IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK
EMC TESTING–J2226F SVARTRÅ

REPORT NUMBER
220816137GZU-001

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TEST REPORT

Applicant Name & Address	:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden
Manufacturing Site	:	Liting Universal (Zhejiang) Electric Corp. Quantang Industri Zone, Pinghu City ZHEJIANG PROVINCE Zhejiang Province 314204
Intertek Report No:		220816137GZU-001
FCC ID	:	FHO-J2226F

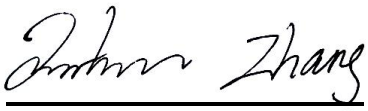
Test standards

CFR 47, FCC Part 15, Subpart B:2020

Sample Description

Product	:	Low Voltage LED decorative lighting string
Model No.	:	J2226F SVARTRÅ
Electrical Rating	:	Input to power unit: 120 Vac, 60Hz; Input to string: 24Vdc, 100mA, Max. 2.4W, 24 pcs non-replaceable LED lamp.
Serial No.		Not Labeled
Date Received	:	16 August 2022
Date Test Conducted	:	10 January 2023

Prepared and Checked By



Jackson Zhang

Engineer

Approved By:

Dean Liu

Project Engineer

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CONTENT

TEST REPORT

1. TEST RESULTS SUMMARY

Classification of EUT: Class B

Test Item	Standard	Result
Conducted disturbance voltage at mains ports	**CFR 47, FCC Part 15, Subpart B**	**Pass**
Radiated emission (30 MHz–1 GHz)	**CFR 47, FCC Part 15, Subpart B**	**Pass**
Radiated emission (Above 1 GHz)	**CFR 47, FCC Part 15, Subpart B**	**N/A**
Remark: Reference publication is used for methods of measurement: ANSI C63.4:2014		

Remark:

1. The symbol “N/A” in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

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2. EMC RESULTS CONCLUSION

RE: EMC Testing Pursuant to FCC part 15 performed on the Low Voltage LED decorative lighting string, Model: J2226F SVARTRÅ.

We tested the Low Voltage LED decorative lighting string, Model: J2226F SVARTRÅ, to determine if it was in compliance with the relevant standards as marked on the Test Results Summary. We found that the unit met the requirement of FCC part 15 standard when tested as received. The worst case's test data was presented in this test report.

The production units are required to conform to the initial sample as received when the units are placed on the market.

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3. LABORATORY MEASUREMENTS

Configuration Information

Support Equipment: N/A

Rated Voltage and frequency under test:	120 V~; 60 Hz
Condition of Environment:	Temperature: 22~28°C Relative Humidity:35~60% Atmosphere Pressure:86~106kPa

Notes:

1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications. An attempt had been made to maximize the emission by varying the configuration of the EUT.

2. Test Facility accreditation:
A2LA Certificate Number 0078.10
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

3. Test Location:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
All tests were performed at:
Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Except Radiated Emissions was performed at:
Room 102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China

4. Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission (9 kHz-150 kHz)	2.54 dB
2	Conducted Emission (150 kHz-30 MHz)	2.51 dB
3	Disturbance Power (30 MHz-300 MHz)	3.13 dB
4	Radiated Emission (9 kHz-30 MHz)	4.15 dB
5	Radiated Emission (30 MHz-1 GHz)	4.62 dB
6	Radiated Emission (1 GHz-6 GHz)	4.67 dB
7	Radiated Emission (6 GHz-18 GHz)	4.76 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty is calculated in accordance with CISPR16-4-2:2011+A1:2014 +A2:2018.
The measurement uncertainty is given with a confidence of 95%, k=2.
Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

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4. EQUIPMENT USED DURING TEST

Conducted Disturbance-Mains Terminal (2)

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM031-04	EMI receiver	ESR3	R&S	1Y
EM006-06	LISN	ENV216	R&S	1Y
SA047-111	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu	1Y
EM031-04-01	EMC32 software (CE)	V10.01.00	R&S	N/A

