



FCC TEST REPORT

FCC Part 15 B

FCC ID:2AXECLD230EKS-FPN4

Report Number..... : ZKT-231225L0368E

Date of Test..... : Dec. 12, 2023 to Feb. 02, 2024

Date of issue..... : Feb. 02, 2024

Total number of pages..... : 16

Test Result : PASS

Testing Laboratory..... : **Shenzhen ZKT Technology Co., Ltd.**

Address : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name : **LG Display Co., Ltd.**

Address : LG TWIN TOWERS (EAST), 128, Yeoui-daero, Yeongdeungpo-gu, Seoul 07336, Republic of Korea

Manufacturer's name : **LG Display Co., Ltd.**

Address : LG TWIN TOWERS (EAST), 128, Yeoui-daero, Yeongdeungpo-gu, Seoul 07336, Republic of Korea

Test specification:

Standard..... : FCC Part 15 B, ANSI C63.4:2014

Test procedure..... : /

Non-standard test method : N/A

Test Report Form No..... : TRF-EL-117_V0

Test Report Form(s) Originator..... : ZKT Testing

Master TRF : Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ZKT, this document may be altered or revised by ZKT, personal only, and shall be noted in the revision of the document.

Product name..... : **ISS(interactive smart shelf)**

Trademark : LG Display

Model/Type reference..... : LD230EKS-FPN4

Ratings..... : Adapter Input:100-240V~50/60Hz
Adapter Output: DC12V, 3A



Testing procedure and testing location:

Testing Laboratory.....: **Shenzhen ZKT Technology Co., Ltd.**

Address.....: 1/F, No. 101, Building B, No. 6, Tangwei Community
Industrial Avenue, Fuhai Street, Bao'an District,
Shenzhen, China

Tested by (name + signature).....: **Jim Liu**

Reviewer (name + signature).....: **Jackson Fang**

Approved (name + signature).....: **Lake Xie**





TABLE OF CONTENT

	Page
1.VERSION	4
2.GENERAL INFORMATION	5
2.1 Description of Device (EUT)	5
2.2 Tested System Details	5
2.3 Test Facility	5
2.4 MEASUREMENT UNCERTAINTY	5
2.5 Test Instrument Used	6
3.CONDUCTED EMISSION AT THE MAINS TERMINALS TEST	8
3.1 Block Diagram Of Test Setup	8
3.2 Test Standard	8
3.3 Power Line Conducted Emission Limit	8
3.4 EUT Configuration on Test	8
3.5 Operating Condition of EUT	8
3.6 Test Procedure	8
3.7 Test Result	8
4.RADIATION EMISSION TEST	11
4.1 Block Diagram of Test Setup	11
4.2 Test Standard	11
4.3 Radiation Limit	11
4.4 EUT Configuration on Test	11
4.5 Operating Condition of EUT	11
4.6 Test Procedure	11
4.7 Test Result	11
5. TEST SETUP PHOTO	16
6. EUT CONSTRUCTIONAL DETAILS	16



1.VERSION

Report No.	Version	Description	Approved
ZKT-231225L0368E	Rev.01	Initial issue of report	Feb. 02, 2024



2.GENERAL INFORMATION

2.1 Description of Device (EUT)

EUT	: ISS(interactive smart shelf)
Model Number	: LD230EKS-FPN4
Trademark	: LG Display
Model Difference	: N/A
Power Supply	Adapter Input:100-240V~50/60Hz
	Adapter Output: DC12V, 3A

2.2 Tested System Details

None.

