EMC TEST REPORT

No. 2102483STO-104

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Surface-mounted luminaire with LED
Type/Model:	T2105 NA Stoftmoln
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: October 19, 2021

Tested by: Per Granberg

Approved by: Anna Näslund

Revision History

Test report no.	Release no.	Date of issue	Description
2102483STO-104	1	October 19, 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
AV	Average
BW	Bandwidth
CAV	CISPR Average
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
F_X	Highest fundamental frequency generated or used within the EUT, or highest frequency at which it operates
H	Horizontal
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

1. CLIENT INFORMATION

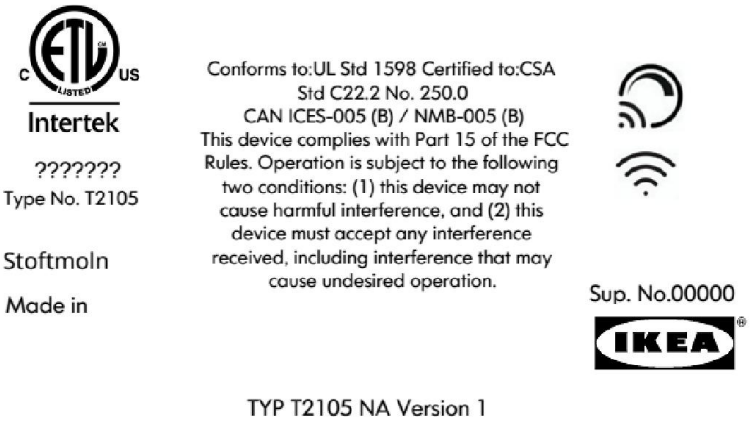
The EUT has been tested by request of

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

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Surface-mounted luminaire with LED								
Type/Model:	T2105 NA Stoftmoln								
Brand name:	IKEA								
S/N:	-								
Manufacturer:	IKEA of Sweden AB Box 702 SE-343 81 Älmhult Sweden								
Highest clock frequency, F_X:	2405 – 2480 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	120	60	-	9	**L1** ☒	**L2** ☐	**L3** ☐	**N** ☒	**PE** ☒
☐ DC					**V+** ☐	**V-** ☐			**PE** ☐
☐ Battery					**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 to this test report.

2.3 Additional information about the EUT

The EUT is surface-mounted luminaire provided with a radio remote controlled dimming and on-off.

The EUT has the following ports:

Port type	Port name	Shielded
AC I/O		
☒ AC power input	AC-power connector	☐
☐ AC power output		☐
DC I/O		
☐ DC power input		☐
☐ DC power output		☐
Signal/control I/O		
☐ Telecom/network		☐
☐ Signal/control		☐
Supplementary information:		

The EUT ports were connected according to the following:

Port name	Cable type	Connected to
AC-power connector	3-core cable	AC mains supply

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
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
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, 60 Hz	The EUT set to max luminous intensity
2	120 V, 60 Hz	The EUT set to min luminous intensity

Test	Mode of operation
Conducted continuous emission	1,2
Radiated emission of EM fields, 30 – 1000 MHz	1,2
Radiated emission of EM fields, 1 – 13 GHz	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	-	Pass
6	ANSI C63.4	Radiated emission of EM fields	Enclosure	-	Pass
Supplementary information:					

