

EMC TEST REPORT

No. 1913929STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: LED-driver
Type/Model: ICPSLC24-30-IL44-1
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:

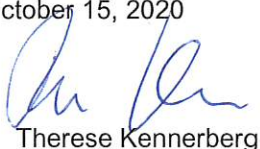
FCC 47 CFR Part 15: Radio frequency device, Subpart B: Unintentional radiators. Class B equipment.

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

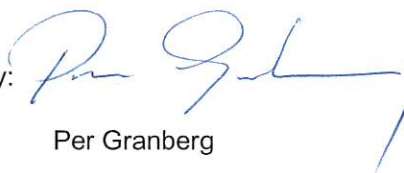
For details, see clause 2 – 4.

Date of issue: October 15, 2020

Tested by:


Therese Kennerberg

Approved by:


Per Granberg

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Revision History

Edition	Date	Description	Changes
1	March 5, 2020	First release	
2	October 15, 2020	Second release	Pictures removed from test-report and added in 1913929STO-001, Ed. 2 Annex 1.

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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 Jon Mikel Lizarrald

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment LED-driver
Type/Model ICPSLC24-30-IL44-1
Brand name IKEA
Serial Number -
Manufacturer IKEA of Sweden AB
Rating Input: 100 – 120 V, 50/60 Hz, max 0.51 A
Output: 24 V DC, max 1.25 A, max 30 W
Class II
Highest clock frequency Transmitting on frequency 2.4 GHz
Software/Firmware version -



Photo of rating plate

2.2 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-driver	ICPSL24-30-IL44-1	-
ZigBee Radio module	MGM210L022JNF2	-

The EUT was equipped with the following cables:

Port	Type	Length [m]	Specifications
AC Mains	Two-core	1.0	-
Load leads	Two-core	< 2.0	-

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 (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 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 #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz with maximum load, 30 W. The load consisted of 5 luminaires Skydrag manufactured by IKEA, Skydrag 7.7 W x 2, Skydrag 5.6 W x 2 and one Skydrag 3.6 W. During the conducted emission test, the EUT was tested with its internal dimmer set to maximum and minimum luminosity respectively and standby. During the radiated emission test, the EUT was set to maximum luminous intensity.

3.5 Test set up and EUT photos

EUT photos and test set up photos are in separate document 1913929STO-001 Ed. 2 Annex 1.

3.6 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	33.0	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 11.4 dB at 0.191 MHz See clause 5.4 – 5.6.	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 9.3 dB at 40.980 MHz See clause 6.5 – 6.6.	PASS
FCC Part 15 subpart B ICES-005	Radiated emission of electromagnetic fields in the frequency range 1.0 – 13.0 GHz The EUT complies with the Class B limits. The margin to the limit was at least 17.9 dB at 12800.500 MHz See clause 6.7.	PASS

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

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
September 30, 2019	22 [°C]	47 [%]