2.3 Test Facility

Site Description

Name of Firm	: Shenzhen ZKT Technology Co., Ltd.
Site Location	: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225
Designation Number: CN1299
IC Registered No.: 27033

2.4 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted Emission (150K-30MHZ)	3.20
Radiated disturbance30MHz-1000MHz	4.80
Radiated disturbance1GHz-6GHz	4.9



2.5 Test Instrument Used

Conducted emissions & Magnetic Emission & Disturbance power Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	N/A	Nov. 14, 2023	Nov. 13, 2024
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Nov. 02, 2023	Nov. 01, 2024
3	Test Cable	N/A	C-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
4	Test Cable	N/A	C-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
5	Test Cable	N/A	C-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
6	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Nov. 02, 2023	Nov. 01, 2024
7	Triple-Loop Antenna	N/A	RF300	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
8	Absorbing Clamp	DZ	ZN23201	15034	N/A	Nov. 07, 2023	Nov. 06, 2024
9	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

Radiation emissions& Radio Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	A.17.05	Nov. 02, 2023	Nov. 01, 2024
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Nov. 02, 2023	Nov. 01, 2024
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	100969	4.32	Nov. 02, 2023	Nov. 01, 2024
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	N/A	Nov. 13, 2023	Nov. 12, 2024
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Nov. 13, 2023	Nov. 12, 2024
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Nov. 13, 2023	Nov. 12, 2024
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Nov. 16, 2023	Nov. 15, 2024
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	60747	N/A	Nov. 02, 2023	Nov. 01, 2024
9	Amplifier (1GHz-26.5GHz)	HuiPu	8449B	3008A00315	N/A	Nov. 02, 2023	Nov. 01, 2024
10	Amplifier (500MHz-40GHz)	QuanJuDa	DLE-161	097	N/A	Nov. 02, 2023	Nov. 01, 2024
11	Test Cable	N/A	R-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
12	Test Cable	N/A	R-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
13	Test Cable	N/A	R-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
14	Test Cable	N/A	RF-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
15	Test Cable	N/A	RF-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024

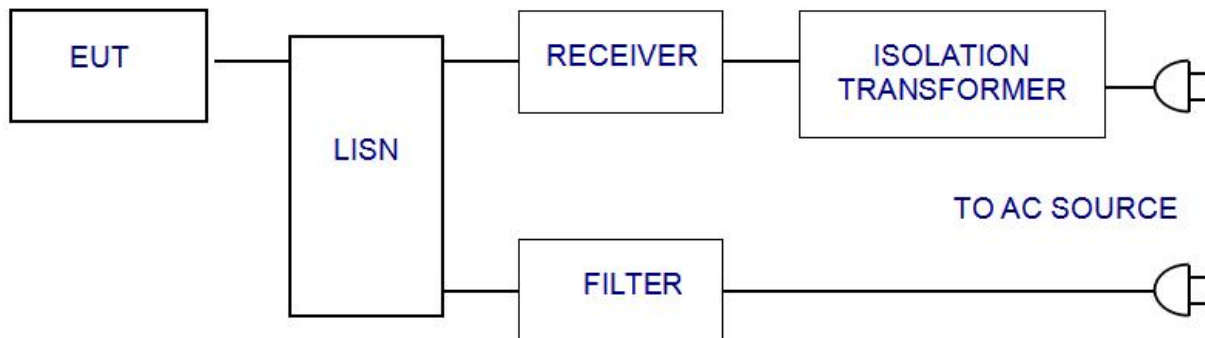


16	Test Cable	N/A	RF-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
17	ESG Signal Generator	Agilent	E4421B	N/A	B.03.84	Nov. 02, 2023	Nov. 01, 2024
18	Signal Generator	Agilent	N5182A	N/A	A.01.87	Nov. 02, 2023	Nov. 01, 2024
19	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	N/A	Nov. 16, 2023	Nov. 15, 2024
20	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Nov. 02, 2023	Nov. 01, 2024
21	MWRF Power Meter Test system	MW	MW100-RF CB	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
22	D.C. Power Supply	LongWei	TPR-6405D	N/A	N/A	\	\
23	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	N/A	\	\
24	RF Software	MW	MTS8310	V2.0.0.0	N/A	\	\
25	Turntable	MF	MF-7802BS	N/A	N/A	\	\
26	Antenna tower	MF	MF-7802BS	N/A	N/A	\	\



3.CONDUCTED EMISSION AT THE MAINS TERMINALS TEST

3.1 Block Diagram Of Test Setup



3.2 Test Standard

FCC PART 15 B

3.3 Power Line Conducted Emission Limit

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.4 EUT Configuration on Test

The following equipments are installed on conducted emission test to meet FCC PART 15 B requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT and simulators as shown in Section 3.1.