Radiated Disturbance（30 MHz-1 GHz）

Equipment No.	Equipment	Model	Manufacturer	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m3	ETS-LINDGREN	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	1Y
EM033-01	TRILOG Super Broadband test Antenna（30 MHz-3 GHz）	VULB 9163	SCHWARZBECK	1Y
EM031-02-01	Coaxial cable	/	R&S	1Y
EM036-01	Common-mode absorbing clamp	CMAD 20B	TESEQ	1Y
SA047-118	Digital Temperature-Humidity Recorder	RS210	YIJIE	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A

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Detail of the equipment calibration due date:

Equipment No.	Cal. Due date (DD-MM-YYYY)
Conducted Disturbance-Mains Terminal (1)	
EM080-05	08/06/2023
EM006-05	05/06/2023
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Mains Terminal (2)	
EM031-04	06/01/2024
EM006-06	05/09/2023
SA047-111	23/10/2023
EM004-03	03/01/2024
EM031-04-01	N/A
Conducted Disturbance-Load and Control Terminal (1)	
EM080-05	08/06/2023
EM080-05-01	05/09/2023
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Load and Control Terminal (2)	
EM080-05	08/06/2023
EM005-06-01	05/09/2023
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Telecom Terminal	
EM080-05	08/06/2023
EM011-05	08/04/2023
EM011-06	08/04/2023
EM006-06	05/09/2023
SA047-112	23/10/2023
EM004-04	03/01/2024
Conducted Disturbance-Antenna Terminal	
EM031-04	06/01/2024
EM084-02	17/07/2023
EM041-01	05/01/2024
EM041-02	05/01/2024
SA047-111	23/10/2023
EM004-03	03/01/2024

Equipment No.	Cal. Due date (DD-MM-YYYY)
Radiated Disturbance (CDN Method)	
EM080-05	08/06/2023
EM003-02	15/11/2023
EM003-03	15/11/2023
EM046-04-03	06/03/2023
EM032-02-01	14/07/2023
EM032-02-02	14/07/2023
SA047-112	23/10/2023
EM004-04	03/01/2024
Radiated electromagnetic disturbances (9 kHz-30 MHz)	
EM031-04	06/01/2024
EM061-04	06/03/2023
SA047-111	23/10/2023
EM004-03	03/01/2024
Radiated Disturbance (9 kHz-30 MHz)	
EM030-04	07/04/2023
EM031-02	15/11/2023
EM011-04	27/06/2023
EM031-02-01	08/04/2023
SA047-118	15/07/2023
EM045-01-01	N/A
Radiated Disturbance (30 MHz-1 GHz)	
EM030-04	07/04/2023
EM031-02	15/11/2023
EM033-01	04/12/2023
EM031-02-01	08/04/2023
EM036-01	17/07/2023
SA047-118	15/07/2023
EM045-01-01	N/A
Radiated Disturbance (1-18 GHz)	
EM030-04	07/04/2023
EM031-02	15/11/2023
EM031-03	15/11/2023
EM033-02	26/06/2023
EM033-02-02	08/04/2023
EM022-03	06/05/2023
SA047-118	15/07/2023
EM045-01-01	N/A

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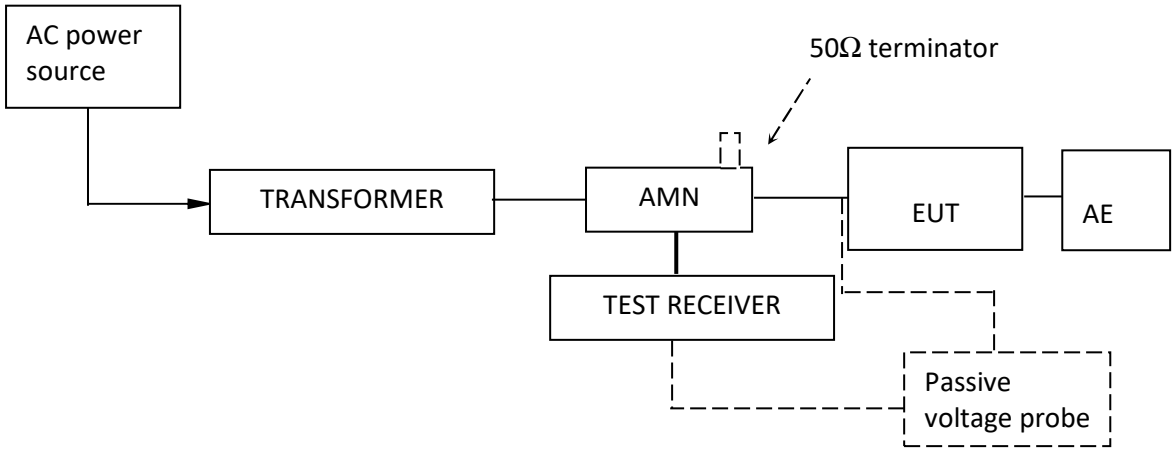
5. EMI TEST

