

Pure Forms LLC

RF TEST REPORT

Report Type:

FCC Part 15.249 RF report

Model:

DL2197

REPORT NUMBER:

230900893SHA-003

ISSUE DATE:

July 2, 2024

DOCUMENT CONTROL NUMBER:

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Applicant: Pure Forms LLC
4744 Center Park, San Antonio, Texas, 78218 USA

Manufacturer: Zhongshan Luxgend Electronics Co.,Ltd
7th, Jiahua Rd., Qianlong, Sanxiang Town, Zhongshan City,
Guangdong Province, China 528463

Manufacturer Site: Zhongshan Luxgend Electronics Co.,Ltd
7th, Jiahua Rd., Qianlong, Sanxiang Town, Zhongshan City,
Guangdong Province, China 528463

Product Name: Desklamp

Type/Model: DL2197

FCC ID: 2BGAI-8930-8935

SUMMARY:

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

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2020): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:



Project Engineer
Dylan Tang

REVIEWED BY:



Reviewer
Wakeyou Wang

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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
230900893SHA-003	Rev. 01	Initial issue of report	July 2, 2024

Measurement result summary

TEST ITEM	FCC REFERENCE	RESULT
Radiated Emissions	15.245(b)&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	Pass
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Desk lamp
Type/Model:	DL2197
Description of EUT:	The EUT is a Desk lamp, it has only one model.
Rating:	DC24V INPUT, 150W Max Adapter: Manufacturer: SHENZHEN PENGSHENGYE ELECTRONIC CO.,LTD Model: PSY2407500MM Input: 100-240Vac, 50/60Hz, Max 3A Output: 24.0V $\Rightarrow$ 7.5A 180.0W
Category of EUT:	Class B
EUT type:	☒ Table top ☐ Floor standing
Software Version:	8930-SW-V0
Hardware Version:	8930-HW-V0
Sample received date:	October 15, 2023
Date of test:	October 15, 2023 ~ April 8, 2024

1.2 Technical Specification

Frequency Range:	24000MHz ~ 24250MHz
Type of Modulation:	CW
Channel Number:	1
Antenna Information:	Series-Fed Microstrip Antenna Array

1.3 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 recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0014
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	NVLAP Accreditation Lab NVLAP LAB CODE: 200849-0
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2023)
ANSI C63.10 (2020)

2.2 Mode of operation during the test

The channel was tested as representatives.

Frequency Band (MHz)				24000MHz ~ 24250MHz			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	24058	-	-	-	-	-	-

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 Test environment condition:

Test items	Temperature	Humidity
20dB Bandwidth	23°C	52% RH
Maximum conducted output power and e.i.r.p.		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	22°C	55% RH
Power line conducted emission	21°C	52% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESR7	EC 6194	2025-02-27
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2024-11-19
☐	A.M.N.	R&S	ENV4200	EC 3558	2025-06-05
☒	Attenuator	Hua Xiang	Ts5-10db-6g	EC 6194-1	2024-12-07
☒	Shielded room	Zhongyu	-	EC 2838	2025-01-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2024-08-22
☒	Test Receiver	R&S	ESR	EC6501	2024-09-24
☒	Bilog Antenna	TESEQ	CBL 6112B	EC 6411	2024-09-12
☐	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC 5262	2024-06-15
☒	Pre-amplifier	Tonscend	tap01018050	EC 6432-1	2024-12-07
☒	Horn antenna	Tonscend	bha9120d	EC 6432-2	2025-03-20
☒	Horn antenna	ETS	3116c	EC 5955	2024-07-22
☒	WW wave antenna (40-60G)	HengDa	M19RH	EC 6529-1	2025-03-09
☒	Mixer (40-60G)	VDi		EC 6529-2	2026-03-05
☒	WW wave antenna (60-90G)	HengDa	M12RH	EC 6382-1	2025-03-14
☒	Mixer (60-90G)	VDi		EC 6382-2	2026-03-05
☒	WW wave antenna (90-140G)	HengDa	M15RH	EC 6383-1	2025-03-05
☒	Mixer (90-140G)	VDi		EC 6383-2	2026-03-05
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2024-07-08
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Thermo-Hygrograph	Testo	175h1	EC 6640	2024-08-28
☒	Pressure meter	YM3	Shanghai Mengde	EC 3320	2024-08-16

