

EMC TEST REPORT

No. 2107583STO-109

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Electronic control gear for LED
Type/Model: ICPSLC24-30NA-IL-2
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:

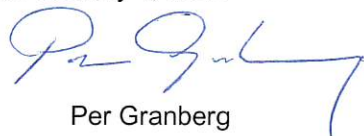
FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators. Class B equipment.

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

For details, see clause 2 – 4.

Date of issue: January 4, 2022

Tested by:



Per Granberg

Approved by:



Anders Lindström

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Revision History

Test report no.	Release no.	Date of issue	Description
2107583STO-109	1	January 4, 2022	

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

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1. CLIENT INFORMATION

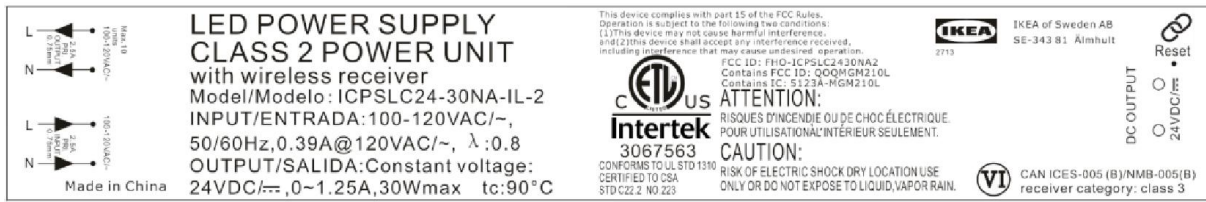
The EUT has been tested by request of

Company	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden
Name of contact	Jonas Filipsson
Client observer	-

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Electronic control gear for LED														
Type/Model:	ICPSLC24-30NA-IL-2														
Brand name:	IKEA														
S/N:	-														
Manufacturer:	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden														
Highest clock frequency, F_x:	38,4 MHz														
Transmitting freq.:	2405 – 2480 MHz														
Software version:	-														
Hardware version:	-														
Mounting position: (during normal use)	<input type="checkbox"/> Table-top <input type="checkbox"/> Floor-standing <input type="checkbox"/> Wall/ceiling <input type="checkbox"/> Hand-held <input checked="" type="checkbox"/> Other: Various														
Input ratings	Voltage [V]	Freq. [Hz]	Current [A]	Power [W]	Coupling										
<input checked="" type="checkbox"/> AC	100 – 120	50/60	0.39	-	<table border="0"> <tr> <td>L1</td> <td>L2</td> <td>L3</td> <td>N</td> <td>PE</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	L1	L2	L3	N	PE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
L1	L2	L3	N	PE											
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<input type="checkbox"/> DC					<table border="0"> <tr> <td>V+</td> <td>V-</td> <td>PE</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	V+	V-	PE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
V+	V-	PE													
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>													
<input type="checkbox"/> Battery					<table border="0"> <tr> <td>V+</td> <td>V-</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	V+	V-	<input type="checkbox"/>	<input type="checkbox"/>						
V+	V-														
<input type="checkbox"/>	<input type="checkbox"/>														
<input type="checkbox"/> Other:															
Output ratings	Voltage [V]	Freq. [Hz]	Current [A]	Power [W]	Coupling										
<input checked="" type="checkbox"/> DC	24	-	0 – 1.25	30	<table border="0"> <tr> <td>V+</td> <td>V-</td> <td>PE</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>	V+	V-	PE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
V+	V-	PE													
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>													
<input type="checkbox"/> Other:															
Supplementary information:	Class II														



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 ICPSLC24-30NA-IL-2 is a LED-driver with output of 24 V DC, provided radio remote controlled dimming and on-off.

The EUT has the following ports:

Port type	Port name	Length [m]	Shielded
AC I/O			
<input checked="" type="checkbox"/> AC power input	AC mains/power supply	-	<input type="checkbox"/>
<input type="checkbox"/> AC power output			<input type="checkbox"/>
DC I/O			
<input type="checkbox"/> DC power input			<input type="checkbox"/>
<input checked="" type="checkbox"/> DC power output	Load port (1)	3.5	<input type="checkbox"/>
Signal/control I/O			
<input type="checkbox"/> Signal/control			<input type="checkbox"/>
<input type="checkbox"/> Telecom/network			<input type="checkbox"/>
Supplementary information:			
(1) Interface (port) of a driver for connecting a long (≥3 m) load cable with a light source.			

