

IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

LED2009C3

REPORT NUMBER

200402176SHA-001

ISSUE DATE

June 10, 2020

DOCUMENT CONTROL NUMBER

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Report no. 200402176SHA-001

Applicant : IKEA of Sweden AB
Box 702, SE-343 81 Älmhult, SWEDEN

Manufacturer : Same as applicant

Manufacturing site : Haysonic IoT Technology CO., Ltd.
Xingtai Industrial Park, Economic Development Zone of Changtai
County, Zhangzhou City, Fujian Province, China

Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2019): Radio Frequency Devices (Subpart B)

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

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Revision History

Report No.	Version	Description	Issued Date
200402176SHA-001	Rev. 01	Initial issue of report	June 10, 2020

Measurement result summary

TEST ITEM	FCC REFERENCE	TEST RESULT	NOTE
Conducted emission	15.107	Pass	
Radiation emission	15.109	Pass	

Notes: 1: NA =Not Applicable

2. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product Name : Self-ballasted LED lamps
Type/Model : LED2009C3
Description of EUT : We tested it, and listed the worst data.
Rating : 120V~, 60Hz, 2.7W, 34mA, with E12 lamp cap
Brand name : IKEA
Category of EUT : Class B
EUT type : ☒ Table top
 ☐ Floor standing
Sample received date : April 22, 2020
Sample identification No. : 0200422-45
Date of test : April 22, 2020

1.2 Description of Test Facility

Name : Intertek Testing Services Shanghai
Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R.
China
Telephone : 86 21 61278200
Telefax : 86 21 54262353

The test facility is : CNAS Accreditation Lab
recognized, certified, Registration No. CNAS L0139
or accredited by these FCC Accredited Lab
organizations Designation Number: CN1175
IC Registration Lab
CAB identifier.: CN0051
VCCI Registration Lab
Registration No.: R-14243, G-10845, C-14723, T-12252
A2LA Accreditation Lab
Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019): Radio Frequency Device: Subpart B

ANSI C63.4 (2014): Interim Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency is specified if used.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description

2.5 Record of climatic conditions

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)
Conducted emission	24	42	101
Radiated Emission	24	42	101

Notes: NA =Not Applicable

2.6 Instrument list

Conducted Emission / Disturbance Power / Tri-loop Test / CDN method					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2020-07-15
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2020-11-29
☒	Shielded room	Zhongyu	-	EC 2838	2021-01-13
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2020-09-12
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-06-10
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2020-07-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2021-03-28
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-02-28
☒	Pressure meter	YM3	Shanghai Mengde	EC 3320	2020-07-01

2.7 Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted emission at mains ports	9kHz ~ 150kHz	3.71 dB
	150kHz ~ 30MHz	3.31 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.04 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.97 dB
	6GHz ~ 18GHz	5.29 dB

3 Conducted emission

Test result: **PASS**

3.1 Limits

3.1.1 Limits for conducted emission of class A device

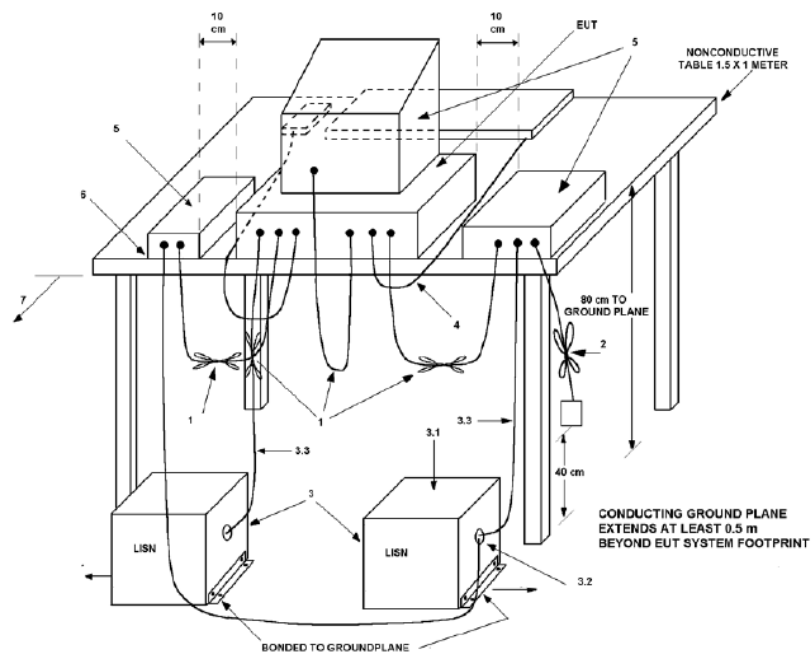
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.1.2 Limits for conducted emission of class B device

