

EMC TEST REPORT

No. 2105354STO-103

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Table standing luminaire with LED
Type/Model: B2105 Sinnerlig
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:


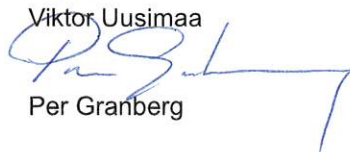
FCC 47 CFR Part 15: Radio frequency devices, Subpart B: Unintentional radiators. Class B equipment.

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

For details, see clause 2 – 4.

Date of issue: May 5, 2022

Tested by:


Viktor Uusimaa

Per Granberg

Approved by:


Anna Näslund

Revision History

Test report no.	Release no.	Date of issue	Description
2105354STO-103	1	May 5, 2022	Radiated emission measurements for FCC and ICES

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

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company	IKEA of Sweden AB 343 81, Älmhult SWEDEN
Name of contact	Markus Mauritzon
Client observer	-

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Table standing luminaire with dimmable LED				
Type/Model:	B2105 Sinnerlig				
Brand name:	IKEA				
S/N:	-				
Manufacturer:	IKEA of Sweden AB				
Highest clock frequency, F_x:	< 108 MHz				
Software version:	-				
Hardware version:	-				
Mounting position: (during normal use)	<input checked="" type="checkbox"/> Table-top <input type="checkbox"/> Floor-standing <input type="checkbox"/> Wall/ceiling <input type="checkbox"/> Hand-held <input type="checkbox"/> Other:				
Supplementary information:	When the luminaire is connected to an appropriate power supply via a USB cable, it can recharge batteries inside the luminaire as well as drive the luminaire itself. It is also possible to drive the luminaire solely with 4, 1,2 V batteries.				
Input ratings	Voltage [V]	Freq. [Hz]	Current [A]	Power [W]	Coupling
<input type="checkbox"/> AC					L1 <input type="checkbox"/> L2 <input type="checkbox"/> L3 <input type="checkbox"/> N <input type="checkbox"/> PE <input type="checkbox"/>
<input checked="" type="checkbox"/> DC	5	-	-	5	V+ <input checked="" type="checkbox"/> V- <input checked="" type="checkbox"/> PE <input type="checkbox"/>
<input checked="" type="checkbox"/> Battery	4 x 1,2	-	-	5	V+ <input checked="" type="checkbox"/> V- <input checked="" type="checkbox"/> PE <input type="checkbox"/>
<input type="checkbox"/> Other:					

Type No. B2105 SINNERLIG



Design and Quality
IKEA of Sweden

5 W 5 V DC

Conforms to: UL Std 153 Certified to: CSA
Std C22.2 No. 250.4 CAN ICES-005 (B) /
NMB-005 (B)



Made in Xxxxx

21520

IKEA of Sweden AB, SE - 34381 Älmhult
1C50-TYAS
© Inter IKEA Systems B.V. 2019

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 consists of the following units:

Unit	S/N	Description
Luminaire	-	Dimmable LED light source
USB-C cable	-	Provides an option to drive the LEDs with the cable, as well as to charge batteries inside the EUT

The EUT has the following ports:

Port type	Port name	Shielded
AC I/O		
<input checked="" type="checkbox"/> AC power input	AC mains*	<input type="checkbox"/>
<input type="checkbox"/> AC power output		<input type="checkbox"/>
DC I/O		
<input checked="" type="checkbox"/> DC power input	Local wired port	<input type="checkbox"/>
<input type="checkbox"/> DC power output		<input type="checkbox"/>
Signal/control I/O		
<input type="checkbox"/> Telecom/network		<input type="checkbox"/>
<input type="checkbox"/> Signal/control		<input type="checkbox"/>
Supplementary information: *This port is referring to the LED driver of the luminaire, which is AE.		