3.5.2 Turn on the power of all equipments.

3.5.3 Let the EUT work in test modes and test it.

3.6 Test Procedure

The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the **FCC PART 15 B** regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESCI) is set at 10KHz.

The frequency range from 150 KHz to 30 MHz is investigated.

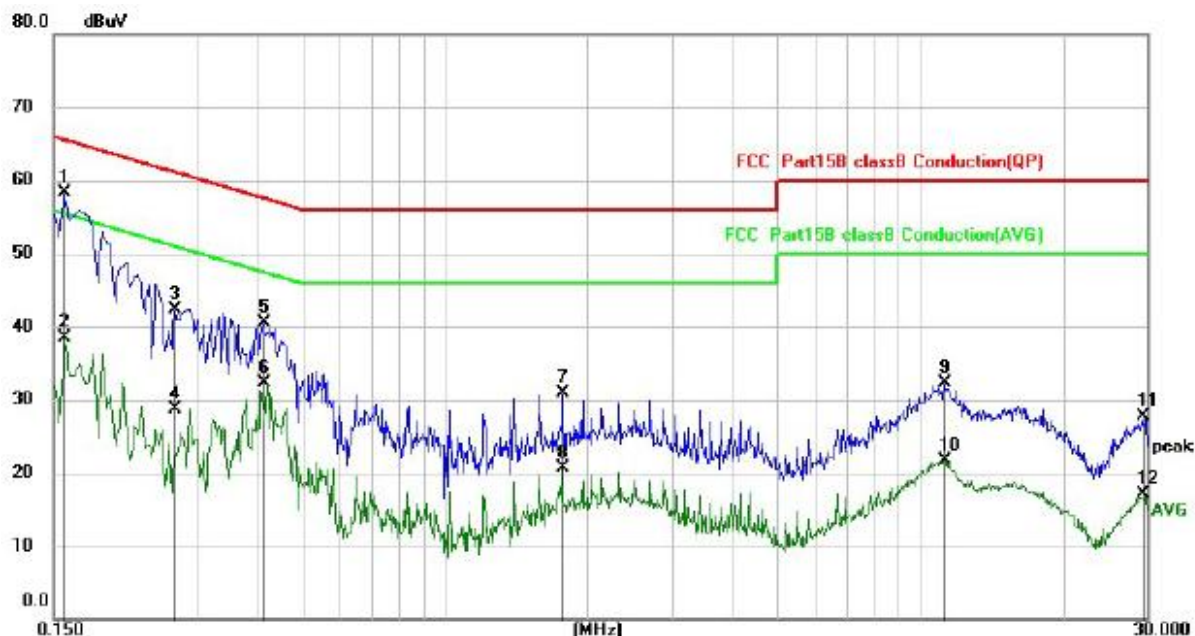
3.7 Test Result

PASS

Please refer to the following page.



Conducted Emission At The Mains Terminals Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Line
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