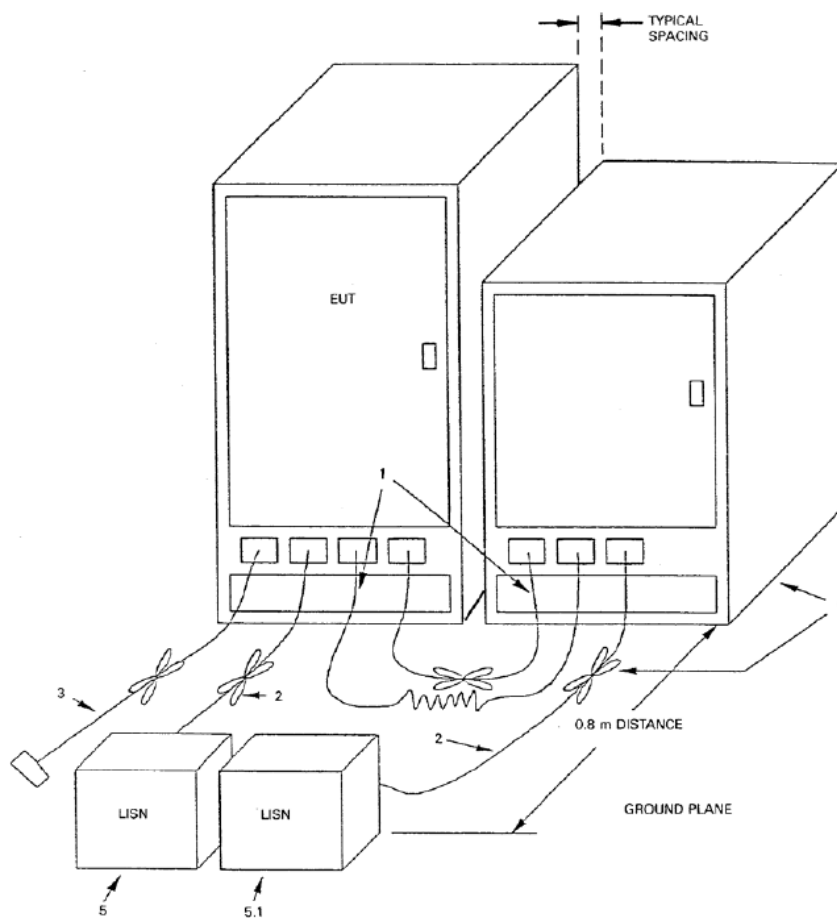
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.2 Test setup

 For table top equipment



☐ For floor standing equipment



3.3 Test Setup and Test Procedure

Measurement was performed in shielded room, and instruments used were following clause 4 and clause 5 of ANSI 63.4.

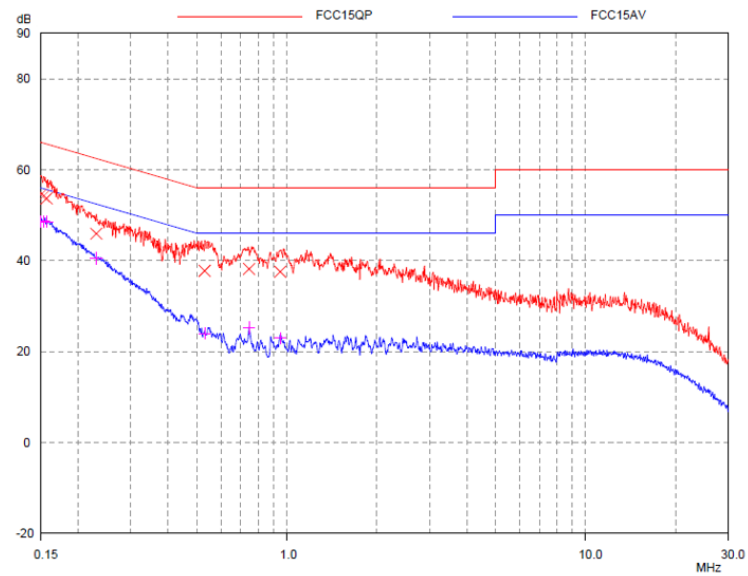
Detailed test procedure was following clause 7.3 of ANSI 63.4.