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

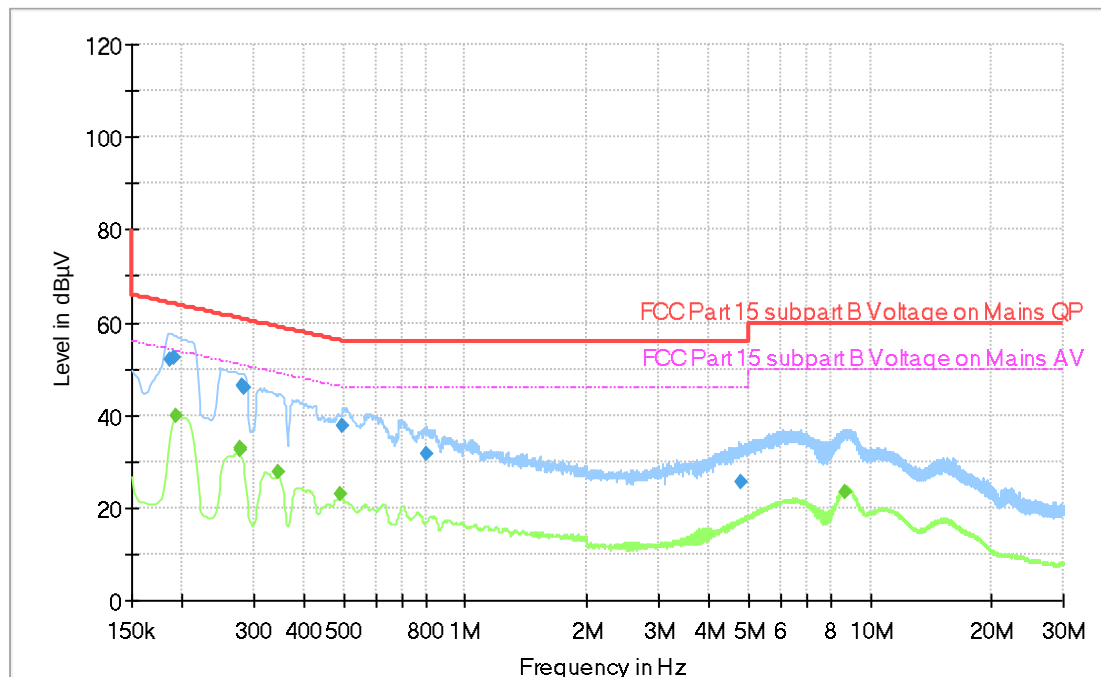
Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz

± 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, maximum luminous intensity



Diagram, Peak and Average overview sweep

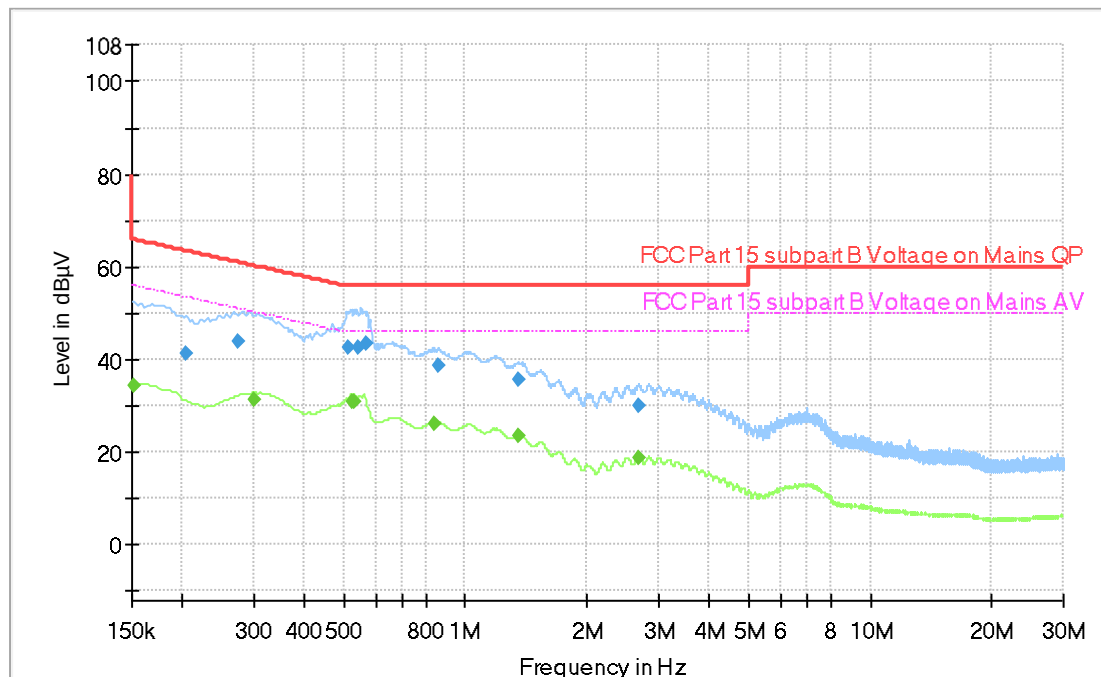
Measurement results, Quasi-peak, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.186	51.9	64.2	N	12.3
0.191	52.6	64.0	N	11.4
0.281	46.4	60.8	N	14.4
0.283	46.0	60.7	N	14.7
0.499	37.8	56.0	N	18.2
0.798	31.8	56.0	N	24.2
4.781	25.5	56.0	N	30.5