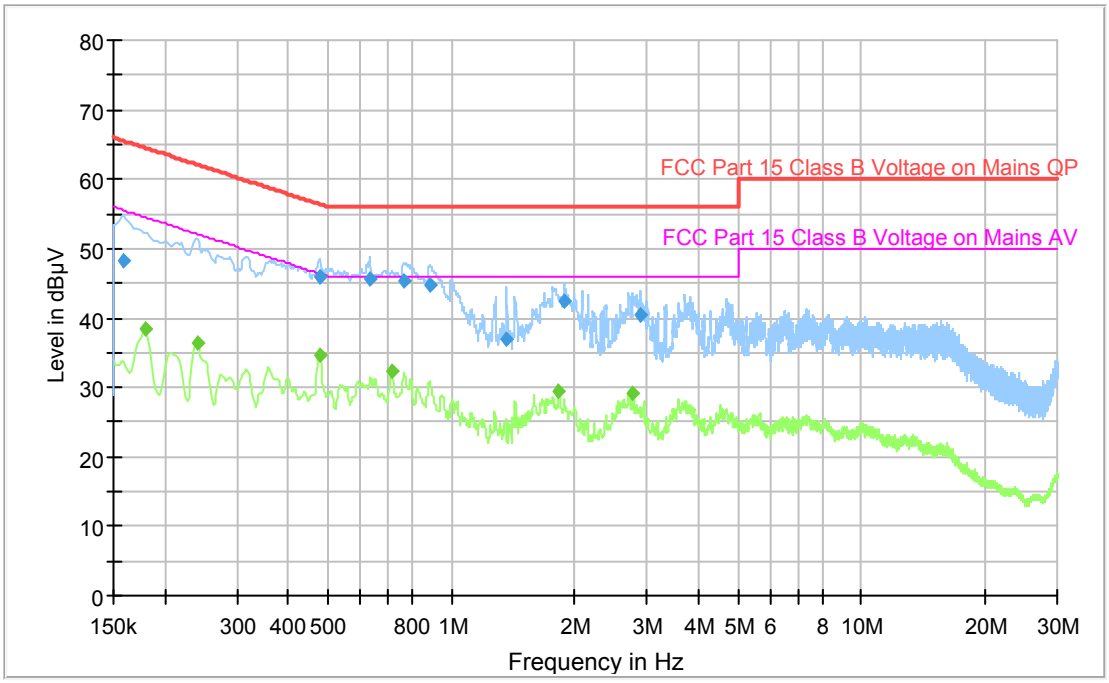
5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
October 14, 2021	22	30	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:	☒ 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, Class B			
☐ 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 port, FCC/ICES-005, Class B, mode of operation No.1



