



FCC TEST REPORT

FCC Part 15 B

FCC ID:2AXECLD290EJS-FPN2

Report Number..... : ZKT-230506L3267E

Date of Test..... : Apr. 25, 2023 to May. 06, 2023

Date of issue..... : May. 06, 2023

Total number of pages..... : 21

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.

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

Trademark : LG Display

Model/Type reference..... : LD290EJS-FPN2

Ratings..... : Input: DC12V, 3A, 36W



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





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1.VERSION

Report No.	Version	Description	Approved
ZKT-230506L3267	Rev.01	Initial issue of report	May. 06, 2023



2.GENERAL INFORMATION

2.1 Description of Device (EUT)

EUT	ISS(interactive smart shelf)
Model Number	LD290EJS-FPN2
Trademark	LG Display
Model Difference	N/A
Power Supply	Input: DC12V, 3A, 36W

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	Oct. 21, 2022	Oct. 20, 2023
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Oct. 21, 2022	Oct. 20, 2023
3	Test Cable	N/A	C-01	N/A	N/A	Oct. 21, 2022	Oct. 20, 2023
4	Test Cable	N/A	C-02	N/A	N/A	Oct. 21, 2022	Oct. 20, 2023
5	Test Cable	N/A	C-03	N/A	N/A	Oct. 21, 2022	Oct. 20, 2023
6	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Oct. 28, 2022	Oct. 27, 2023
7	Triple-Loop Antenna	N/A	RF300	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
8	Absorbing Clamp	DZ	ZN23201	15034	N/A	Oct. 31, 2022	Oct. 30, 2023
9	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

Radiation 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	Oct. 28, 2022	Oct. 27, 2023
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Oct. 28, 2022	Oct. 27, 2023
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	4.32	Oct. 28, 2022	Oct. 27, 2023
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	N/A	Nov. 02, 2022	Nov. 01, 2023
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Nov. 01, 2022	Oct. 31, 2023
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Oct. 28, 2022	Oct. 27, 2023
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Nov. 01, 2022	Oct. 31, 2023
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	060747	N/A	Nov. 15, 2022	Nov. 14, 2023
9	Amplifier (1GHz-26.5GHz)	Agilent	8449B	3008A00315	N/A	Oct. 28, 2022	Oct. 27, 2023
10	Amplifier (500MHz-40GHz)	全聚达	DLE-161	097	N/A	Oct. 28, 2022	Oct. 27, 2023
11	Test Cable	N/A	R-01	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
12	Test Cable	N/A	R-02	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
13	Test Cable	N/A	R-03	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
14	Test Cable	N/A	RF-01	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
15	Test Cable	N/A	RF-02	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023

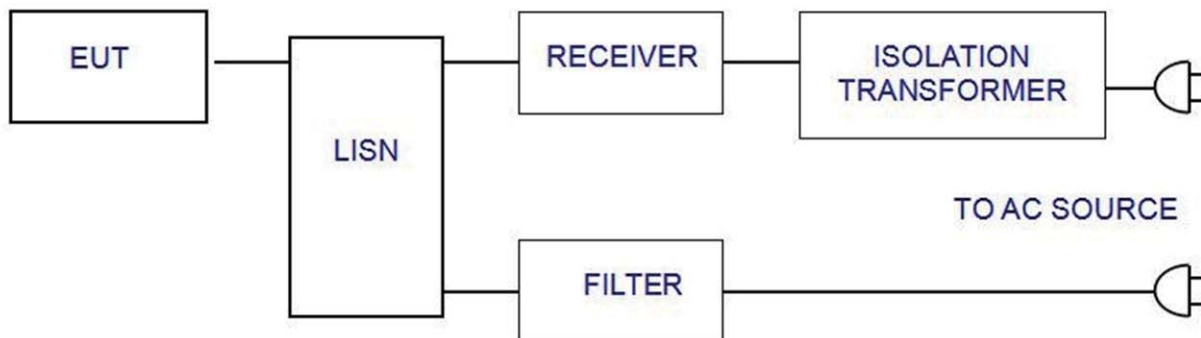


16	Test Cable	N/A	RF-03	N/A	N/A	Oct. 28, 2022	Oct. 27, 2023
17	ESG Signal Generator	Agilent	E4421B	N/A	B.03.84	Oct. 21, 2022	Oct. 20, 2023
18	Signal Generator	Agilent	N5182A	N/A	A.01.87	Oct. 21, 2022	Oct. 20, 2023
19	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	N/A	Nov. 15, 2022	Nov. 14, 2023
20	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Oct. 28, 2022	Oct. 27, 2023
21	MWRF Power Meter Test system	MW	MW100-RF CB	N/A	N/A	Oct. 21, 2022	Oct. 20, 2023
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.