Measurement results, Average, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.193	39.8	53.9	N	14.1
0.276	32.9	50.9	N	18.0
0.278	32.5	50.9	N	18.4
0.344	27.8	49.1	N	21.3
0.490	23.1	46.2	N	23.1
8.707	23.5	50.0	L	26.5

5.5 Test results, AC Power input port, Class B, minimum luminous intensity



Diagram, Peak and Average overview sweep

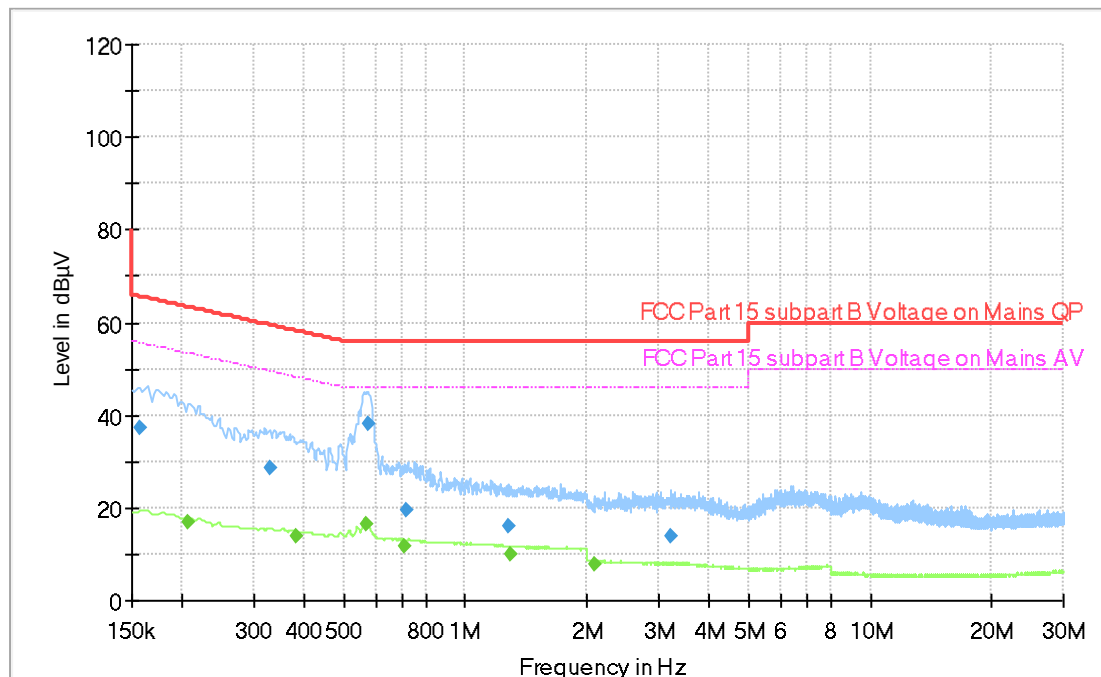
Measurement results, Quasi-peak, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.204	41.2	63.5	N	22.3
0.274	43.8	61.0	N	17.2
0.515	42.4	56.0	N	13.6
0.542	42.6	56.0	N	13.4
0.569	43.5	56.0	N	12.5
0.859	38.5	56.0	N	17.5
1.354	35.6	56.0	N	20.4
2.670	30.2	56.0	N	25.8