5.1 Conducted Disturbance Voltage at mains ports

Test Result: Pass

5.1.1 Block Diagram of Test Setup



5.1.2 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.
The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane(Ground Reference Plane).And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT. During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.
The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

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5.1.3 Limit

Frequency range MHz	**AC mains terminals** dB (uV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
Note 1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz. Note 2: The lower limit is applicable at the transition frequency.		

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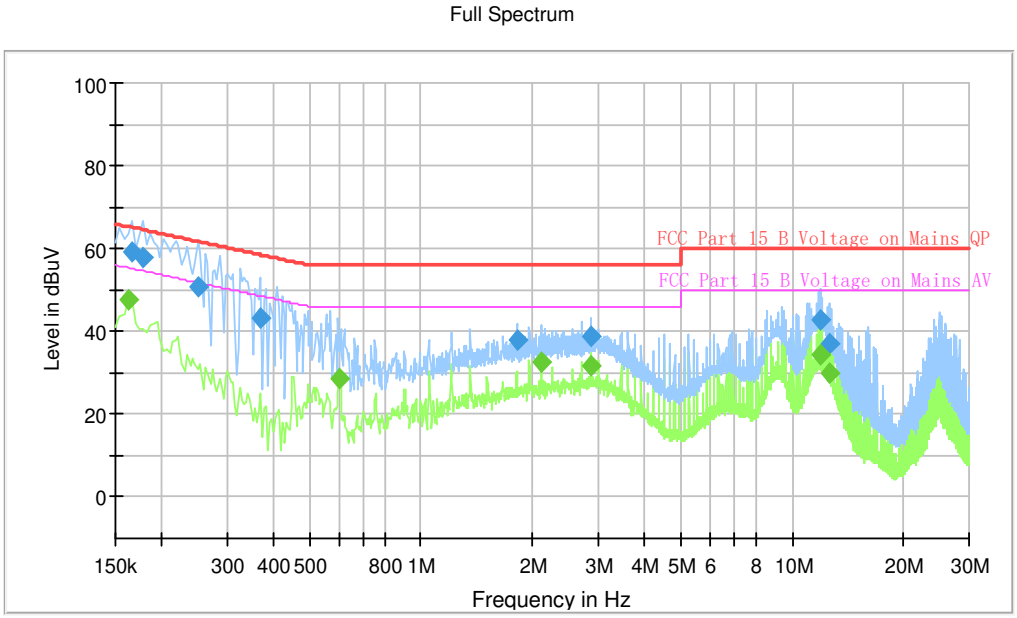
5.1.4 Test Data and curve

At mains terminal:

Tested Wire: Live **Operation Mode: White lighting constant bright**



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.162000	---	47.67	55.36	7.70	1000.0	9.000	L1	ON	9.7
0.166000	58.98	---	65.16	6.18	1000.0	9.000	L1	ON	9.7
0.178000	57.80	---	64.58	6.78	1000.0	9.000	L1	ON	9.7
0.250000	50.57	---	61.76	11.19	1000.0	9.000	L1	ON	9.7
0.370000	43.07	---	58.50	15.43	1000.0	9.000	L1	ON	9.7
0.602000	---	28.64	46.00	17.36	1000.0	9.000	L1	ON	9.8
1.810000	38.04	---	56.00	17.96	1000.0	9.000	L1	ON	9.8
2.110000	---	32.59	46.00	13.41	1000.0	9.000	L1	ON	9.8
2.862000	38.70	---	56.00	17.30	1000.0	9.000	L1	ON	9.8
2.862000	---	31.68	46.00	14.32	1000.0	9.000	L1	ON	9.8
11.906000	---	34.49	50.00	15.51	1000.0	9.000	L1	ON	10.1
11.906000	42.59	---	60.00	17.41	1000.0	9.000	L1	ON	10.1
12.658000	---	29.80	50.00	20.20	1000.0	9.000	L1	ON	10.1
12.658000	36.87	---	60.00	23.13	1000.0	9.000	L1	ON	10.1