The EUT ports were connected according to the following:

Port name	Cable type	Connected to
Local wired port	0,9 m USB-C	LED Power supply

2.4 Peripheral/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
4 Rechargeable 1,2 V batteries	IKEA of Sweden AB	LADDA 2450	-
LED Power Supply	IKEA of Sweden AB	ICPSW5-5KR-1	-

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 #
<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	Maximum light intensity, cable operated, batteries charging
2	Battery	Maximum light intensity, 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	ANSI C63.4	Conducted continuous emission	AC power input	-	P
5	CISPR 15	Conducted continuous emission	AC power input	-	P
6	ANSI C63.4	Radiated emission of EM fields	Enclosure	-	P
6	CISPR 15	Radiated emission of EM fields	Enclosure	-	P
Supplementary information:					

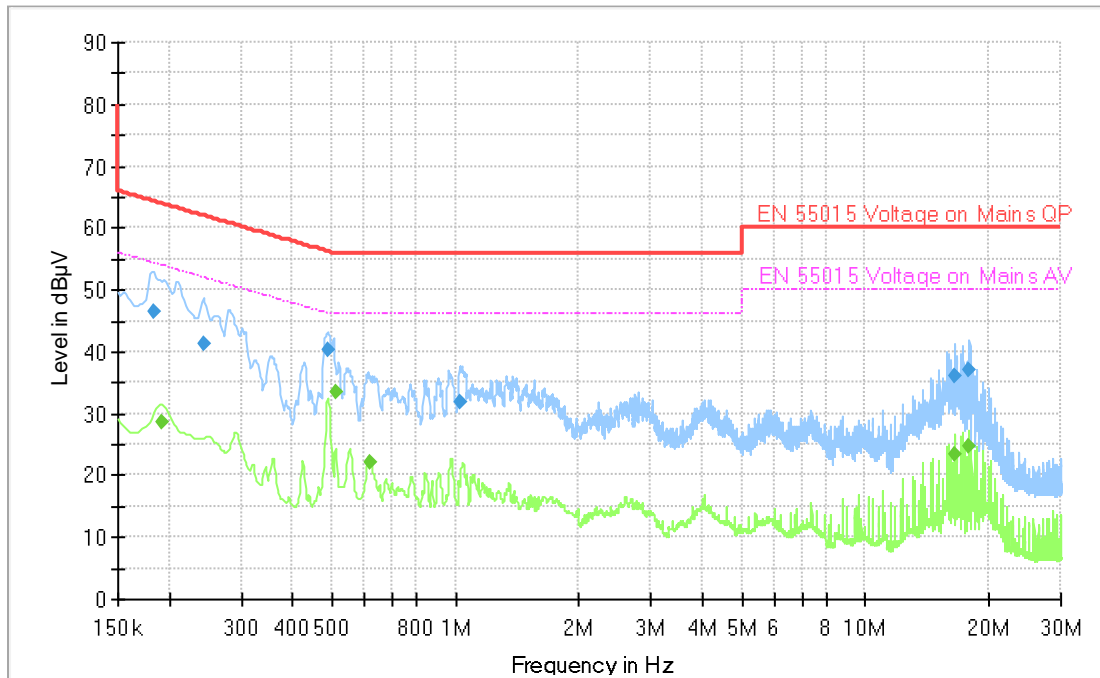
**5. CONDUCTED CONTINUOUS DISTURBANCES
in the frequency-range 0.15 – 30 MHz**

Date of test	Temp. [°C]	Humidity [%RH]	Tested by
September 8, 2021	22	56	VUU/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

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.183750	46.44	64.31	17.87	1000.0	9.000	N	GND	10.0
0.242250	41.29	62.02	20.73	1000.0	9.000	N	GND	10.0
0.487500	40.40	56.21	15.81	1000.0	9.000	N	GND	10.0
1.032000	31.75	56.00	24.25	1000.0	9.000	N	GND	10.0
16.579500	36.14	60.00	23.86	1000.0	9.000	N	GND	10.7
17.974500	36.91	60.00	23.09	1000.0	9.000	N	GND	10.8