EUT arrangement and operation conditions were according to clause 6 and clause 7 of ANSI 63.4.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

3.4 Test Protocol

L line:

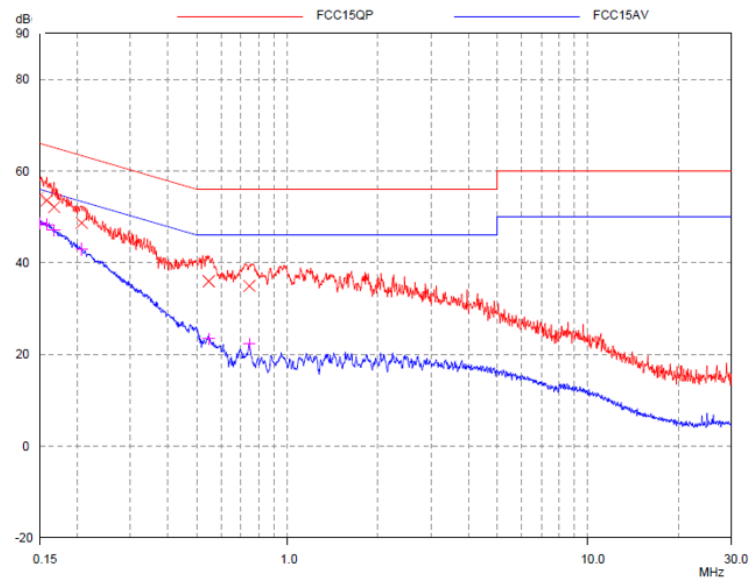


Final Measurement Results

Frequency MHz	QP Level dB	QP Limit dB	QP Delta dB
0.15	54.53	66.00	11.47
0.15302	54.19	65.83	11.64
0.15673	53.71	65.64	11.93
0.22993	45.93	62.45	16.52
0.52959	37.79	56.00	18.21
0.74652	38.19	56.00	17.81
0.94856	37.59	56.00	18.41

Frequency MHz	AV Level dB	AV Limit dB	AV Delta dB
0.15	48.53	56.00	7.47
0.15302	48.60	55.83	7.23
0.15673	48.53	55.64	7.11
0.22993	40.54	52.45	11.91
0.52959	23.97	46.00	22.03
0.74652	25.23	46.00	20.77
0.94856	22.90	46.00	23.10

N line:



Final Measurement Results

Frequency MHz	QP Level dB	QP Limit dB	QP Delta dB
0.15	54.63	66.00	11.37
0.15798	53.61	65.57	11.96
0.16707	52.15	65.10	12.95
0.20643	48.69	63.35	14.66
0.54678	35.95	56.00	20.05
0.74652	34.95	56.00	21.05

Frequency MHz	AV Level dB	AV Limit dB	AV Delta dB
0.15	48.60	56.00	7.40
0.15798	48.33	55.57	7.24
0.16707	47.06	55.10	8.04
0.20643	42.91	53.35	10.44
0.54678	23.37	46.00	22.63
0.74652	22.31	46.00	23.69

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Correct Factor = 10.00 + 2.00 = 12.00dB;
Corrected Reading = 10dBuV + 12.00dB = 22.00dBuV;
Margin = 66.00dBuV – 22.00dBuV = 44.00dB.