Remark:

1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBµV) = Corr. (dB) + Read Level (dBµV)
3. Delta Limit (dB) = Level (dBµV)-Limit (dBµV)

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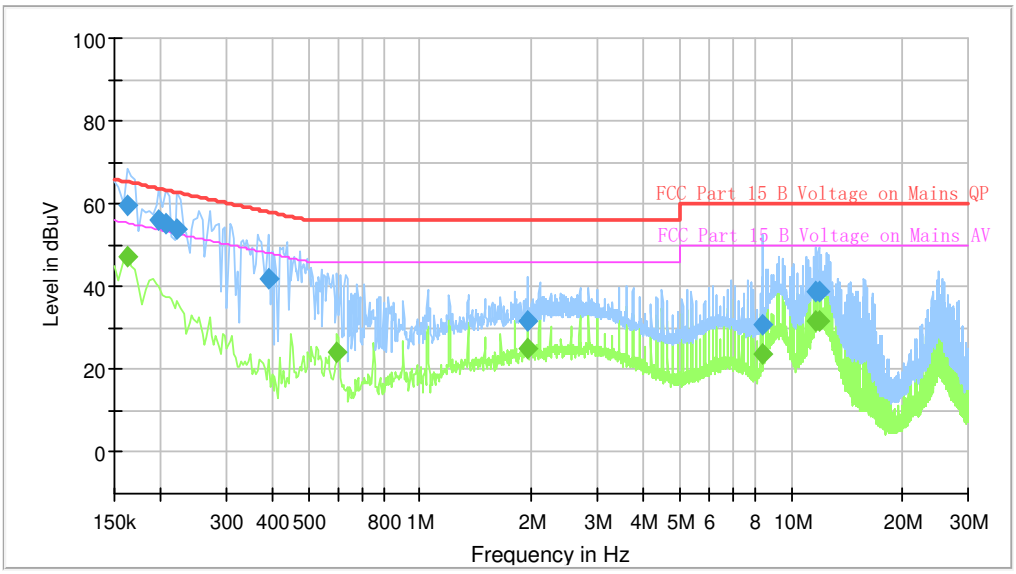
Tested Wire: Neutral **Operation Mode: White lighting constant bright**



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.162000	---	47.44	55.36	7.92	1000.0	9.000	N	ON	9.8
0.162000	59.51	---	65.36	5.85	1000.0	9.000	N	ON	9.8
0.198000	55.89	---	63.69	7.81	1000.0	9.000	N	ON	9.8
0.206000	55.22	---	63.37	8.15	1000.0	9.000	N	ON	9.8
0.222000	53.92	---	62.74	8.82	1000.0	9.000	N	ON	9.8
0.390000	41.79	---	58.06	16.27	1000.0	9.000	N	ON	9.8
0.598000	---	24.33	46.00	21.67	1000.0	9.000	N	ON	9.8
1.946000	31.70	---	56.00	24.30	1000.0	9.000	N	ON	9.8
1.950000	---	25.02	46.00	20.98	1000.0	9.000	N	ON	9.8
8.386000	30.81	---	60.00	29.19	1000.0	9.000	N	ON	10.0
8.398000	---	23.73	50.00	26.27	1000.0	9.000	N	ON	10.0
11.702000	---	31.63	50.00	18.37	1000.0	9.000	N	ON	10.1
11.702000	38.90	---	60.00	21.10	1000.0	9.000	N	ON	10.1
11.854000	---	31.64	50.00	18.36	1000.0	9.000	N	ON	10.1
11.854000	38.94	---	60.00	21.06	1000.0	9.000	N	ON	10.1