2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	$\pm 0.74\text{dB}$
Radiated Emissions in restricted frequency bands below 1GHz	$\pm 4.90\text{dB}$
Radiated Emissions in restricted frequency bands above 1GHz	$\pm 5.02\text{dB}$
Emission outside the frequency band	$\pm 2.89\text{dB}$

3 Radiated Emissions

Test result: Pass

3.1 Limit

Fundamental Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902 - 928	94	54
2400 - 2483.5	94	54
5725 - 5875	94	54
24000 - 24250	108	68

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	$2400/F(\text{kHz})$	300
0.490 ~ 1.705	$24000/F(\text{kHz})$	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

3.2 Measurement Procedure

For Radiated emission below 30MHz:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- Both X and Y axes of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

TEST REPORT**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

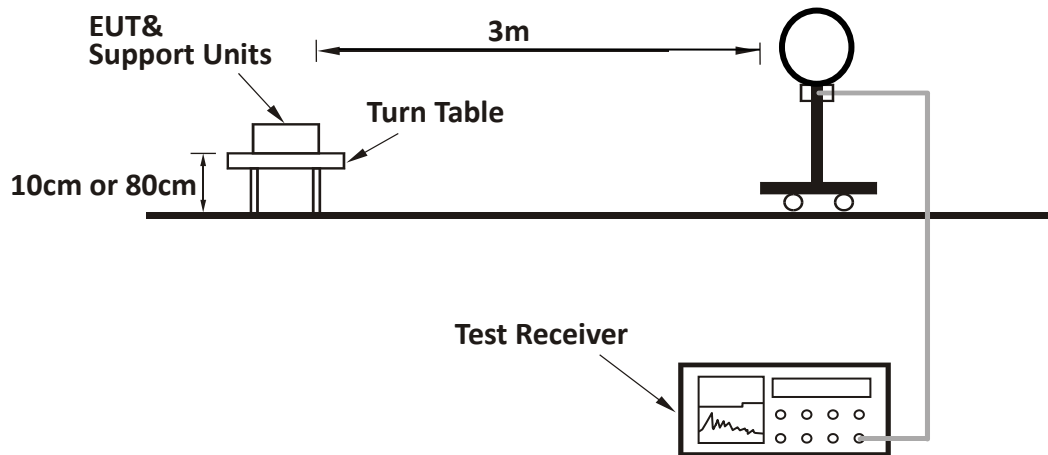
- a) The EUT was placed on the top of a rotating table 0.01 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 or 1 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

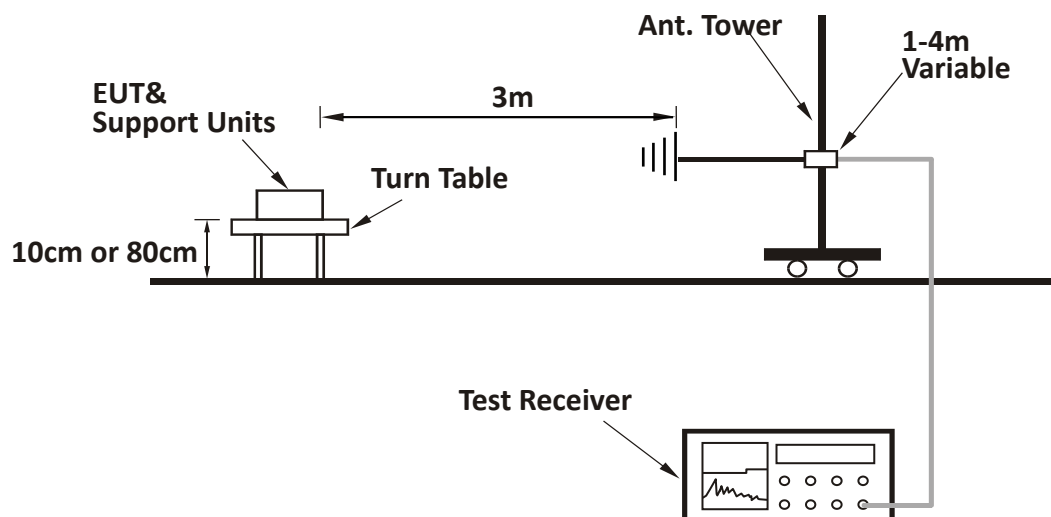
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or $3 \times \text{RBW}$ (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