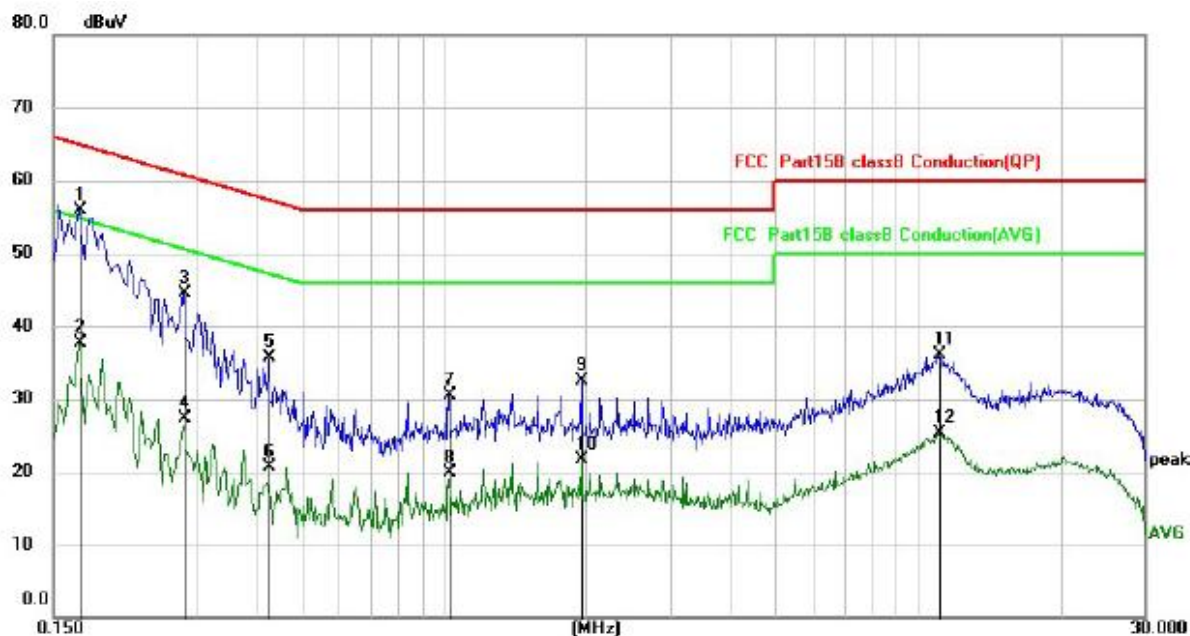
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1580	48.38	9.95	58.33	65.57	-7.24	QP
2		0.1580	28.54	9.95	38.49	55.57	-17.08	AVG
3		0.2700	32.42	9.96	42.38	61.12	-18.74	QP
4		0.2700	18.67	9.96	28.63	51.12	-22.49	AVG
5		0.4140	30.51	9.98	40.49	57.57	-17.08	QP
6		0.4140	22.28	9.98	32.26	47.57	-15.31	AVG
7		1.7660	20.86	10.07	30.93	56.00	-25.07	QP
8		1.7660	10.69	10.07	20.76	46.00	-25.24	AVG
9		11.2340	21.68	10.62	32.30	60.00	-27.70	QP
10		11.2340	11.14	10.62	21.76	50.00	-28.24	AVG
11		29.4060	16.22	11.39	27.61	60.00	-32.39	QP
12		29.4060	5.62	11.39	17.01	50.00	-32.99	AVG

Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Final Level = Reading level + Correct Factor
- 4.Correct Factor= Liss factor+ Cable loss factor + limiter factor
- 5.Margin= Measurement Level-Limit



Conducted Emission At The Mains Terminals Test Data			
Temperature:	24.5 °C	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Neutral
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1700	45.91	9.95	55.86	64.96	-9.10	QP
2		0.1700	27.77	9.95	37.72	54.96	-17.24	AVG
3		0.2819	34.50	9.96	44.46	60.76	-16.30	QP
4		0.2819	17.30	9.96	27.26	50.76	-23.50	AVG
5		0.4260	25.76	9.98	35.74	57.33	-21.59	QP
6		0.4260	10.79	9.98	20.77	47.33	-26.56	AVG
7		1.0220	20.52	10.01	30.53	56.00	-25.47	QP
8		1.0220	9.95	10.01	19.96	46.00	-26.04	AVG
9		1.9540	22.51	10.09	32.60	56.00	-23.40	QP
10		1.9540	11.55	10.09	21.64	46.00	-24.36	AVG
11		11.0700	25.42	10.61	36.03	60.00	-23.97	QP
12		11.0700	14.65	10.61	25.26	50.00	-24.74	AVG