Remark:
1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBµV) = Corr. (dB) + Read Level (dBµV)
3. Delta Limit (dB) = Level (dBµV)-Limit (dBµV)

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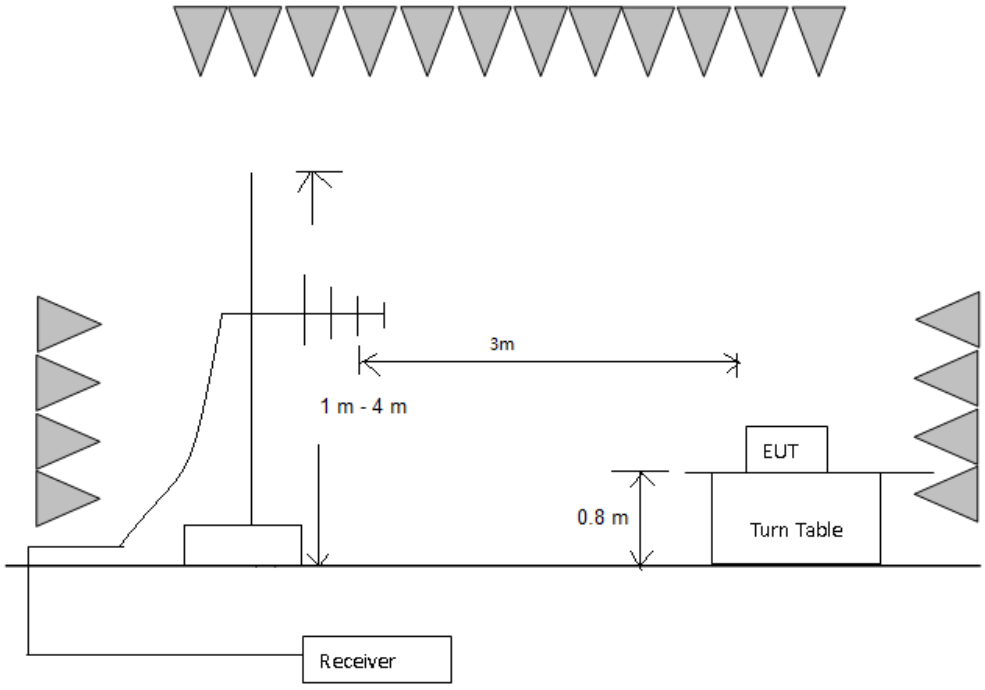
5.2 Radiated Emission 30 MHz -1000 MHz

Test Result: Pass

5.2.1 Block Diagram of Test Setup



5.2.2 Test Setup and Procedure

The measurement was applied in a semi-anechoic chamber. The EUT and simulators were placed on a 0.8 m high foamed table above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4 requirement during radiated test. The bandwidth setting on R&S Test Receiver was 120 kHz.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

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Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper Frequency of Radiated Measurement
Below 1.705 MHz	30MHz
1.705 MHz – 108 MHz	1 GHz
108 MHz – 500 MHz	2 GHz
500 MHz – 1 GHz	5 GHz
Above 1 GHz	5th harmonic of the highest frequency or 40 GHz, whichever is lower.
At transitional frequencies the lower limit applies.	

Remark: Radiated Emission was performed from 30 MHz to 1 GHz.

5.2.3 Limit

Class B limit at 3m test distance:

Frequency range MHz	Quasi-peak limits dB (µV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
960 to 1000	54
At transitional frequencies the lower limit applies.	