3.3 Test Configuration

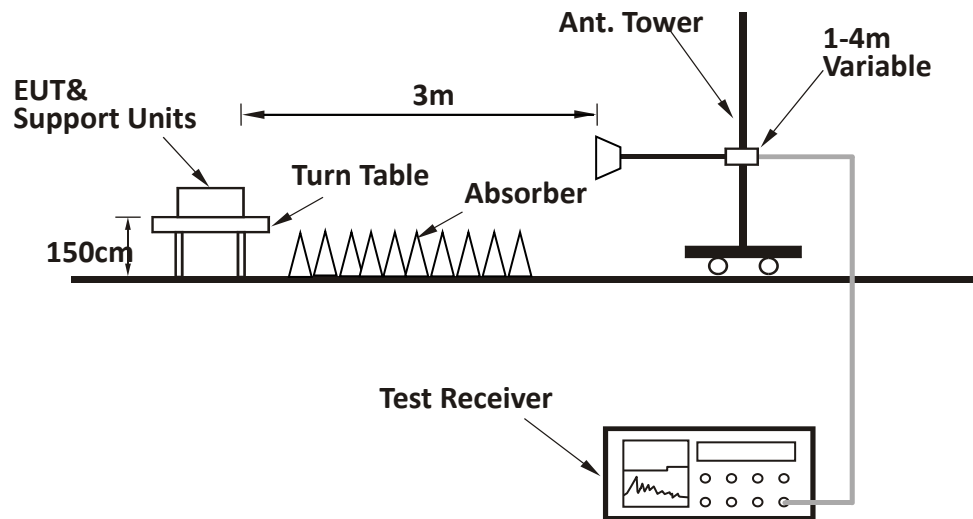
For Radiated emission below 30MHz:



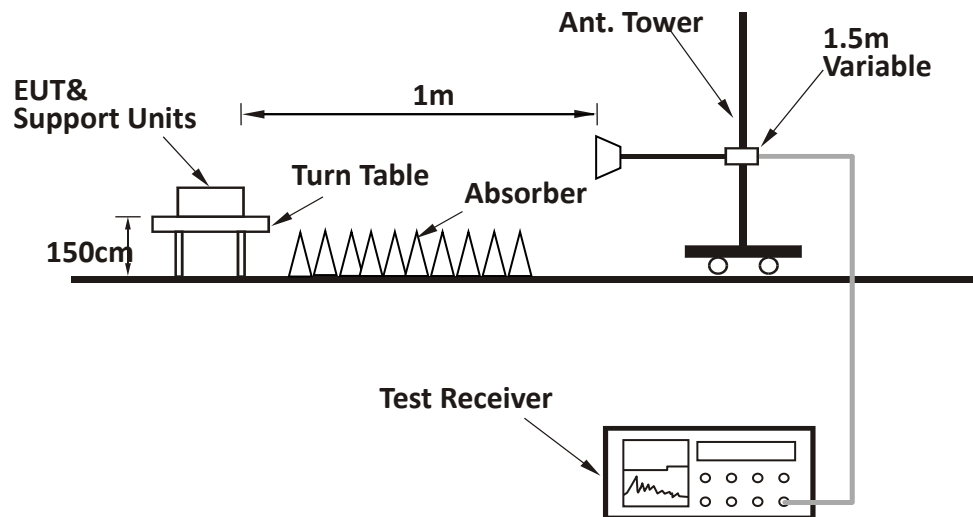
For Radiated emission 30MHz to 1GHz:



For Radiated emission 1GHz to 40GHz:



