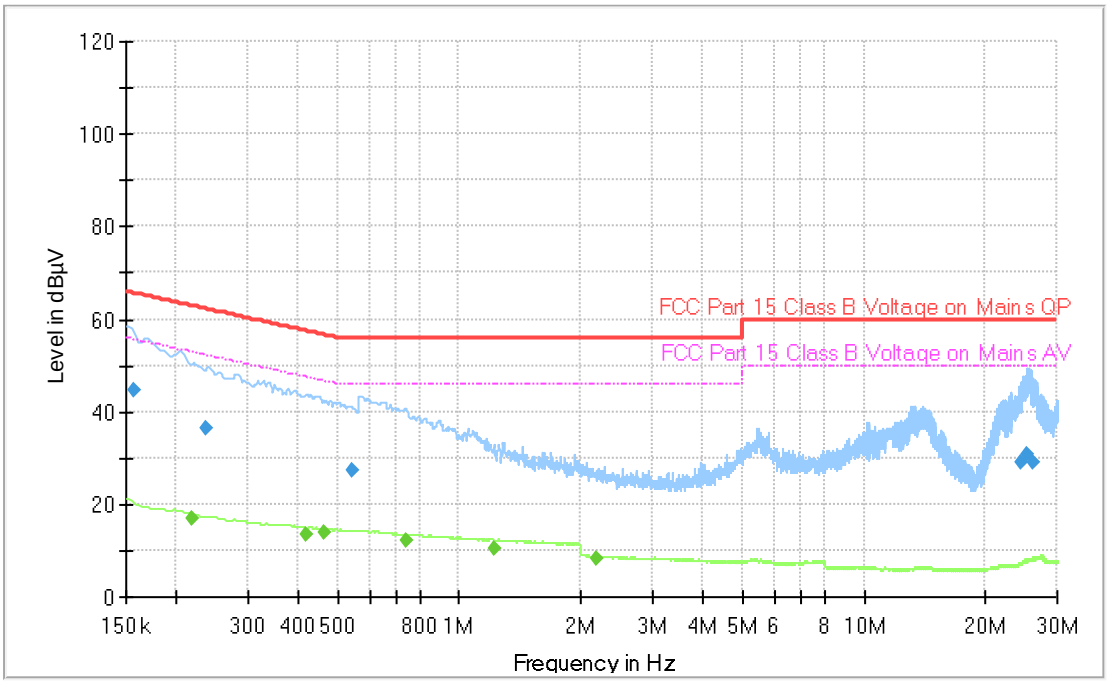
Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Line	Margin (dB)
0.150	49,0	66.0	N	17.0
0.159	47.1	65.5	N	18.4

Measurement results, Average. Mode 1

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Line	Margin
0.150	38.8	56.0	N	38.2
0.334	30.3	49.3	L1	19.0

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]

5.2 Test results, AC Power input port, Class B, Mode 2



Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak, Mode 2

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

Measurement results, Average. Mode 2

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

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]

5.3 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V.10.50.40	--	--	--
Test receiver	Rohde & Schwarz	ESU 8	12866	07-2021	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	07-2021	1 year
Pulse Limiter	ROHDE & SCHWARZ	ESH3-Z2	4623	07-2021	1 year
Cable	SUHNER	G03232 D-01	9701	06-2021	1 year
Cable	HUBER+SUHNER	RG 223/U	9815	06-2021	1 year

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

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
November 29, 2021	22	15	Ann-Christine Norrström

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

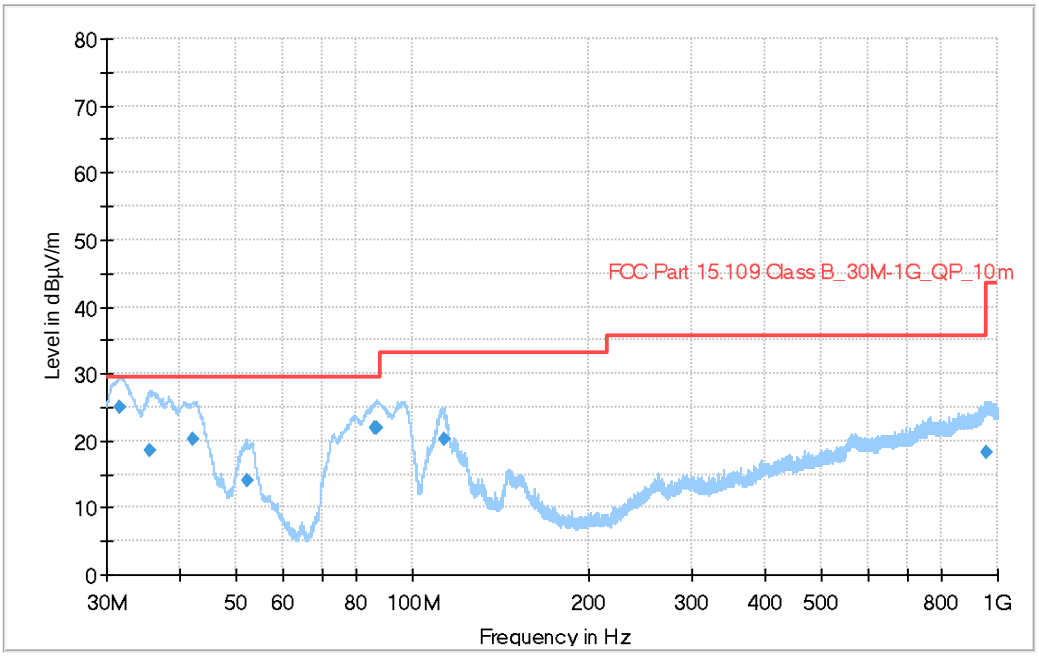
Frequency range:	Measuring distance	Measurement uncertainty
☐ 30 to 1000 MHz	3 m	± 5.1 dB
☒ 30 to 1000 MHz	10 m	± 5.0 dB
☐ 1.0 to 18 GHz	3 m	± 4.5 dB
☐ 18 to 26 GHz	3 m	± 4.8 dB
☐ 26 to 40 GHz	3 m	± 5.7 dB