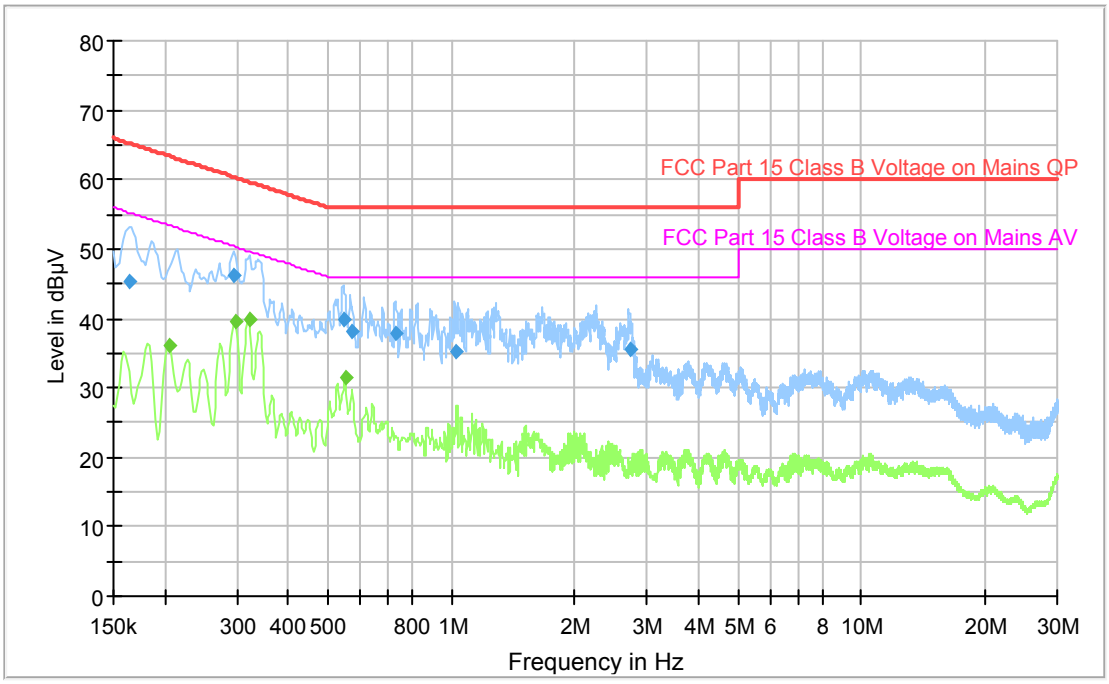
Diagram, Peak and AV overview sweep

Measurement results, Quasi-peak & Average

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE
0.159000	48.27	---	65.52	17.25	1000.0	9.000	L1	GND
0.179250	---	38.30	54.52	16.22	1000.0	9.000	L1	GND
0.240000	---	36.34	52.10	15.76	1000.0	9.000	L1	GND
0.476250	45.88	---	56.40	10.52	1000.0	9.000	L1	GND
0.476250	---	34.62	46.40	11.78	1000.0	9.000	L1	GND
0.631500	45.65	---	56.00	10.35	1000.0	9.000	L1	GND
0.712500	---	32.38	46.00	13.62	1000.0	9.000	L1	GND
0.768750	45.33	---	56.00	10.67	1000.0	9.000	L1	GND
0.888000	44.88	---	56.00	11.12	1000.0	9.000	L1	GND
1.360500	36.97	---	56.00	19.03	1000.0	9.000	L1	GND
1.821750	---	29.53	46.00	16.47	1000.0	9.000	L1	GND
1.878000	42.51	---	56.00	13.49	1000.0	9.000	L1	GND
2.773500	---	29.03	46.00	16.97	1000.0	9.000	L1	GND
2.874750	40.40	---	56.00	15.60	1000.0	9.000	L1	GND

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

5.2 Test results, AC Power port, FCC/ICES-005, Class B, mode of operation No.2



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
0.163500	45.30	---	65.28	19.98	1000.0	9.000	L1	GND
0.206250	---	36.14	53.36	17.22	1000.0	9.000	L1	GND
0.296250	46.20	---	60.35	14.15	1000.0	9.000	L1	GND
0.298500	---	39.65	50.28	10.63	1000.0	9.000	L1	GND
0.323250	---	39.92	49.62	9.70	1000.0	9.000	L1	GND
0.546000	39.95	---	56.00	16.05	1000.0	9.000	L1	GND
0.555000	---	31.36	46.00	14.64	1000.0	9.000	L1	GND
0.570750	38.00	---	56.00	18.00	1000.0	9.000	L1	GND
0.735000	37.77	---	56.00	18.23	1000.0	9.000	L1	GND
1.025250	35.11	---	56.00	20.89	1000.0	9.000	L1	GND
2.724000	35.39	---	56.00	20.61	1000.0	9.000	L1	GND

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 - 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
October 8, 2021	21	48	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:	☒ 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

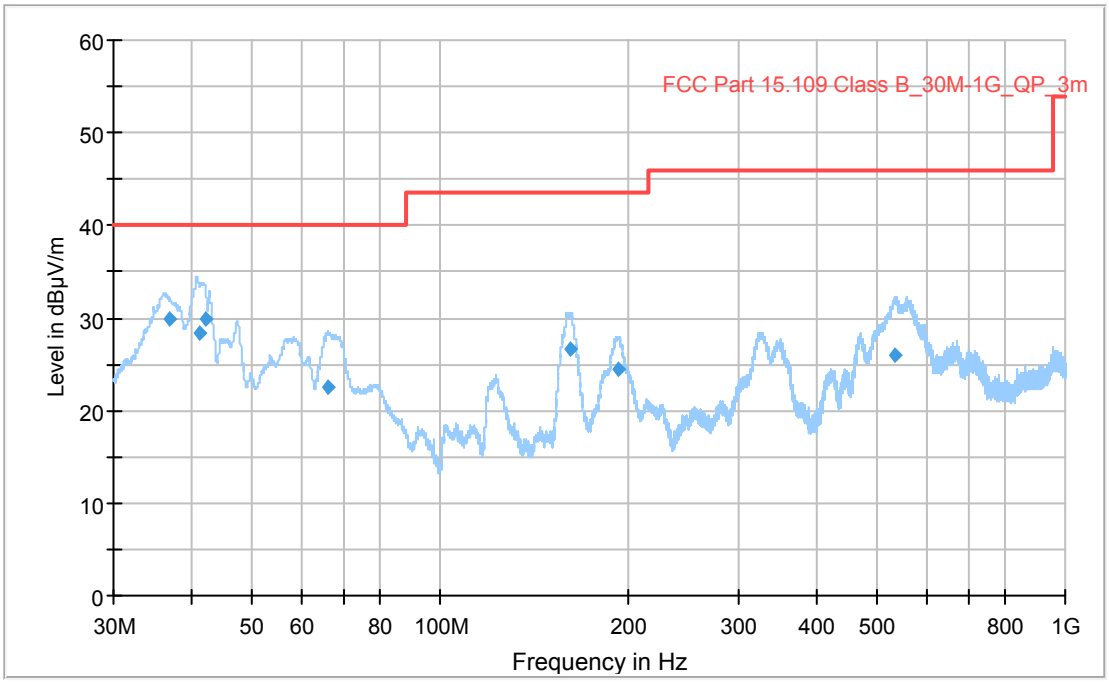
Frequency range:	Measuring distance	Measurement uncertainty
☒ 30 to 1000 MHz	3 m	± 5.1 dB
☐ 30 to 1000 MHz	10 m	± 5.0 dB
☒ 1.0 to 18 GHz	3 m	± 4.5 dB
☐ 18 to 26 GHz	3 m	± 4.8 dB
☐ 26 to 40 GHz	3 m	± 5.7 dB