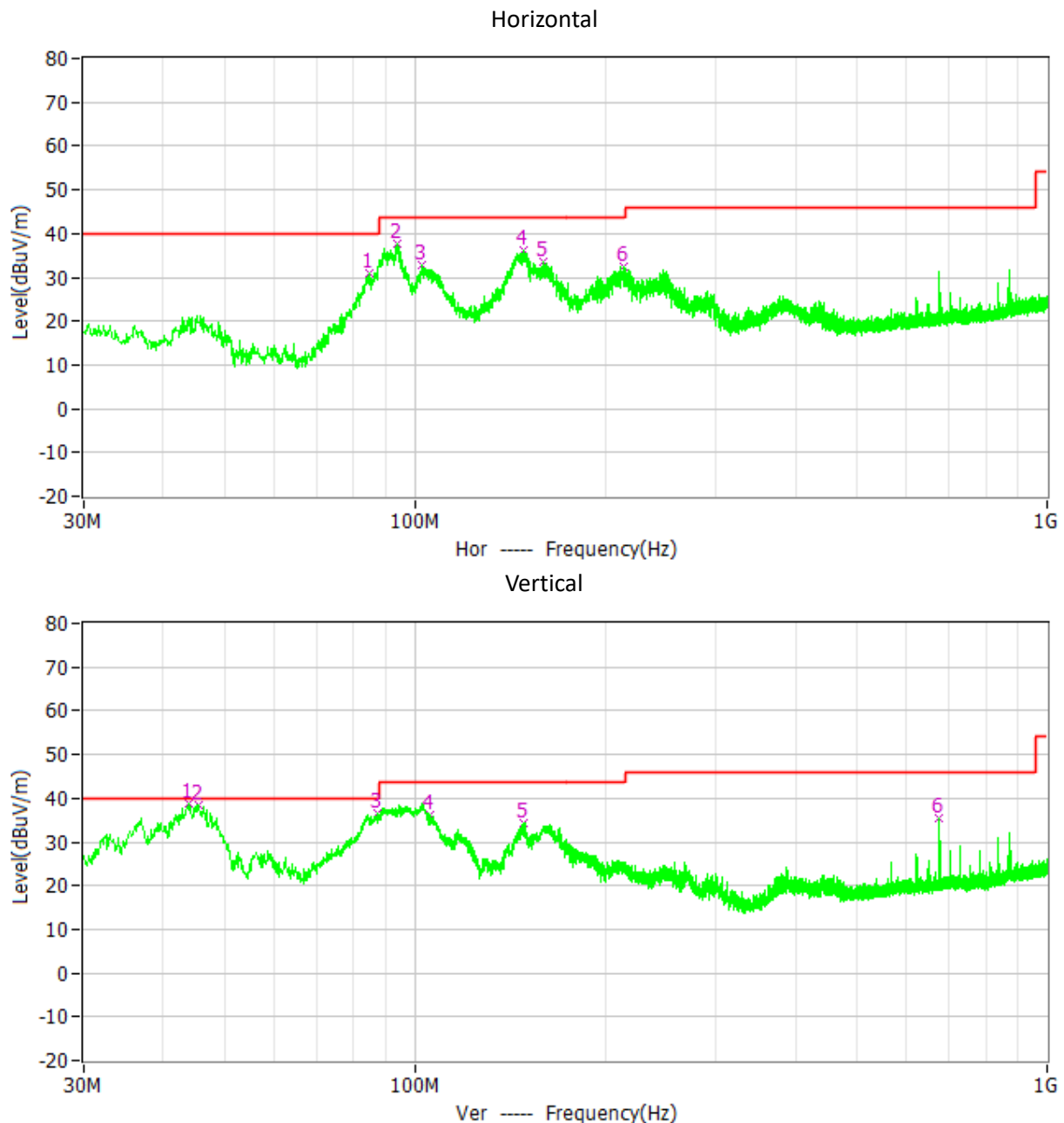
For Radiated emission above 40GHz:



3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:



TEST REPORT

Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	84.805	30.9	9.2	40.0	9.1	QP
H	94.117	37.5	10.9	43.5	6.0	QP
H	102.653	32.7	12.1	43.5	10.8	QP
H	148.728	36.1	12.1	43.5	7.4	QP
H	159.398	33.7	11.4	43.5	9.8	QP
H	214.300	32.6	10.9	43.5	10.9	QP
V	43.968	38.8	12.3	40.0	1.2	QP
V	45.617	38.6	11.5	40.0	1.4	QP
V	87.618	36.6	9.7	40.0	3.4	QP
V	105.951	36.2	12.4	43.5	7.3	QP
V	149.116	34.4	12.1	43.5	9.1	QP
V	676.020	35.4	21.7	46.0	10.6	QP