The EUT ports were connected according to the following:

Port name	Cable type	Connected to
Power supply	2 core	AC-mains
Load/local wired	2 core	LED light load of 30 W

2.4 Peripheral/auxiliary equipment

Peripheral

Equipment needed for correct operation of the EUT, but not included as part of the testing.

Equipment	Manufacturer	Type/Model	S/N
Load	IKEA	30 W, LED-strip	-
Remote control	IKEA	605121-1 7AX1-RC-ZAB-H0 3V, Zigbee3.0	-

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

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 #
<input checked="" type="checkbox"/> STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2
<input type="checkbox"/> BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1
<input type="checkbox"/> 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	Max light intensity, provided with a LED-load of 30 W

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

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:					

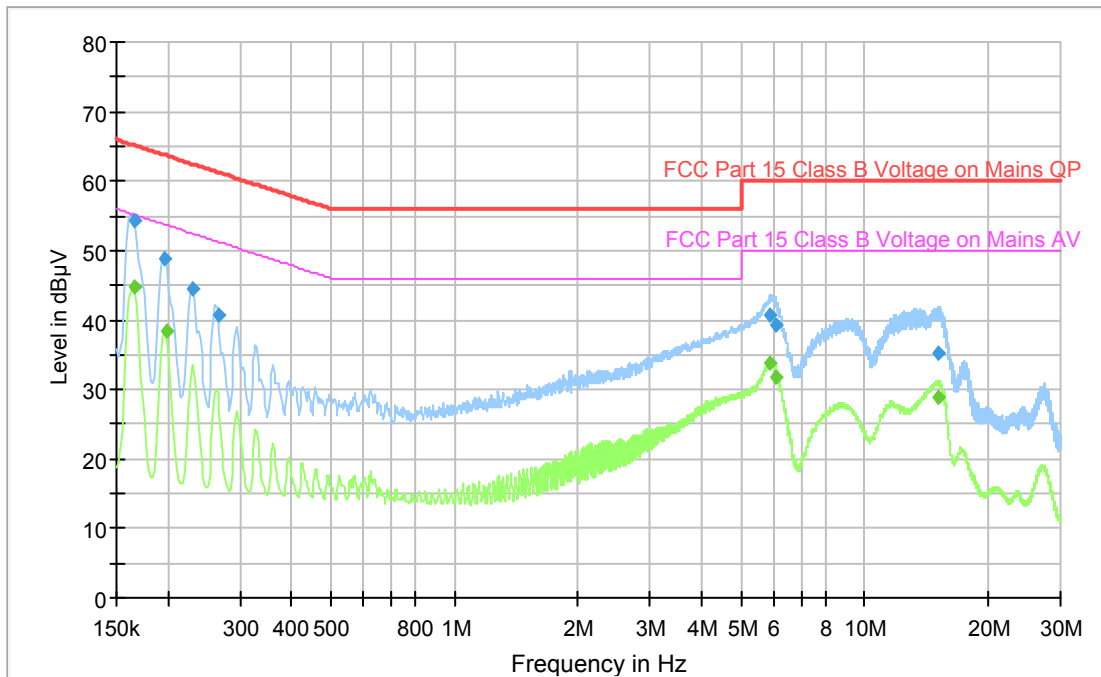
5. CONDUCTED CONTINUOUS DISTURBANCES
in the frequency-range 0.15 – 30 MHz

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
November 12, 2021	22	25	PEG