Measurement results, Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.192750	28.74	53.92	25.18	1000.0	9.000	N	GND	10.0
0.510000	33.39	46.00	12.61	1000.0	9.000	N	GND	10.0
0.615750	22.05	46.00	23.95	1000.0	9.000	N	GND	10.0
16.579500	23.31	50.00	26.69	1000.0	9.000	L1	GND	10.8
17.976750	24.55	50.00	25.45	1000.0	9.000	N	GND	10.8

5.2 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 -	--	--	--
Coaxial cable	Suhner	G03232 D-01	9701	2021-06-07	1 Year
Power source	Chroma	61604	31757	--	--
Measurement receiver	Rohde & Schwarz	ESU 8	12866	2021-07-07	1 Year
Thermometer	Vaisala	HMI41	8335	2020-11-06	1 Year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32455	2021-07-06	1 Year
Coaxial cable	HUBER+SUHNER	RG 223/U	9815	2021-06-07	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	2728	2021-07-05	1 Year
Multimeter	GOSSSEN METRAWATT	Metra Hit 16S	8141	2021-07-09	1 Year

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHz – 1 GHz

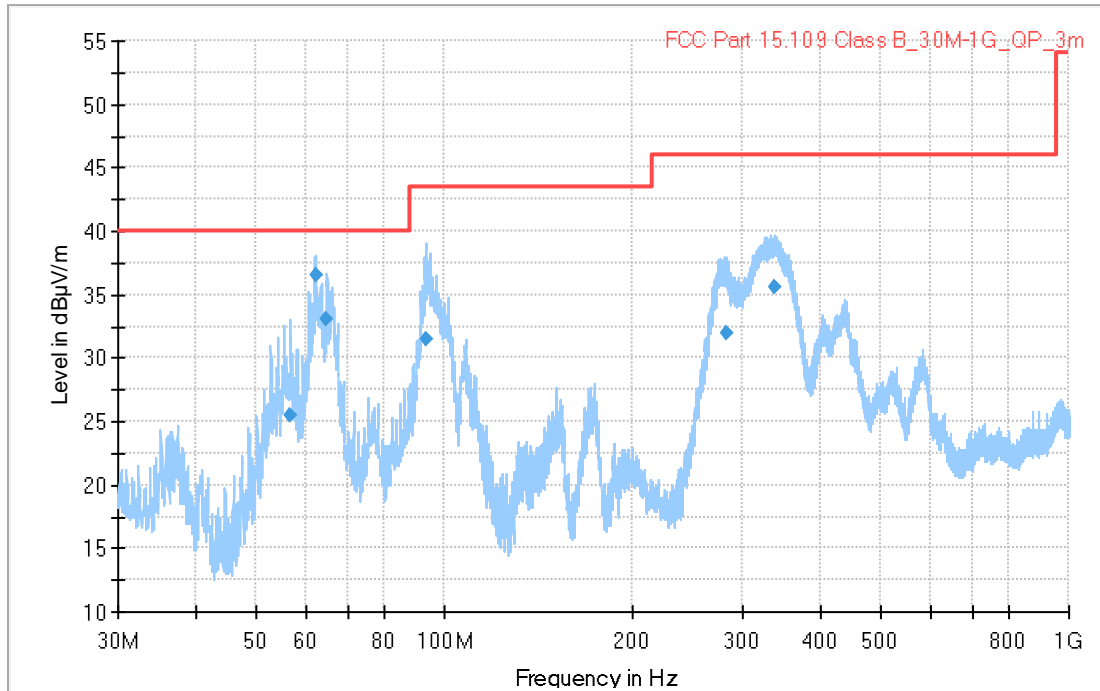
Date of test	Temp. [°C]	Humidity [%RH]	Tested by
September 9, 2021	21	32	VUU/PEG