Test result above 1GHz:

Antenna	Frequency (GHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	24.058	96.68	128	31.32	PK
H		96.44	108	11.56	AV
V		86.86	128	41.14	PK
V		86.36	108	21.64	AV

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	23945.596	52.59	74.00	21.41	PK
H	24000	52.45	74.00	21.55	PK
H	24250	51.33	74.00	22.67	PK
H	24275.134	51.54	74.00	22.46	PK
V	239511.054	52.25	74.00	21.75	PK
V	24000	52.09	74.00	21.91	PK
V	24250	51.24	74.00	22.76	PK
V	24275.386	51.42	74.00	22.58	PK

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The emission was conducted from 1GHz to 40GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	9585	40.8	74.00	33.2	PK
H	9585	28.8	54.00	25.2	AV
H	17966	39.7	74.00	34.3	PK
H	17966	28.3	54.00	25.7	AV
H	35069.9	62.47	74.00	11.53	PK
H	35069.9	50.25	54.00	3.75	AV
H	39836.1	61.25	74.00	12.75	PK
H	39836.1	48.56	54.00	5.44	AV
V	9551	41.8	74.00	32.2	PK
V	9551	29.5	54.00	24.5	AV
V	13537	40.8	74.00	33.2	PK
V	13537	28.7	54.00	25.3	AV
V	31817.8	56.67	74.00	17.33	PK
V	31817.8	47.56	54.00	6.44	AV
V	39637.6	59.69	74.00	14.31	PK
V	39637.6	48.15	54.00	5.85	AV

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

The emission was conducted from 40GHz to 100GHz

Antenna	Frequency (MHz)	Measured Level (dBm)	Antenna Gain (dBi)	Level@1m (dBuV/m)	Level@3m (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	48120	-58.2	23.50	89.204	79.662	88.0	8.338	PK
H	48120	-77.5	23.50	69.904	60.362	68.0	7.638	AV
H	72180	-56.8	23.46	94.166	84.623	88.0	3.377	PK
H	72180	-75.5	23.46	75.466	65.923	68.0	2.077	AV
H	96240	-57.3	23.32	96.305	86.762	88.0	1.238	PK
H	96240	-77.8	23.32	75.805	66.262	68.0	1.738	AV

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V	48120	-59.1	23.50	88.304	78.762	88.0	9.238	PK
V	48120	-77.9	23.50	69.504	59.962	68.0	8.038	AV
V	72180	-57.2	23.46	93.766	84.223	88.0	3.777	PK
V	72180	-76.8	23.46	74.166	64.623	68.0	3.377	AV
V	96240	-58.2	23.32	95.405	85.862	88.0	2.138	PK
V	96240	-78.3	23.32	75.305	65.762	68.0	2.238	AV

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

2. $\text{Level@1m} = 126.8 - 20\log(\lambda) + P - G$

where (According to ANSI 63.10 section 9.4):