Measurement results, Average, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.152	34.4	55.9	N	21.5
0.301	31.2	50.2	N	19.0
0.526	31.0	46.0	N	15.0
0.533	30.8	46.0	N	15.2
0.841	26.3	46.0	N	19.7
1.352	23.4	46.0	N	22.6
2.672	18.6	46.0	N	27.4

5.6 Test results, AC Power input port, Class B, standby



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.157	37.4	65.6	N	28.2
0.328	28.5	59.5	N	31.0
0.575	38.2	56.0	N	17.8
0.715	19.7	56.0	N	36.3
1.280	15.9	56.0	N	40.1
3.230	13.9	56.0	N	42.1

Measurement results, Average, Class B

Frequency [MHz]	Result [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.206	16.9	53.4	N	36.5
0.382	13.9	48.2	N	34.3
0.569	16.3	46.0	N	29.7
0.704	11.7	46.0	N	34.3
1.291	9.8	46.0	N	36.2
2.092	7.9	46.0	N	38.1

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

5.7 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V10.50.00	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	06-2019	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	2728	06-2019	1 year
Cable	Suhner	GO3232 D-01	9701	06-2019	1 year
Cable	Huber+Suhner	RG 223/U	9815	06-2019	1 year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 13 GHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
October 3, 2019	19 [°C]	39 [%]

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

Above 1 GHz additionally the average detector was activated.

During height scan above 1 GHz the EUT was kept in antennas cone of radiation.

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

Test setup:

1 – 13 GHz

Test receiver set-up:

Preview test:

Peak,

RBW 1 MHz

VBW 3 MHz

Final test:

Average,

RBW 1 MHz

Peak,

RBW 1 MHz

Measuring distance:

3 m

Measuring angle:

0 – 359°

Antenna

Height above ground plane:

1 – 4 m

Polarisation:

Vertical and Horizontal

Type:

Horn

Antenna tilt:

Activated

6.4 Measurement uncertainty

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 3 m

± 5.1 dB

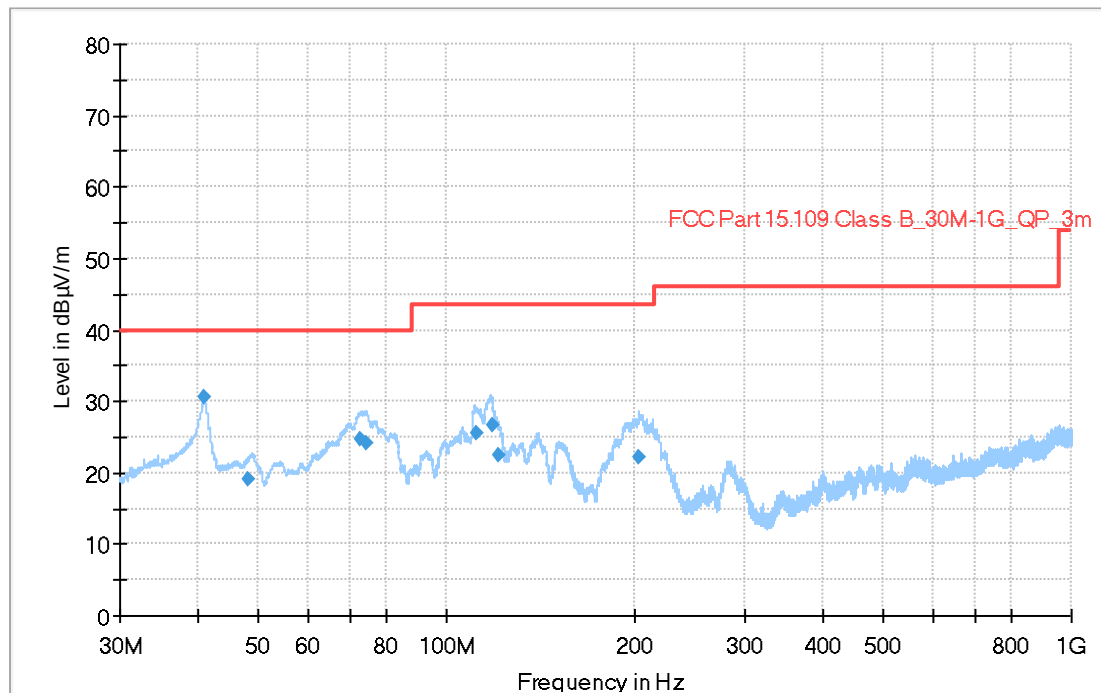
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m