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	1000	3000
Final						-	1000	1000	-

Measurement distance [m]	Frequency [MHz]	Limits [dBµV/m]		
		QP	PK	AV
Limits, FCC, Class A				
☐ 3 / ☐ 10	30 – 88	49.5 / 39.1	-	-
	88 – 216	54.0 / 43.5	-	-
	216 – 960	56.9 / 46.4	-	-
	960 – 1000	60.0 / 49.5	-	-
☐ 3	Above 1000	-	80.0	60.0
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	Above 1000	-	74.0	54.0
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, Mode1



Diagram, Peak overview sweep

Measurement results, Quasi-peak, Mode 1

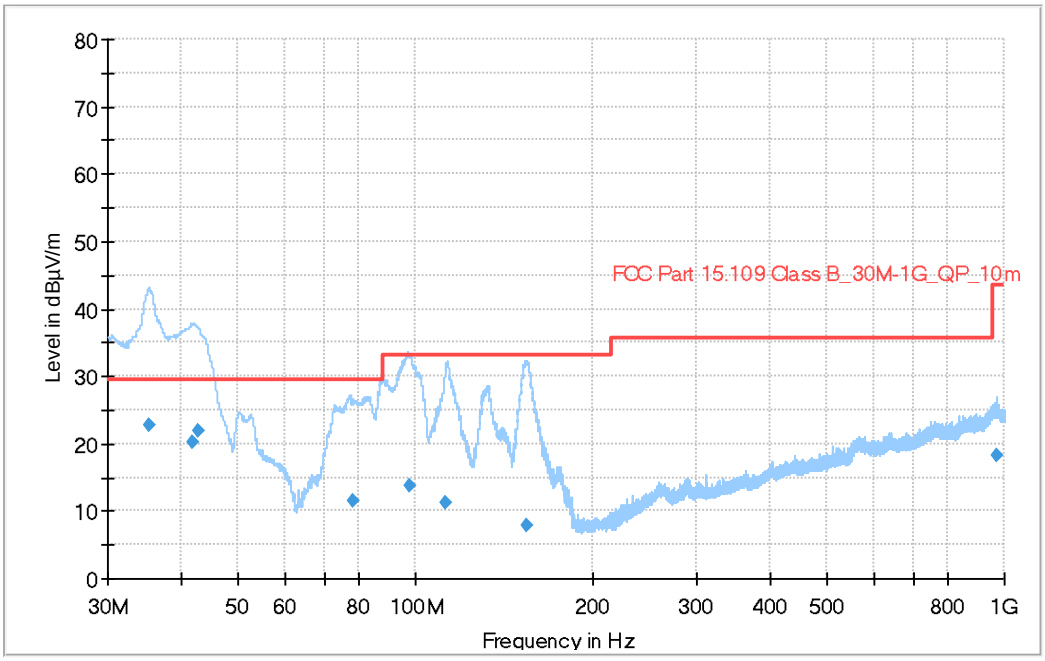
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Pol	Height (cm)	Azimuth	Margin (dB)
31.590	25.1	29.5	V	100.0	197.0	4.4*
35.670	18.5	29.5	V	159.0	224.0	11.0
42.270	20.3	29.5	V	106.0	183.0	9.2
52.140	14.0	29.5	V	261.0	210.0	15.5
86.460	21.9	29.5	V	161.0	-21.0	7.6
86.760	22.0	29.5	V	150.0	-17.0	7.5
112.890	20.2	33.1	V	105.0	7.0	12.8
956.190	18.2	35.6	H	131.0	190.0	17.4

The EUT also fulfil the limit for ICES-005, see limit in table page 15.

*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]

6.2 Test results, 30 – 1000 MHz, FCC, Class B, Mode2



Diagram, Peak and Average overview sweep

Measurement results, Peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Pol	Height (cm)	Azimuth	Margin (dB)
35.340	22.7	29.5	V	145.0	282.0	6.8
41.700	20.1	29.5	V	122.0	103.0	9.4
42.720	21.9	29.5	V	100.0	137.0	7.6
78.090	11.6	29.5	V	124.0	19.0	17.9
97.440	13.8	33.1	V	143.0	-11.0	19.3
112.860	11.3	33.1	V	118.0	140.0	21.79
154.170	8.0	33.1	V	225.0	58.0	25.1
969.810	18.4	43.5	H	194.0	84.0	25.1

The EUT also fulfil the limit for ICES-005, see limit in table page 15.

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

6.3 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Antenna bilog	TESEQ	CBL 6111D	34200	03-2020	3 Years
Preamplifier	SEMKO	AM1331	7992	09-2021	1 Year
Coaxial cable	ROSENBERGER	LA5-S003-10000 (UFB293C)	39163	02-2021	1 Year
Coaxial cable	ROSENBERGER	LA5-S003-8500	39148	05-2021	1 Year
Coaxial cable	Huber+Suhner	SUCOFLEX 106	39122	05-2021	1 Year
Measurement receiver	Rohde & Schwarz	ESW 44	33890	07-2021	1 Year
Temp and moisture	Vaisala	HMI 41	31215	07-2021	1 Year