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:	<input checked="" type="checkbox"/> Table-top (EUT 0.4 m from the RGP) <input type="checkbox"/> Floor-standing (EUT 12 mm from the RGP) <input type="checkbox"/> Other:		
Tested port type(s):	Coupling device	Measurement uncertainty	
		Frequency range	Value
<input checked="" type="checkbox"/> AC power	<input checked="" type="checkbox"/> 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			
<input type="checkbox"/> AC power input Class A	0.15 – 0.50	79	66
	0.50 – 30.0	73	60
<input checked="" type="checkbox"/> 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



Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak & Average

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE
0.165750	54.23	---	65.17	10.94	1000.0	9.000	N	GND
0.165750	---	44.66	55.17	10.51	1000.0	9.000	N	GND
0.197250	48.76	---	63.73	14.97	1000.0	9.000	N	GND
0.199500	---	38.32	53.63	15.31	1000.0	9.000	N	GND
0.231000	44.62	---	62.41	17.79	1000.0	9.000	N	GND
0.264750	40.85	---	61.28	20.43	1000.0	9.000	N	GND
5.889750	---	33.74	50.00	16.26	1000.0	9.000	L1	GND
5.896500	40.66	---	60.00	19.34	1000.0	9.000	L1	GND
6.085500	39.42	---	60.00	20.58	1000.0	9.000	N	GND
6.094500	---	31.87	50.00	18.13	1000.0	9.000	L1	GND
15.072000	35.15	---	60.00	24.85	1000.0	9.000	N	GND
15.184500	---	28.99	50.00	21.01	1000.0	9.000	N	GND

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 - V10.50.40	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	2021-07-07	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	2021-07-05	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z5	32455	2021-07-06	1 year
Measurement cable	Huber+Suhner	RG 223/U	9815	2021-06-07	1 year
Measurement cable	Suhner	G03232 D-01	9701	2021-06-07	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHz – 13 GHz

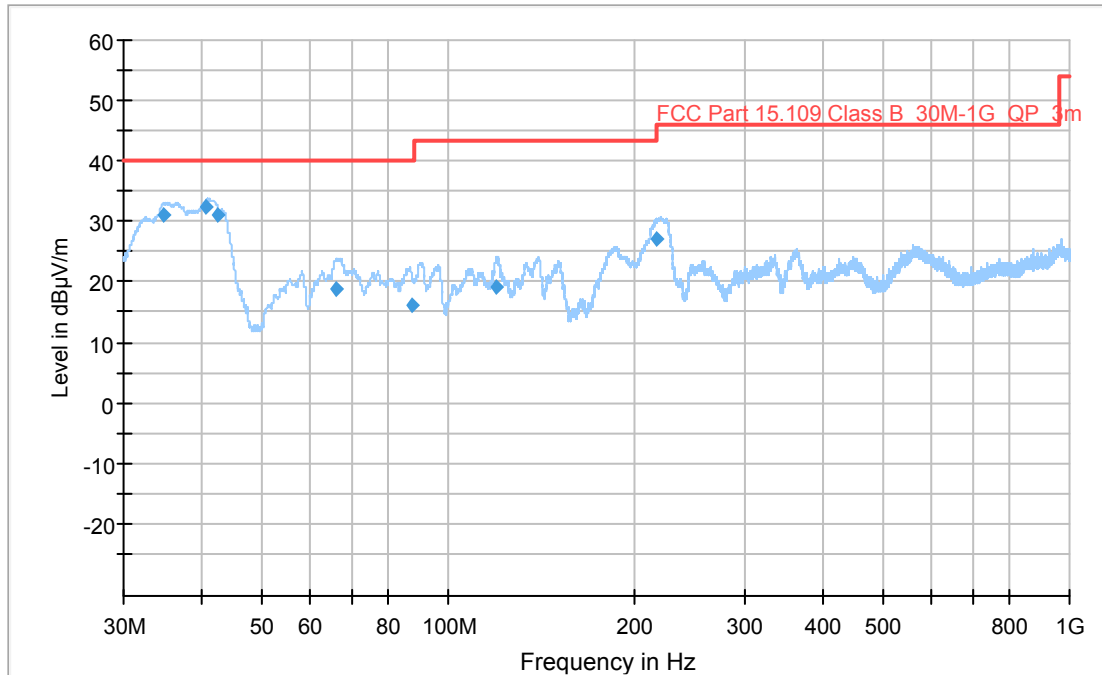
Date of test	Temp. [°C]	Humidity [%RH]	Tested by
November 18, 2021	21	29	PEG
December 9, 2021	21	20	PEG