E is the field strength of the emission at the measurement distance, in dBμV/m

P is the power measured at the output of the test antenna, in dBm

λ is the wavelength of the emission under investigation [300/fMHz], in m

G is the gain of the test antenna, in dBi

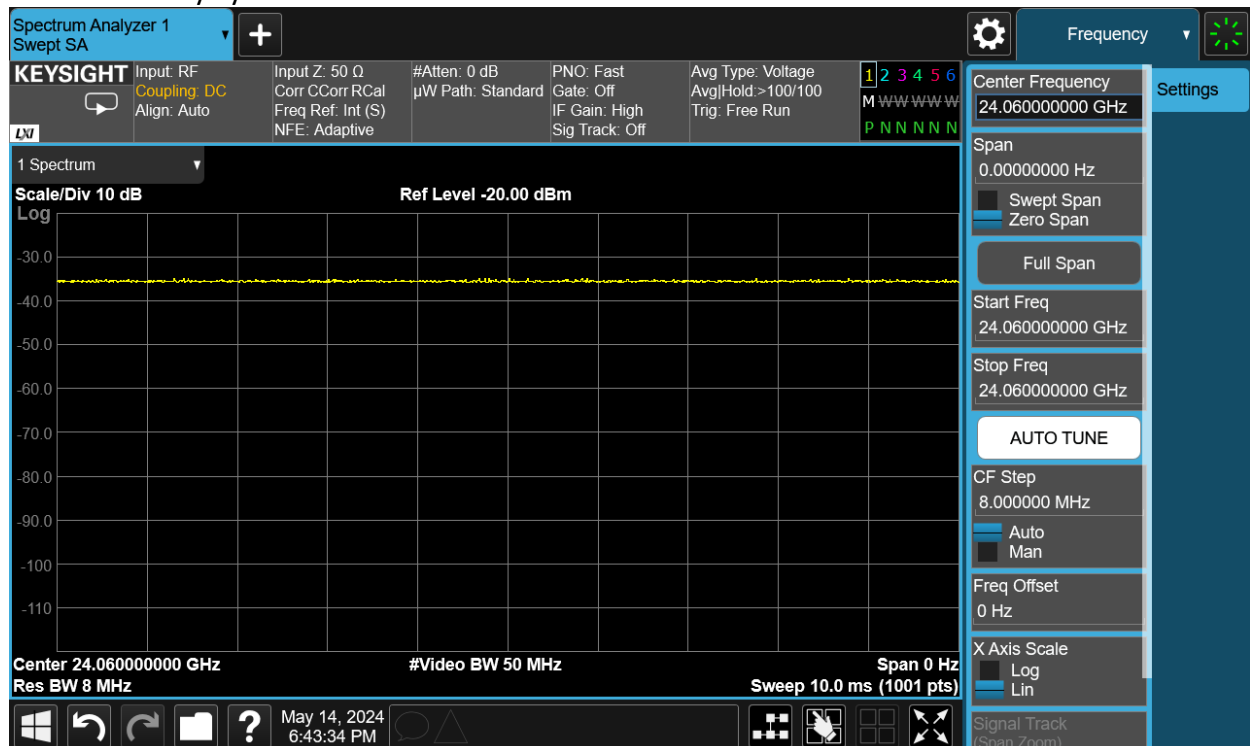
3. $\text{Margin} = \text{Limit} - \text{Level@1m}$

4. $\text{Level@3m} = \text{Level@1m} + 20\log(1\text{m}/3\text{m})$.

3.5 Duty Cycle:

The test data with maximum duty cycle was listed below.