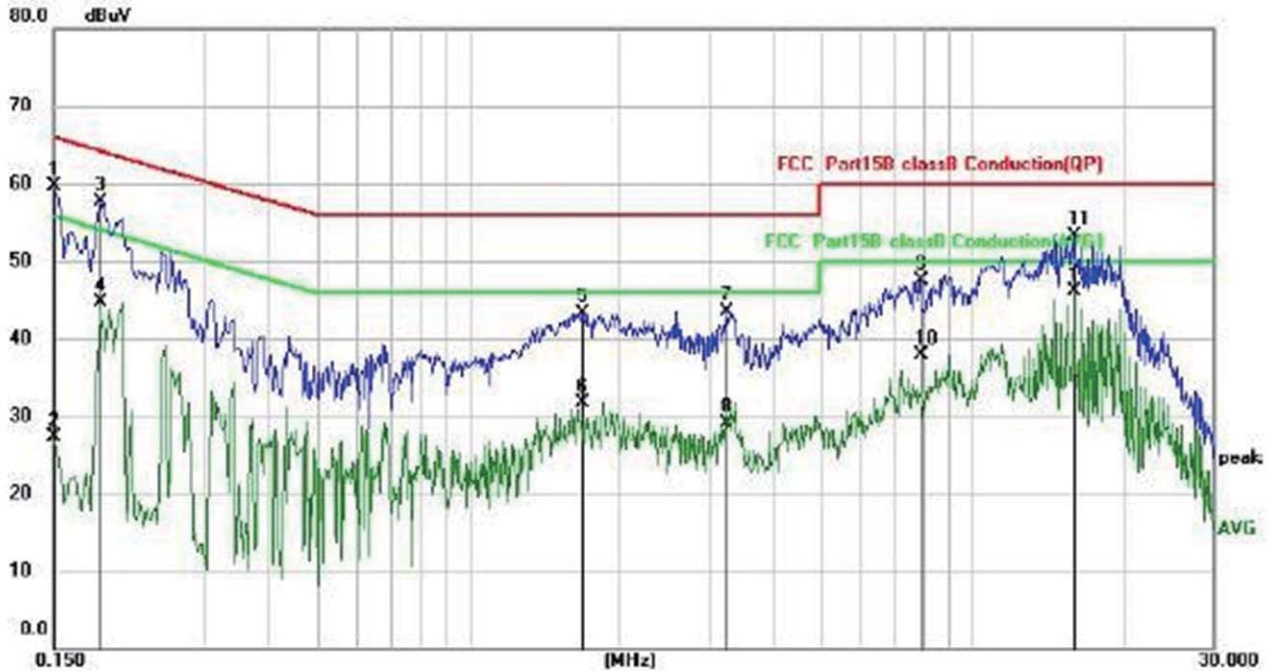
3.7 Test Result

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:	Charging & USB &HDMI



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV	dBuV	dB	
1		0.1500	49.62	10.01	59.63	66.00	-6.37	QP
2		0.1500	17.33	10.01	27.34	56.00	-28.66	AVG
3		0.1859	47.67	10.01	57.68	64.22	-6.54	QP
4		0.1859	34.63	10.01	44.64	54.22	-9.58	AVG
5		1.6814	33.26	10.01	43.27	56.00	-12.73	QP
6		1.6814	21.65	10.01	31.66	46.00	-14.34	AVG
7		3.2540	33.49	10.09	43.58	56.00	-12.42	QP
8		3.2540	18.92	10.09	29.01	46.00	-16.99	AVG
9		7.8619	37.23	10.27	47.50	60.00	-12.50	QP
10		7.8619	27.67	10.27	37.94	50.00	-12.06	AVG
11		15.9500	42.89	10.48	53.37	60.00	-6.63	QP
12	*	15.9500	35.53	10.48	46.01	50.00	-3.99	AVG