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 checked="" type="checkbox"/> $F_x \leq 108$ MHz: 1 GHz <input type="checkbox"/> $108 \text{ MHz} < F_x \leq 500$ MHz: 2 GHz <input type="checkbox"/> $500 \text{ MHz} < F_x \leq 1$ GHz: 5 GHz <input 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 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 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	-	-
	216 – 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	-	-
	216 – 1000	46.0 / 35.6	-	-

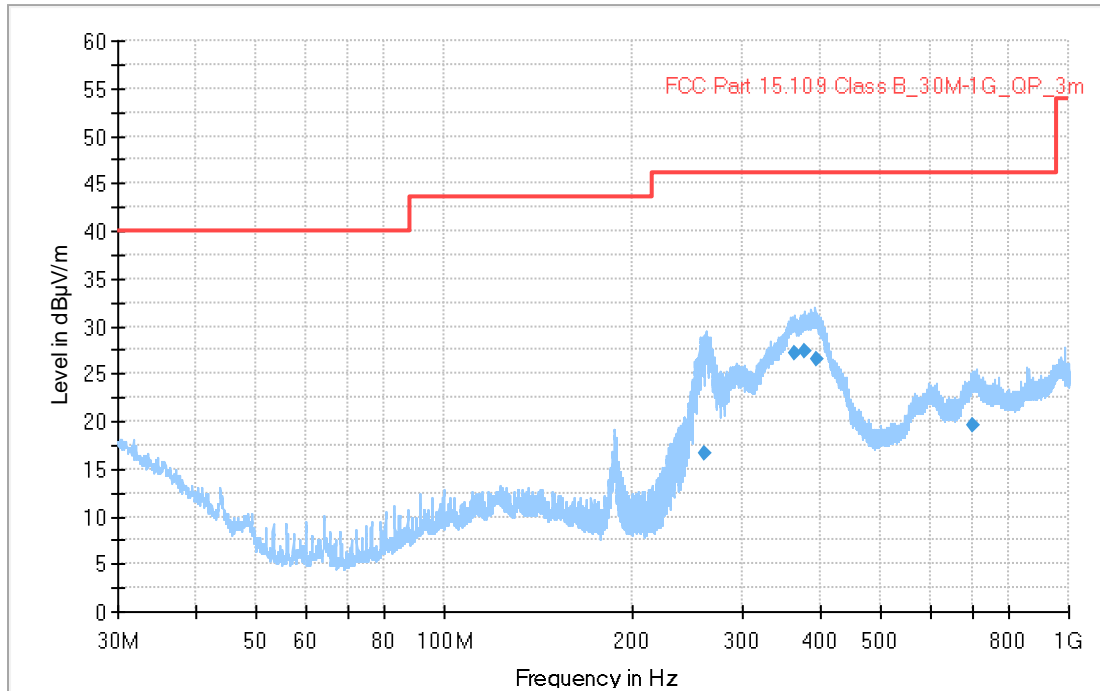
6.1 Test results, 30 – 1000 MHz, FCC, Class B



Diagram, Peak overview sweep, operation mode No. 1

Measurement results, Quasi-peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
56.730	25.49	40.00	14.51	1000.0	120.0	100.0	V	24.0	-27
62.100	36.52	40.00	3.48	1000.0	120.0	105.0	V	195.0	-28
64.740	33.10	40.00	6.90	1000.0	120.0	121.0	V	272.0	-28
93.180	31.43	43.50	12.09	1000.0	120.0	115.0	V	144.0	-24
282.480	31.92	46.00	14.10	1000.0	120.0	111.0	H	13.0	-20
337.320	35.63	46.00	10.39	1000.0	120.0	159.0	V	106.0	-18