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	-	-
	216 – 1000	46.0 / 35.6	-	-

6.1 Test results, 30 – 1000 MHz, FCC/ICES-005, Class B, mode of operation No.1



Diagram, Peak overview sweep

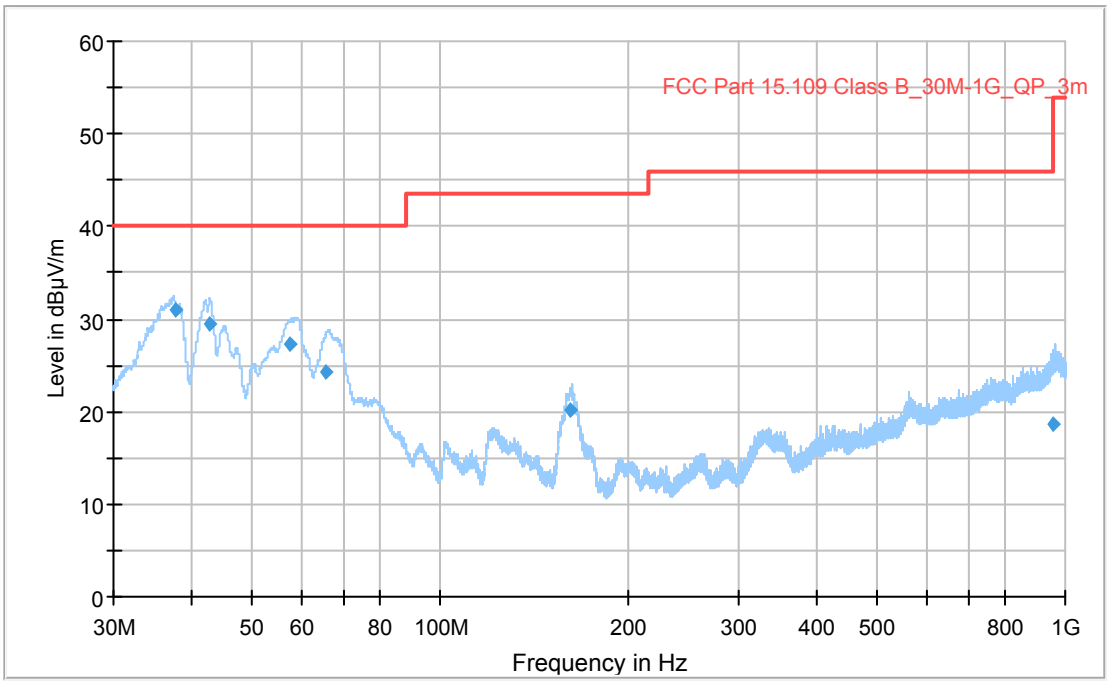
Measurement results, Quasi-peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
36.810	29.80	40.00	10.20	1000.0	120.0	100.0	V	209.0
41.310	28.30	40.00	11.70	1000.0	120.0	111.0	V	147.0
42.120	29.97	40.00	10.03	1000.0	120.0	104.0	V	155.0
65.910	22.53	40.00	17.47	1000.0	120.0	104.0	V	302.0
161.010	26.72	43.52	16.80	1000.0	120.0	100.0	V	156.0
192.390	24.57	43.52	18.95	1000.0	120.0	103.0	V	293.0
533.370	26.04	46.02	19.98	1000.0	120.0	183.0	H	207.0

The EUT also fulfil the class B limit of ICES-005, see limit table on page 16.