The worst Duty cycle= 100%



4 Power line conducted emission

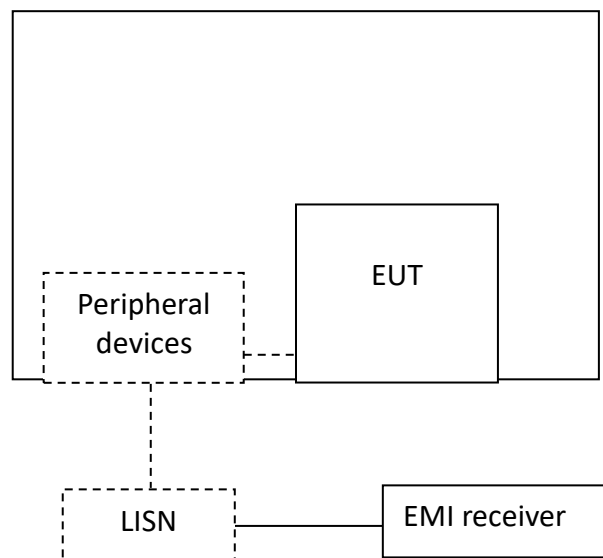
Test result: Pass

4.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

4.2 Test Configuration



4.3 Measurement Procedure

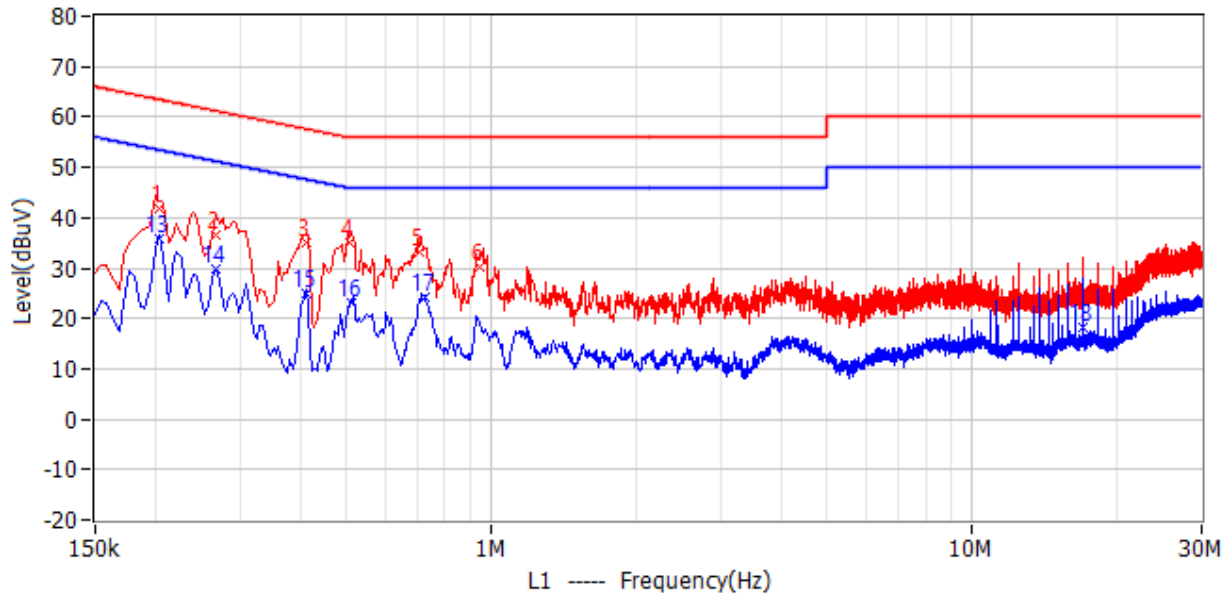
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

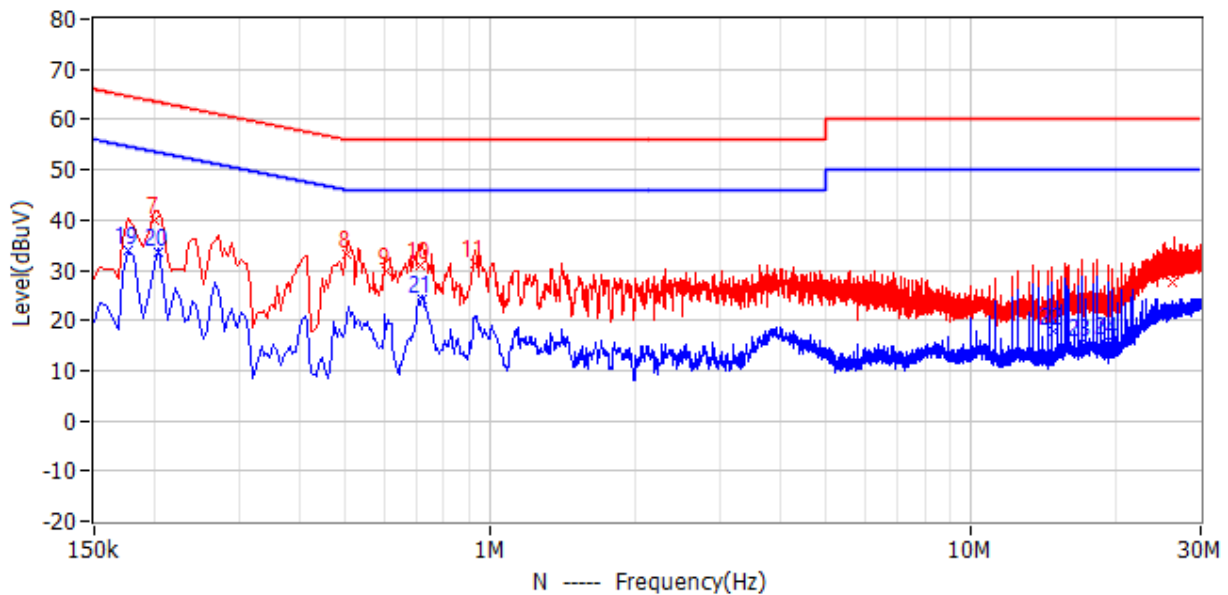
The bandwidth of the test receiver is set at 9 kHz.