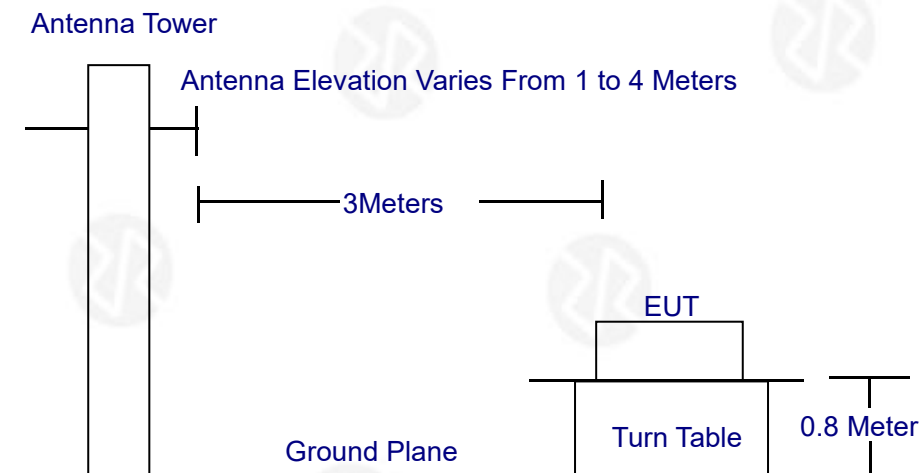
Notes:

- 1.An initial pre-scan was performed on the line and neutral lines with peak detector.
- 2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3.Final Level = Reading level + Correct Factor
- 4.Correct Factor= Liss factor+ Cable loss factor + limiter factor
- 5.Margin= Measurement Level-Limit



4.RADIATION EMISSION TEST

4.1 Block Diagram of Test Setup



4.2 Test Standard

FCC PART 15 B

4.3 Radiation Limit

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB μ V/m)
30 ~ 88	3	40.0
88 ~ 216	3	43.5
216 ~ 960	3	46.0
960 ~ 1000	3	54.0

4.4 EUT Configuration on Test

The FCC PART 15 B regulations test method must be used to find the maximum emission during radiated emission test. The configuration of EUT is the same as used in conducted emission test. Please refer to Section 2.2.

4.5 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.2 except the test set up replaced as Section 4.1.

4.6 Test Procedure

The EUT and its simulators are placed on a turned table that is 0.8 meter above the ground. The turned table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna that is mounted on the antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated biconical and log periodical antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on test. In order to find the maximum emission levels, the interface cable must be manipulated according to FCC PART 15 B on radiated emission test.

The bandwidth setting on the field strength meter (R&S Test Receiver ESCI) is set at 120KHz below 1GHz, set at 1MHz above 1GHz. The frequency range from 30MHz to 1000MHz is checked. The highest frequency of the internal sources of the EUT was below 108MHz, so the measurement was only made up to 1GHz.

4.7 Test Result

PASS

Please refer to the following page.



Radiation Emission Test Data			
Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		44.9006	30.90	-5.69	25.21	40.00	-14.79	QP
2		72.0843	28.15	-8.26	19.89	40.00	-20.11	QP
3		149.2239	35.94	-3.26	32.68	43.50	-10.82	QP
4	*	263.8190	41.54	-6.30	35.24	46.00	-10.76	QP
5		361.7139	35.02	-3.14	31.88	46.00	-14.12	QP
6		869.1302	27.02	6.73	33.75	46.00	-12.25	QP

Notes:

- 1.An initial pre-scan was performed on the peak detector.
- 2.Quasi-Peak measurement were performed at the frequencies with maximized peak emission.
- 3.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4.Final Level = Reading level + Correct Factor
- 5.Correct Factor= Antenna factor+ Cable loss factor - Amplifier factor
- 6.Margin= Measurement Level-Limit



Radiation Emission Test Data

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB	dBuV/m	dB/m	dB
1		45.6948	38.06	-5.83	32.23	40.00	-7.77
2		72.0843	32.21	-8.26	23.95	40.00	-16.05
3	*	149.2239	43.35	-3.26	40.09	43.50	-3.41
4		361.7139	30.91	-3.14	27.77	46.00	-18.23
5		650.7997	30.43	3.61	34.04	46.00	-11.96
6		884.5029	30.34	6.80	37.14	46.00	-8.86