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

6.2 Test results, 30 – 1000 MHz, FCC/ICES-005, Class B, mode of operation No.2



Diagram, Peak overview sweep

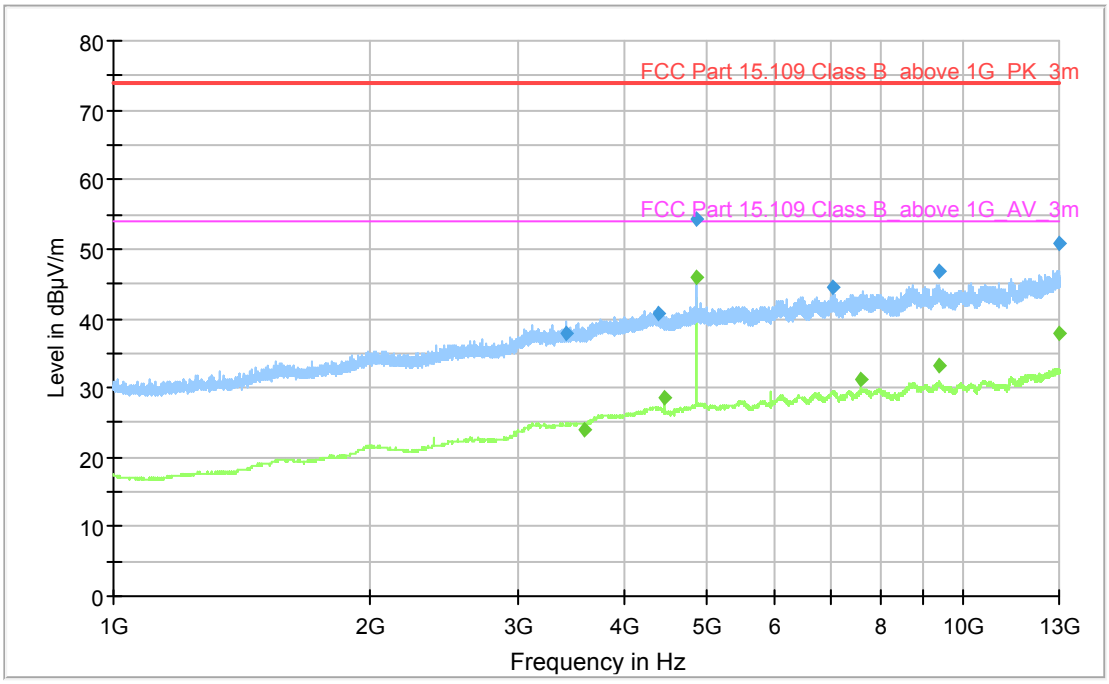
Measurement results, Quasi-peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
37.800	30.94	40.00	9.06	1000.0	120.0	100.0	V	273.0
42.750	29.45	40.00	10.55	1000.0	120.0	105.0	V	191.0
57.300	27.36	40.00	12.64	1000.0	120.0	102.0	V	275.0
65.610	24.16	40.00	15.84	1000.0	120.0	143.0	V	280.0
162.060	20.11	43.52	23.41	1000.0	120.0	105.0	V	196.0
957.720	18.69	46.02	27.33	1000.0	120.0	113.0	V	166.0

The EUT also fulfil the class B limit of ICES-005, see limit table on page 16.

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

6.3 Test results, 1 – 13 GHz, FCC, Class B, mode of operation No.1



Diagram, Peak and Average overview sweep

Measurement results, Peak & Average

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol
3417.000	37.72	---	74.00	36.28	1000.0	1000.0	303.0	H
3581.000	---	23.97	54.00	30.03	1000.0	1000.0	190.0	V
4383.000	40.60	---	74.00	33.40	1000.0	1000.0	172.0	H
4450.500	---	28.69	54.00	25.31	1000.0	1000.0	159.0	H
4852.500	---	45.84	54.00	8.16	1000.0	1000.0	239.0	V
4852.500	54.29	---	74.00	19.71	1000.0	1000.0	183.0	V
7052.500	44.62	---	74.00	29.38	1000.0	1000.0	207.0	H
7601.000	---	31.27	54.00	22.73	1000.0	1000.0	133.0	H
9362.500	46.73	---	74.00	27.27	1000.0	1000.0	100.0	H
9393.750	---	33.14	54.00	20.86	1000.0	1000.0	139.0	V
12980.000	---	37.81	54.00	16.19	1000.0	1000.0	325.0	V
12996.750	50.88	---	74.00	23.12	1000.0	1000.0	317.0	V

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

6.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V10.50.40	--	--	--
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