4 Radiated emission

Test result: **PASS**

4.1 Radiated emission limits

4.1.1 Limits for radiated emission of class A device

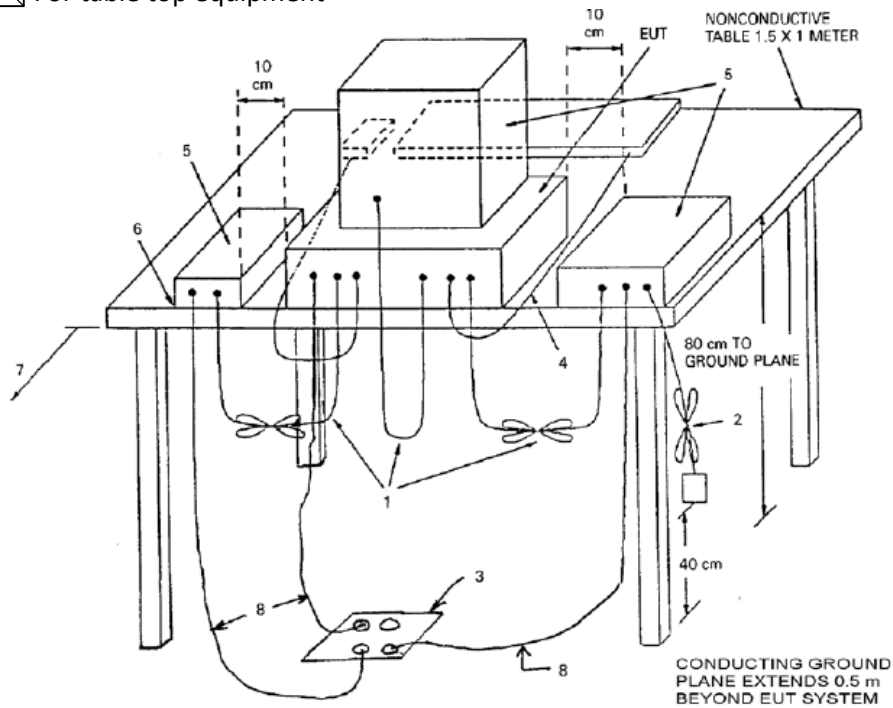
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 ~ 88	39
88 ~ 216	43.5
216 ~ 960	46.4
Above 960	49.5
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.1.2 Limits for radiated emission of class B device

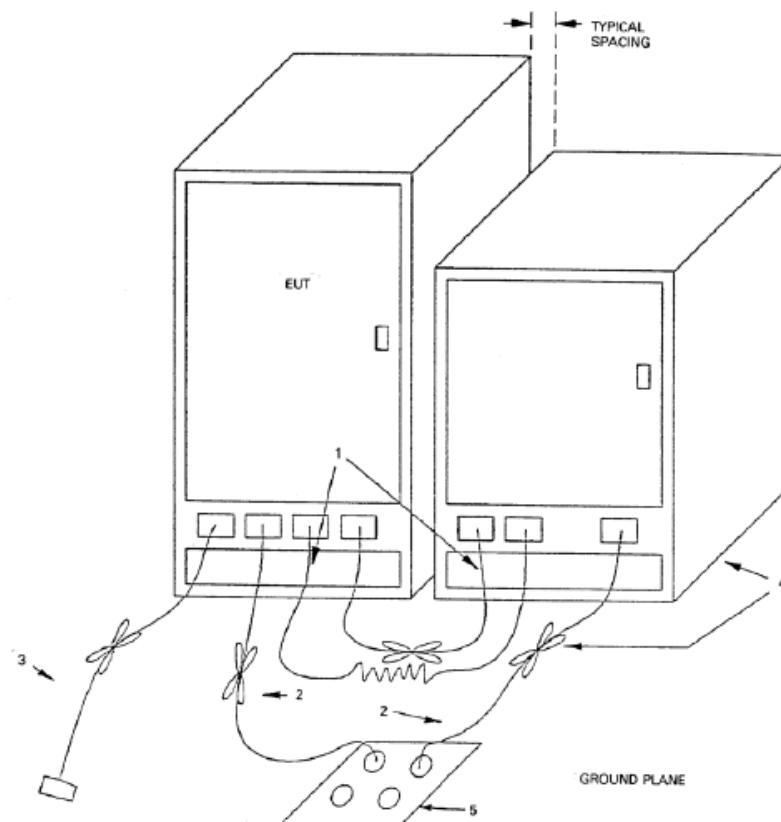
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 960	46.0
Above 960	54.0
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.2 Block diagram and test set up

☒ For table top equipment



☐ For floor standing equipment



4.3 Test Setup and Test Procedure

The measurement was performed in a semi-anechoic chamber.

The distance from EUT to receiving antenna is 3 meter.

Measurement was performed according to clause 4 and clause 5 of ANSI 63.4.

Test procedure was according to clause 8.3 of ANSI 63.4.