± 4.5 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, Class B

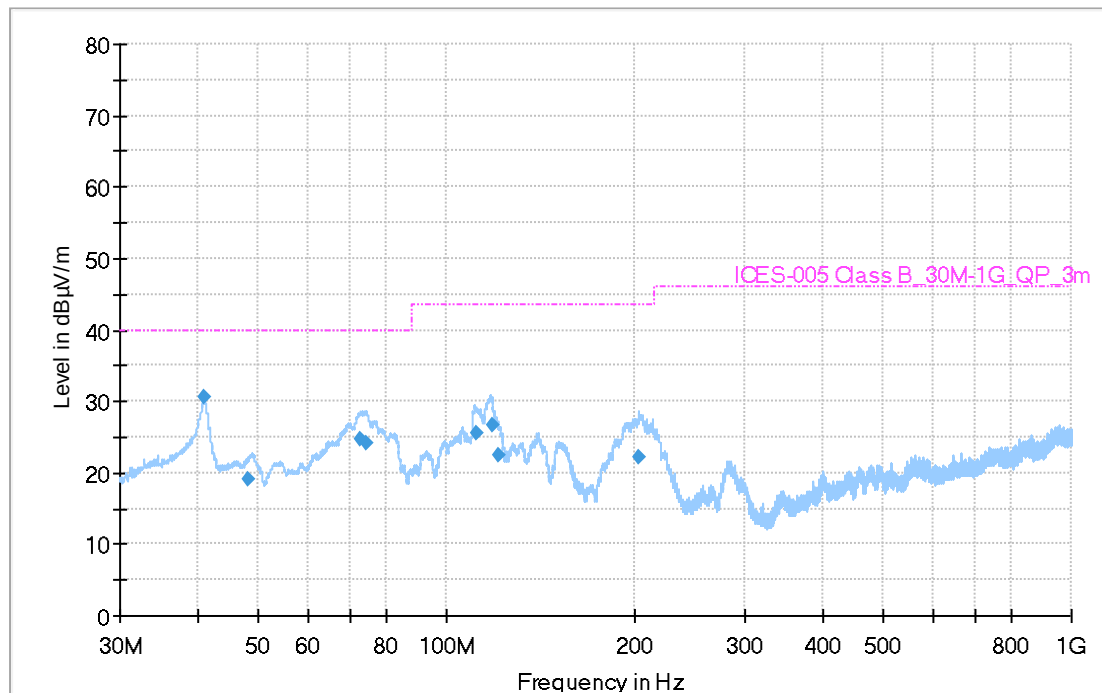


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, FCC, Class B

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
40.980	30.7	40.0	V	9.3
48.150	19.2	40.0	V	20.8
72.870	24.7	40.0	V	15.3
74.280	24.3	40.0	V	15.7
111.480	25.7	43.5	V	17.8
118.020	26.6	43.5	V	16.9
121.500	22.4	43.5	V	21.1
203.550	22.2	43.5	H	21.3