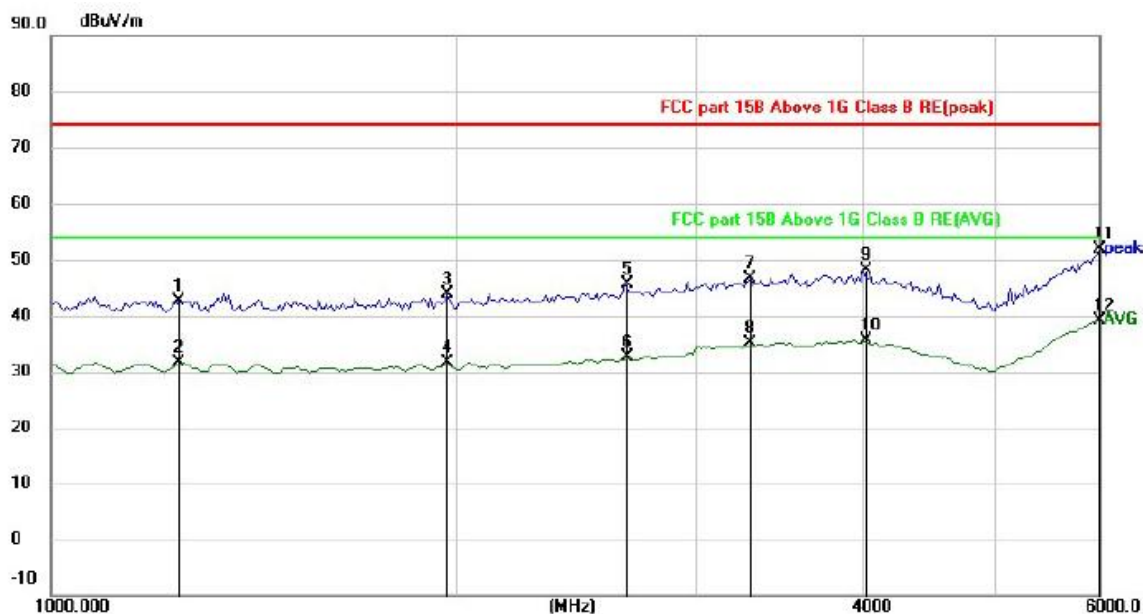
Notes:

1. An initial pre-scan was performed on the peak detector.
2. Quasi-Peak measurement were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Final Level = Reading level + Correct Factor
5. Correct Factor = Antenna factor + Cable loss factor - Amplifier factor
6. Margin = Measurement Level - Limit



Radiation Emission Test Data

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		1245.442	43.74	-1.05	42.69	74.00	-31.31	peak
2		1245.442	32.60	-1.05	31.55	54.00	-22.45	AVG
3		1966.763	42.97	1.03	44.00	74.00	-30.00	peak
4		1966.763	30.53	1.03	31.56	54.00	-22.44	AVG
5		2667.091	42.14	3.42	45.56	74.00	-28.44	peak
6		2667.091	29.28	3.42	32.70	54.00	-21.30	AVG
7		3306.861	41.28	5.28	46.56	74.00	-27.44	peak
8		3306.861	29.91	5.28	35.19	54.00	-18.81	AVG
9		4009.288	41.32	6.84	48.16	74.00	-25.84	peak
10		4009.288	28.72	6.84	35.56	54.00	-18.44	AVG
11		6000.000	39.56	12.24	51.80	74.00	-22.20	peak
12	*	6000.000	26.87	12.24	39.11	54.00	-14.89	AVG