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:	<input checked="" type="checkbox"/> Table-top (EUT 0.8 m from the RGP) <input type="checkbox"/> Floor-standing (EUT 12 mm from the RGP) <input type="checkbox"/> Other:	
Highest measured frequency:	<input type="checkbox"/> $F_x \leq 108$ MHz: 1 GHz <input type="checkbox"/> 108 MHz < $F_x \leq 500$ MHz: 2 GHz <input type="checkbox"/> 500 MHz < $F_x \leq 1$ GHz: 5 GHz <input checked="" type="checkbox"/> $F_x > 1$ GHz: $5 \times F_x$ up to a max. of 40 GHz <input type="checkbox"/> F_x is unknown: 40 GHz	
Frequency range:	Measuring distance	Measurement uncertainty
<input checked="" type="checkbox"/> 30 to 1000 MHz	3 m	± 5.1 dB
<input type="checkbox"/> 30 to 1000 MHz	10 m	± 5.0 dB
<input checked="" type="checkbox"/> 1.0 to 18 GHz	3 m	± 4.5 dB
<input type="checkbox"/> 18 to 26 GHz	3 m	± 4.8 dB
<input type="checkbox"/> 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 [dB μ V/m]		
		QP	PK	AV
Limits, FCC, Class A				
<input type="checkbox"/> 3 / <input type="checkbox"/> 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	-	-
<input type="checkbox"/> 3	Above 1000	-	80.0	60.0
Limits, FCC, Class B				
<input checked="" type="checkbox"/> 3 / <input type="checkbox"/> 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	-	-
<input checked="" type="checkbox"/> 3	Above 1000	-	74.0	54.0
Limits, ICES-005 Class A				
<input type="checkbox"/> 3 / <input type="checkbox"/> 10	30 – 88	49.5 / 39.1	-	-
	88 – 216	54.0 / 43.5	-	-
	230 – 1000	56.9 / 46.4	-	-
Limits, ICES-005, Class B				
<input checked="" type="checkbox"/> 3 / <input type="checkbox"/> 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/ICES-005, Class B



Diagram, Peak overview sweep

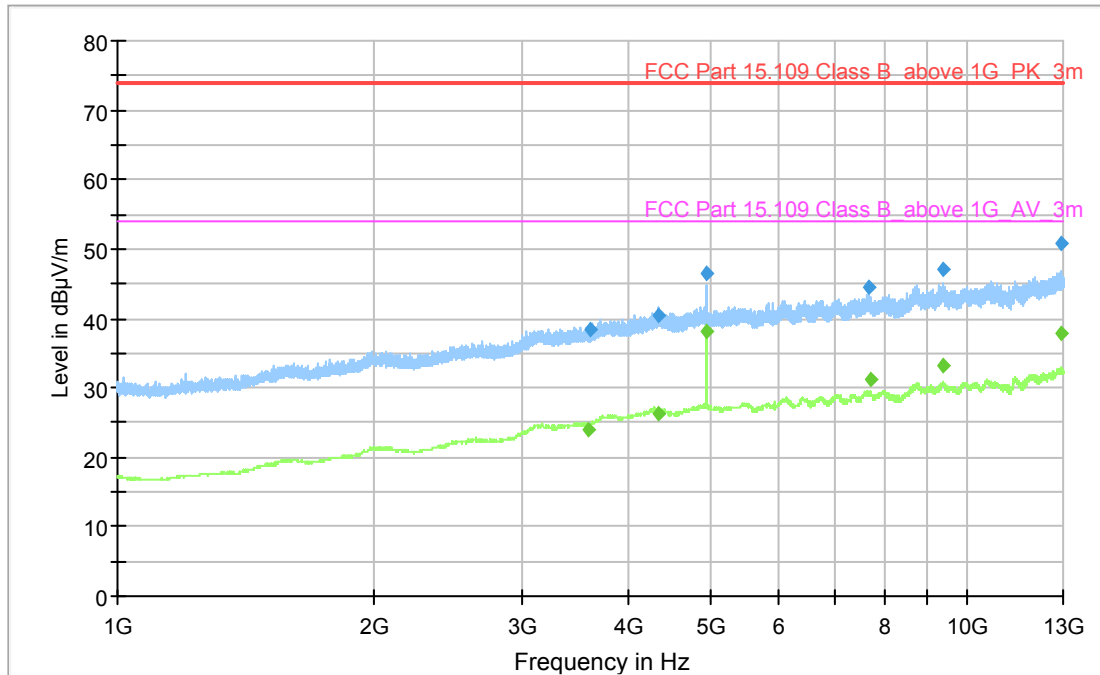
Measurement results, Quasi-peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
34.830	31.13	40.00	8.87	1000.0	120.0	100.0	V	117.0
40.710	32.31	40.00	7.69	1000.0	120.0	105.0	V	129.0
42.540	31.02	40.00	8.98	1000.0	120.0	102.0	V	87.0
66.150	18.94	40.00	21.06	1000.0	120.0	124.0	V	289.0
87.510	16.23	40.00	23.77	1000.0	120.0	118.0	V	228.0
119.700	19.30	43.52	24.22	1000.0	120.0	274.0	H	59.0
216.330	27.03	46.02	18.99	1000.0	120.0	137.0	H	71.0