6.6 Test results, 30 – 1000 MHz, ICES-005, Class B



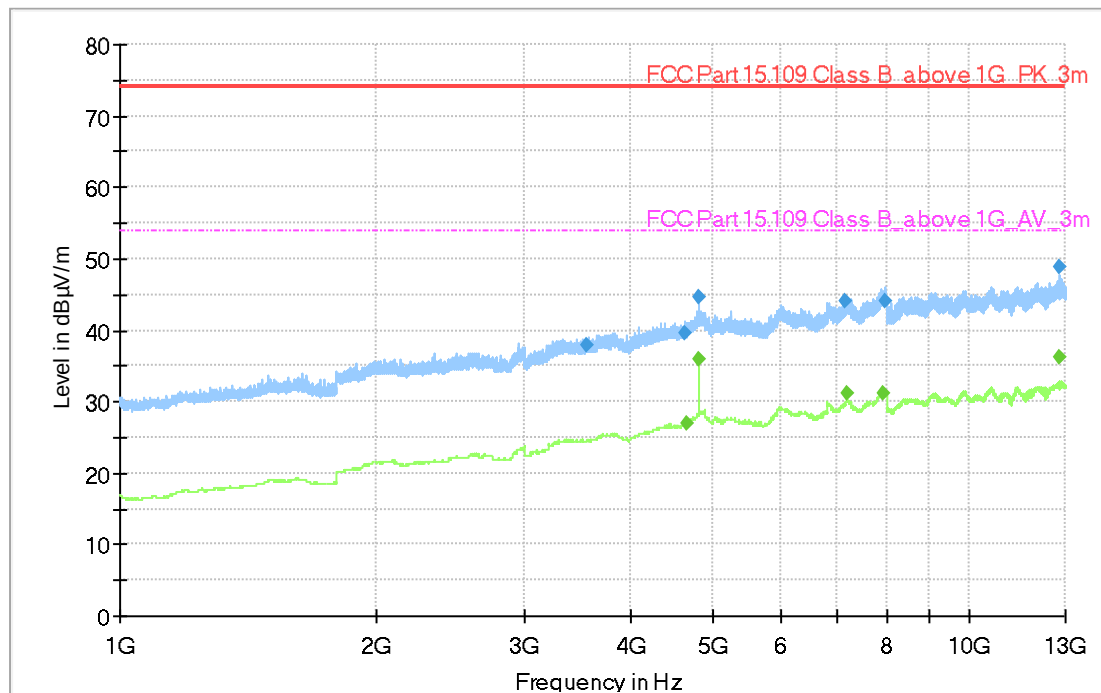
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, ICES-005, Class B

Frequency [MHz]	Result [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
40.980	30.7	40.0	V	9.3
48.150	19.2	40.0	V	20.8
72.870	24.7	40.0	V	15.3
74.280	24.3	40.0	V	15.7
111.480	25.7	43.5	V	17.8
118.020	26.6	43.5	V	16.9
121.500	22.4	43.5	V	21.1
203.550	22.2	43.5	H	21.3

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

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



Diagram, Peak and average overview sweep, 1 – 13 GHz at 3 m distance.

Measurement results, Peak, Class B

Frequency [MHz]	Result [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
3556.8	38.0	74.0	H	36.0
4633.5	39.6	74.0	V	34.4
4812.8	44.6	74.0	V	29.4
7169.8	44.2	74.0	V	29.8
7960.3	44.0	74.0	V	30.0
12770.8	48.8	74.0	H	25.2

Measurement results, Average, Class B

Frequency [MHz]	Result [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
4649.5	26.9	54.0	V	27.1
4812.8	36.0	54.0	H	18.0
7196.0	31.1	54.0	H	22.9
7945.8	31.2	54.0	H	22.8
12800.5	36.1	54.0	V	17.9

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

6.8 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V10.50.00	--	--	--
Measurement Receiver	Rohde & Schwarz	ESU 44	33890	06-2019	1 year
Bilog antenna	Chase	CBL 6111A	971	09-2017	3 years
Horn antenna	Bonn	BLMA 1826-5A	31247	01-2017	3 years
Preamplifier	SEMKO	AM1331	s7992	04-2019	1 year
Measurement cable	HUBER+SUHNER	Sucoflex 106	39122	03-2019	1 year
Measurement cable	Rosenberger	LA5-S003-10000	39163	04-2019	1 year
Measurement cable	Rosenberger	LA5-S003-7000	39162	04-2019	1 year