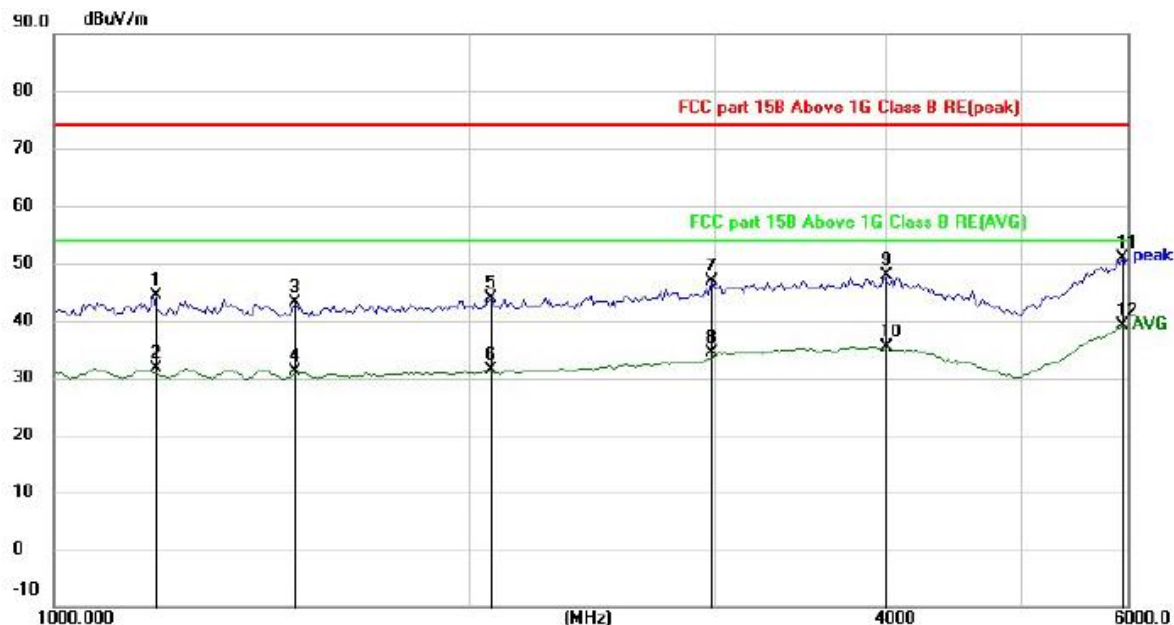
Notes:

1. An initial pre-scan was performed on the peak detector.
2. Quasi-Peak measurements were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not shown in the test report.
4. Final Level = Reading level + Correct Factor
5. Correct Factor = Antenna factor + Cable loss factor - Amplifier factor
6. Margin = Measurement Level - Limit



Radiation Emission Test Data

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Type C to USB +SD+ Earphone



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1180.264	45.63	-1.36	44.27	74.00	-29.73	peak
2		1180.264	32.98	-1.36	31.62	54.00	-22.38	AVG
3		1496.525	43.41	-0.39	43.02	74.00	-30.98	peak
4		1496.525	31.46	-0.39	31.07	54.00	-22.93	AVG
5		2075.375	42.55	1.39	43.94	74.00	-30.06	peak
6		2075.375	29.91	1.39	31.30	54.00	-22.70	AVG
7		2996.523	42.22	4.56	46.78	74.00	-27.22	peak
8		2996.523	29.87	4.56	34.43	54.00	-19.57	AVG
9		3991.369	40.91	6.86	47.77	74.00	-26.23	peak
10		3991.369	28.53	6.86	35.39	54.00	-18.61	AVG
11		5946.487	39.24	11.74	50.98	74.00	-23.02	peak
12	*	5946.487	27.50	11.74	39.24	54.00	-14.76	AVG

Notes:

1. An initial pre-scan was performed on the peak detector.
2. Quasi-Peak measurement were performed at the frequencies with maximized peak emission.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Final Level = Reading level + Correct Factor
5. Correct Factor = Antenna factor + Cable loss factor - Amplifier factor
6. Margin = Measurement Level - Limit



5. TEST SETUP PHOTO

Reference to the appendix III for details.

6. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

******* END OF REPORT *******