The EUT also fulfil the class B limit of ICES-005, see limit table on page 13.

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

6.2 Test results, 1 – 13 GHz, FCC, Class B



Diagram, Peak and Average overview sweep

Measurement results, Peak and Average

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
3581.000	---	24.01	54.00	29.99	1000.0	1000.0	100.0	H
3602.250	38.36	---	74.00	35.64	1000.0	1000.0	251.0	H
4326.250	40.47	---	74.00	33.53	1000.0	1000.0	167.0	H
4332.250	---	26.42	54.00	27.58	1000.0	1000.0	296.0	H
4952.750	---	38.23	54.00	15.77	1000.0	1000.0	232.0	V
4952.750	46.39	---	74.00	27.61	1000.0	1000.0	253.0	V
7685.750	44.43	---	74.00	29.57	1000.0	1000.0	311.0	V
7699.500	---	31.25	54.00	22.75	1000.0	1000.0	325.0	V
9386.000	46.94	---	74.00	27.06	1000.0	1000.0	189.0	V
9400.750	---	33.14	54.00	20.86	1000.0	1000.0	136.0	V
12911.000	50.96	---	74.00	23.04	1000.0	1000.0	301.0	H
12955.250	---	37.73	54.00	16.27	1000.0	1000.0	325.0	H

Frequency (MHz)	Azimuth (deg)	Corr. (dB/m)	Comment
3581.000	198.0	-3	
3602.250	273.0	-3	
4326.250	264.0	0	
4332.250	237.0	0	
4952.750	171.0	1	
4952.750	175.0	1	
7685.750	220.0	7	
7699.500	176.0	7	
9386.000	173.0	9	
9400.750	74.0	9	
12911.000	139.0	14	
12955.250	28.0	14	

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
Measurement software	Rohde & Schwarz	EMC32 - V11.30.00	--	--	--
Measurement Receiver	Rohde & Schwarz	ESW44	33890	2021-07-21	1 year
Antenna	Chase	CBL 6111A	34200	2020-03-18	3 years
Pre-amplifier	SEMKO	AM1331	7992	2021-09-30	1 year
Horn antenna	Rohde & Schwarz	HF907	31245	2020-01-17	3 years
Pre-amplifier	Bonn	BLMA 0118-M	31246	2021-09-08	1 year
Measurement cable	Huber & Suhner	Sucoflex 106	39122	2021-05-06	1 year
Measurement cable	Rosenberger	LA5-S003-7000	39148	2021-05-06	1 year
Measurement cable	Rosenberger	LA5-S003-7000	39163	2021-02-04	1 year