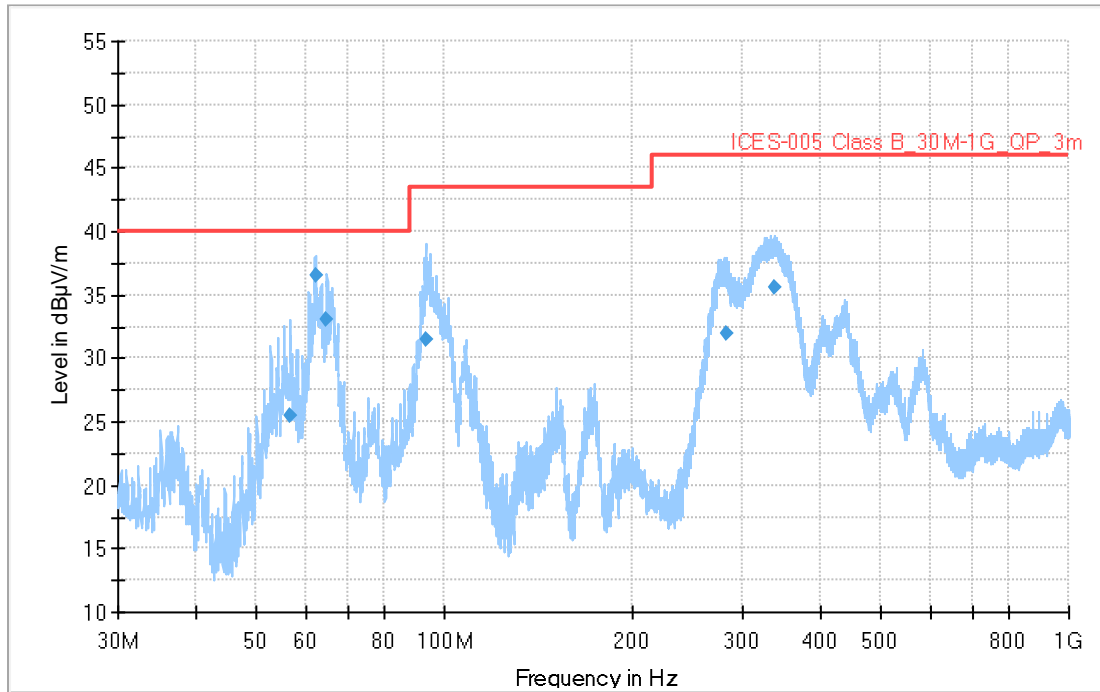
Diagram, Peak overview sweep, operation mode No. 2

Measurement results, Quasi-peak, operation mode No. 2

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
261.660	16.55	46.00	29.47	1000.0	120.0	204.0	V	56.0	-19
363.450	27.26	46.00	18.76	1000.0	120.0	148.0	V	50.0	-18
376.710	27.46	46.00	18.56	1000.0	120.0	152.0	V	40.0	-17
393.120	26.62	46.00	19.40	1000.0	120.0	154.0	V	66.0	-17
700.170	19.64	46.00	26.38	1000.0	120.0	133.0	H	331.0	-10