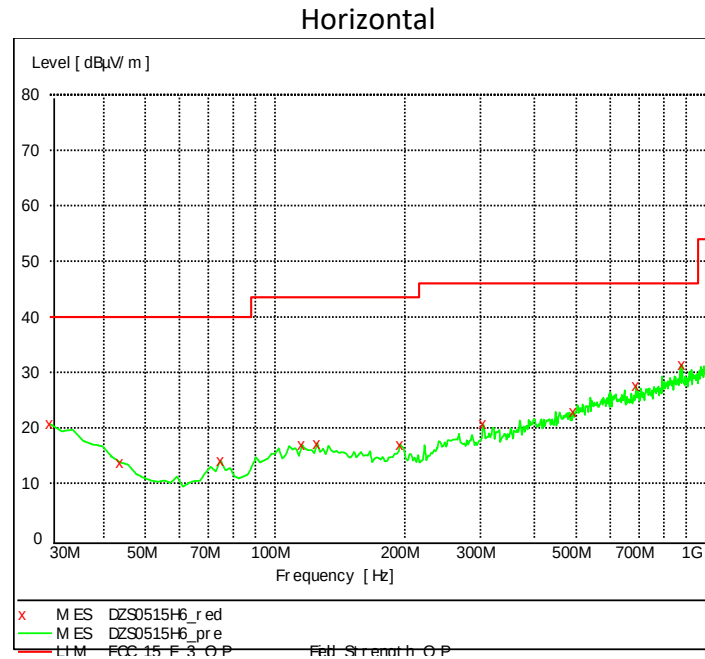
EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

The bandwidth setting on R&S Test Receiver was 120 kHz.

The required measurement frequency range was checked.

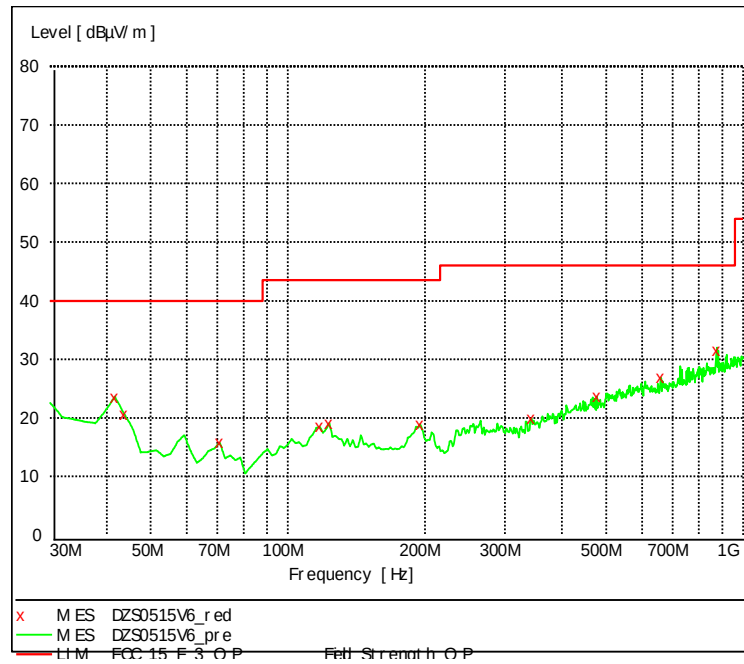
4.4 Test Protocol

Test Curve:



Frequency	Level	Transd	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
30.000000	20.70	18.8	40.0	19.3
43.607214	13.70	11.7	40.0	26.3
74.709419	14.10	7.6	40.0	25.9
115.531062	16.90	13.1	43.5	26.6
125.250501	17.20	13.2	43.5	26.3
195.230461	17.00	11.0	43.5	26.5
304.088176	20.80	15.1	46.0	25.2
492.645291	23.00	19.5	46.0	23.0
688.977956	27.70	21.5	46.0	18.3
881.422846	31.30	23.6	46.0	14.7

Vertical



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
41.663327	23.60	12.6	40.0	16.4
43.607214	20.70	11.7	40.0	19.3
70.821643	15.80	7.4	40.0	24.2
117.474950	18.50	13.2	43.5	25.0
123.306613	19.10	13.2	43.5	24.4
195.230461	18.90	11.0	43.5	24.6
342.965932	19.90	16.2	46.0	26.1
477.094188	23.70	19.3	46.0	22.3
659.819639	26.90	21.3	46.0	19.1
875.591182	31.50	23.5	46.0	14.5

Test data:

1G - 18G:

Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limits (dBuV/m)	Margin (dBuV/m)
Horizontal	2396.79	34.70	74.0	39.3
	3691.38	47.30	74.0	26.7
	4815.63	47.20	74.0	26.8
	9653.30	50.80	74.0	23.2
	17080.16	51.10	74.0	22.9
Vertical	3691.38	41.40	74.0	32.6
	4917.83	46.90	74.0	27.1
	7336.67	46.30	74.0	27.7
	8136.42	35.10	74.0	38.9
	17012.02	50.10	74.0	23.9

Note: * means the emission level is 20dB or more lower than the relevant limit.

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, limit = 40.00dBuV/m.

Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m; Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

*****END of the report*****