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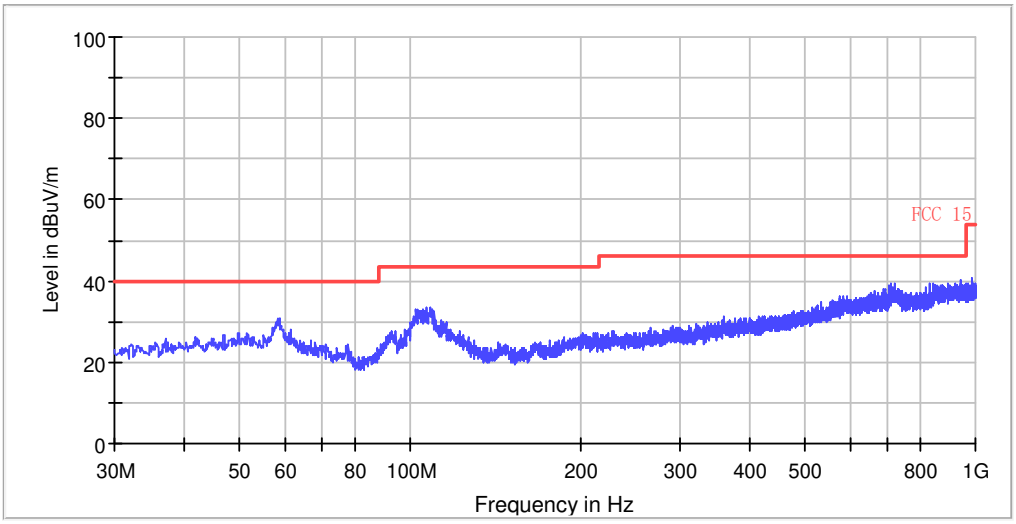
5.2.4 Test Data and Curve

Operation Mode: **White lighting constant bright**
Horizontal



All emission levels are more than 6 dB below the limit.

Remark:
1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB) + Read Level (dBµV)
3. Margin (dB) = Limit QPK (dBµV/m) –Quasi Peak (dBµV/m)

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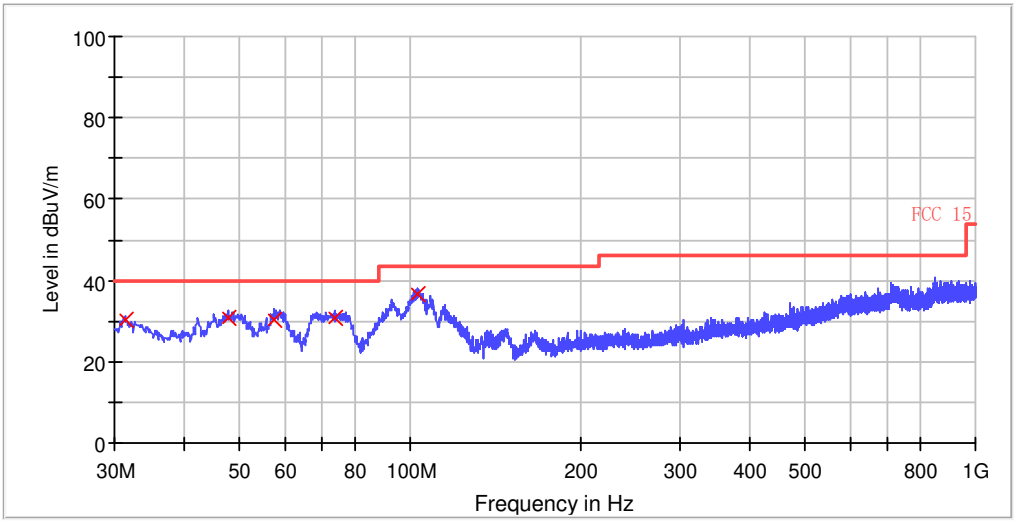
Vertical



QP

Frequency (MHz)	Quasi Peak (dBuV/m)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
31.280000	30.4	120.000	V	17.4	9.6	40.0
47.760000	30.8	120.000	V	20.7	9.2	40.0
57.440000	30.5	120.000	V	19.8	9.5	40.0
73.360000	30.9	120.000	V	15.6	9.1	40.0
102.840000	36.6	120.000	V	18.8	6.9	43.5

Remark:

1. Corr. (dB) = Antenna Factor (dB) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB) + Read Level (dBµV)
3. Margin (dB) = Limit QPK (dBµV/m) –Quasi Peak (dBµV/m)

5.3 Radiated Emission above 1 GHz

Test Result: Not Applicable

Remark:

The highest internal source of the EUT is not more than 108 MHz, so the measurement above 1000 MHz is not applicable.

**********End of Report**********