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

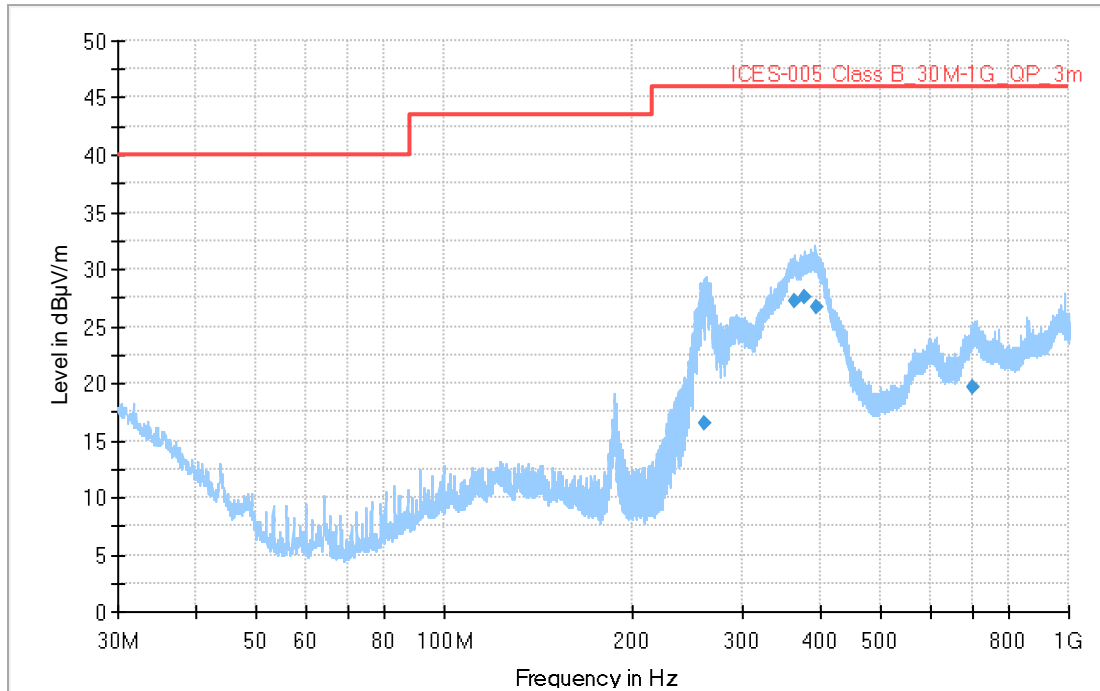
6.2 Test results, 30 – 1000 MHz, ICES-005, Class B



Diagram, Peak overview sweep, operation mode No. 1

Measurement results, Quasi-peak, operation mode No. 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
56.730	25.49	40.00	14.51	1000.0	120.0	100.0	V	24.0	-27
62.100	36.52	40.00	3.48	1000.0	120.0	105.0	V	195.0	-28
64.740	33.10	40.00	6.90	1000.0	120.0	121.0	V	272.0	-28
93.180	31.43	43.50	12.07	1000.0	120.0	115.0	V	144.0	-24
282.480	31.92	46.00	14.08	1000.0	120.0	111.0	H	13.0	-20
337.320	35.63	46.00	10.37	1000.0	120.0	159.0	V	106.0	-18



Diagram, Peak overview sweep, operation mode No. 2

Measurement results, Quasi-peak, operation mode No. 2

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
261.660	16.55	46.00	29.45	1000.0	120.0	204.0	V	56.0	-19
363.450	27.26	46.00	18.74	1000.0	120.0	148.0	V	50.0	-18
376.710	27.46	46.00	18.54	1000.0	120.0	152.0	V	40.0	-17
393.120	26.62	46.00	19.38	1000.0	120.0	154.0	V	66.0	-17
700.170	19.64	46.00	26.36	1000.0	120.0	133.0	H	331.0	-10

6.3 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 – 8	--	--	--
Multimeter	Fluke	287 True RMS	31781	2020-11-26	1 Year
Test receiver	Rohde & Schwarz	ESW 44	33890	2021-07-21	1 Year
Attenuator	Rohde & Schwarz	ESH3-Z2	32455	2121-07-06	1 Year
Coaxial cable	Suhner	RG 214/U	9798	2021-02-04	1 Year
Coaxial cable	Huber+Suhner	SUCOFLEX 106	39122	2021-05-06	1 Year
Antenna control unit	Maturo GMBH	NCD	33670	-	-
Camera control unit	Pontis	HDCon6103	32899	-	-
Bilog Antenna	TESEQ	CBL 6111D	34200	2020-03-18	3 Years
Preamplifier	Semko	AM1331	S7992	2020-06-15	1 Year
Coaxial cable	Rosenberger	LAS-S003-10000 (UFB293C)	39148	2021-05-06	1 Year
Cable	Rosenberger	LA5-S003-10000 (UFB293C)	39163	2021-02-04	1 Year