4.4 Test Results of Power line conducted emission

L line



N line



TEST REPORT

Test Data:

No.	Frequency	Limit dBuV	Level dBuV	Margin dB	Reading dBuV	Factor dB	Detector	Phase
1	204.000kHz	63.4	41.9	21.5	35.7	6.2	QP	L1
2	267.000kHz	61.2	36.5	24.7	30.3	6.2	QP	L1
3	411.000kHz	57.6	35.0	22.7	28.8	6.2	QP	L1
4	505.500kHz	56.0	35.2	20.8	29.0	6.2	QP	L1
5	708.000kHz	56.0	33.1	22.9	26.9	6.2	QP	L1
6	946.500kHz	56.0	30.2	25.8	24.0	6.2	QP	L1
7	199.500kHz	63.6	39.9	23.7	33.7	6.2	QP	N
8	501.000kHz	56.0	33.3	22.7	27.1	6.2	QP	N
9	609.000kHz	56.0	30.0	26.0	23.8	6.2	QP	N
10	717.000kHz	56.0	31.1	24.9	24.9	6.2	QP	N
11	928.500kHz	56.0	31.4	24.6	25.2	6.2	QP	N
12	26.237MHz	60.0	27.7	32.3	20.2	7.5	QP	N
13	204.000kHz	53.4	35.7	17.7	29.5	6.2	AV	L1
14	267.000kHz	51.2	30.0	21.2	23.8	6.2	AV	L1
15	411.000kHz	47.6	25.0	22.7	18.8	6.2	AV	L1
16	510.000kHz	46.0	23.1	22.9	16.9	6.2	AV	L1
17	726.000kHz	46.0	24.3	21.7	18.1	6.2	AV	L1
18	17.030MHz	50.0	18.2	31.8	11.1	7.1	AV	L1
19	177.000kHz	54.6	34.1	20.5	28.0	6.1	AV	N
20	204.000kHz	53.4	33.7	19.7	27.5	6.2	AV	N
21	721.500kHz	46.0	24.1	21.9	17.9	6.2	AV	N
22	14.838MHz	50.0	17.8	32.2	10.9	6.9	AV	N
23	17.021MHz	50.0	15.7	34.3	8.6	7.1	AV	N
24	19.194MHz	50.0	15.9	34.1	8.7	7.2	AV	N

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

2. Level = Reading + Factor

3. Margin = Limit - Level

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

5 Assigned bandwidth (20dB bandwidth)

Test result: Pass

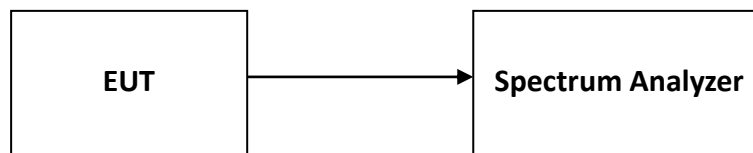
5.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

5.2 Measurement Procedure

The 20dB Bandwidth is measured using the Spectrum Analyzer.
Set Span = 2 times to 5 times the OBW, RBW = approximately 1 % to 5 % of the OBW,
 $VBW \geq 3 \cdot RBW$, Sweep = auto, Detector = peak, Trace = max hold.
The test was performed at one channels.

5.3 Test Configuration



5.4 The results

Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	F _L at 20dB BW (MHz)	F _H at 20dB BW (MHz)
24058	24057.108	24057.458	>24000	/
	24059.151	24059.663	/	<24250
Limit	N/A	N/A	F _L >24000	F _H <24250
Result	Complied			



6 Antenna requirement

Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:

EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

***** END *****