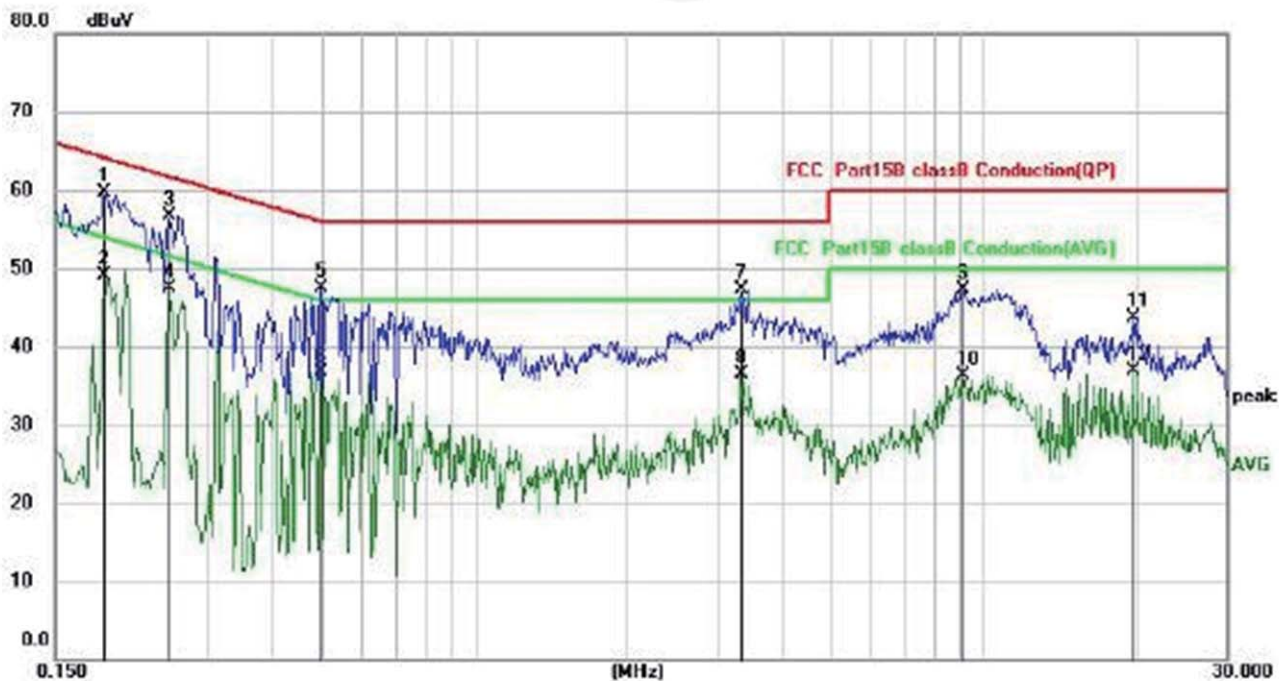
Notes:

- 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:	Charging & USB &HDMI



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1864	49.60	10.01	59.61	64.20	-4.59	QP
2		0.1864	39.08	10.01	49.09	54.20	-5.11	AVG
3		0.2508	46.67	10.00	56.67	61.73	-5.06	QP
4	*	0.2508	37.46	10.00	47.46	51.73	-4.27	AVG
5		0.4979	37.53	9.97	47.50	56.03	-8.53	QP
6		0.4979	26.69	9.97	36.66	46.03	-9.37	AVG
7		3.3380	37.13	10.09	47.22	56.00	-8.78	QP
8		3.3380	26.45	10.09	36.54	46.00	-9.46	AVG
9		9.0859	37.04	10.32	47.36	60.00	-12.64	QP
10		9.0859	26.03	10.32	36.35	50.00	-13.65	AVG
11		19.6659	33.24	10.56	43.80	60.00	-16.20	QP
12		19.6659	26.44	10.56	37.00	50.00	-13.00	AVG

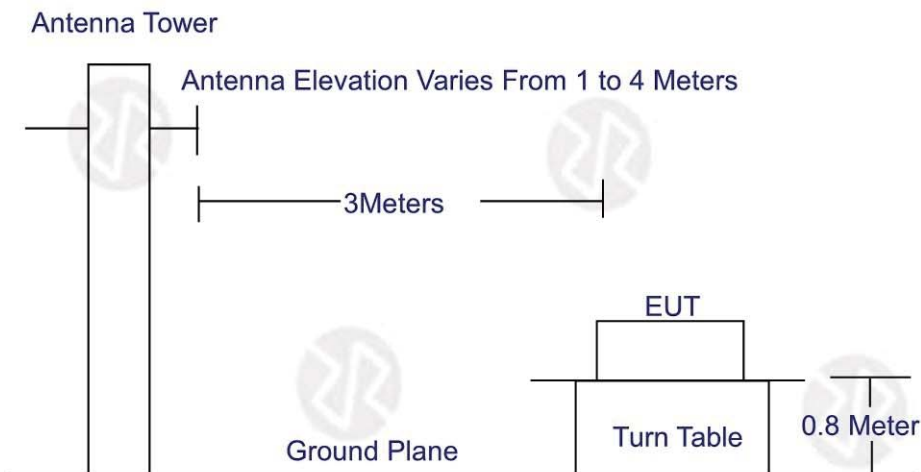
Notes:

- 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:	Charging & USB &HDMI



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		45.6946	38.13	-6.56	31.57	40.00	-8.43	QP
2		97.1148	45.81	-9.82	35.99	43.50	-7.51	QP
3		147.9214	41.73	-5.47	36.26	43.50	-7.24	QP
4		282.9849	37.14	-6.27	30.87	46.00	-15.13	QP
5		446.4139	36.66	-1.40	35.26	46.00	-10.74	QP
6	*	762.0384	36.26	5.05	41.31	46.00	-4.69	QP

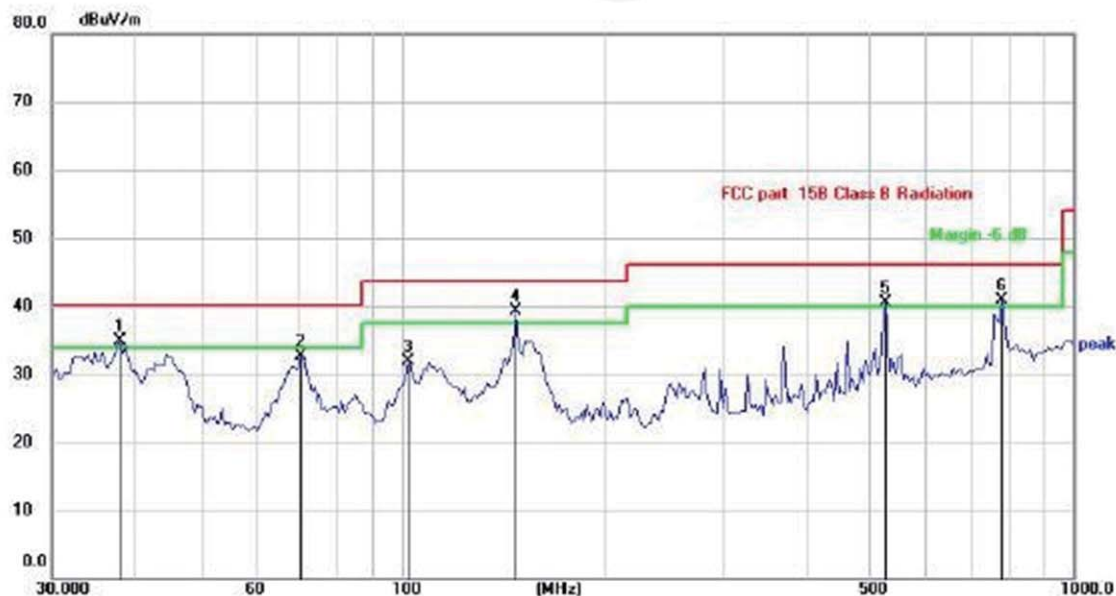
Notes:

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:	Charging & USB &HDMI



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV/m	dB/m	dB	
1	!	38.0114	41.48	-6.53	34.95	40.00	-5.05	QP
2		70.8315	41.93	-9.20	32.73	40.00	-7.27	QP
3		102.3596	41.42	-9.46	31.96	43.50	-11.54	QP
4	*	147.9214	44.77	-5.47	39.30	43.50	-4.20	QP
5	!	527.3202	39.87	0.69	40.56	46.00	-5.44	QP
6	!	782.3451	35.44	5.44	40.88	46.00	-5.12	QP

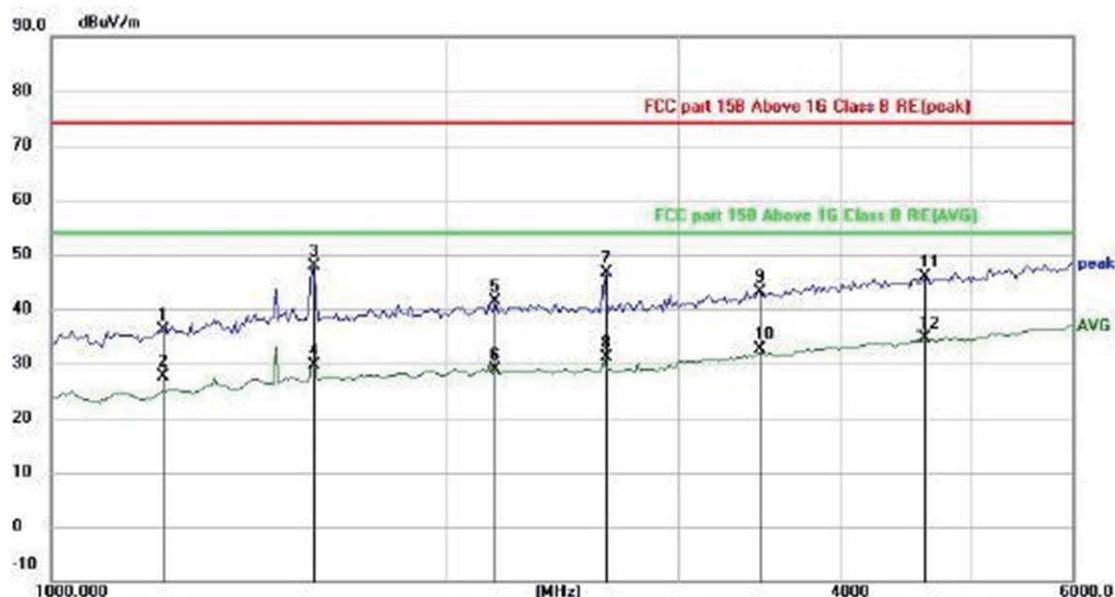
Notes:

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 :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Charging & USB &HDMI



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1212.415	43.60	-7.56	36.04	74.00	-37.96	peak
2		1212.415	35.11	-7.56	27.55	54.00	-26.45	AVG
3		1579.169	51.78	-3.88	47.90	74.00	-26.10	peak
4		1579.169	33.56	-3.88	29.68	54.00	-24.32	AVG
5		2180.197	42.51	-1.08	41.43	74.00	-32.57	peak
6		2180.197	29.87	-1.08	28.79	54.00	-25.21	AVG
7		2643.304	46.68	-0.10	46.58	74.00	-27.42	peak
8		2643.304	31.29	-0.10	31.19	54.00	-22.81	AVG
9		3473.882	40.63	2.62	43.25	74.00	-30.75	peak
10		3473.882	30.03	2.62	32.65	54.00	-21.35	AVG
11		4627.211	39.66	6.27	45.93	74.00	-28.07	peak
12	*	4627.211	28.36	6.27	34.63	54.00	-19.37	AVG

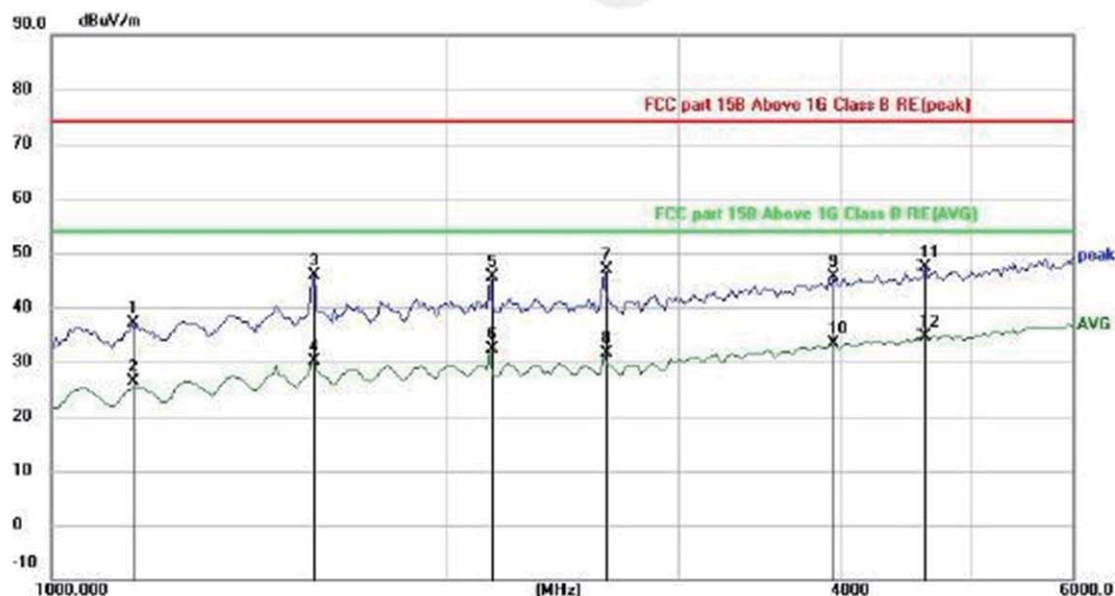
Notes:

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 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:	Charging & USB &HDMI



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1154.123	45.19	-8.13	37.06	74.00	-36.94	peak
2		1154.123	34.61	-8.13	26.48	54.00	-27.52	AVG
3		1586.258	49.77	-3.84	45.93	74.00	-28.07	peak
4		1586.258	33.92	-3.84	30.08	54.00	-23.92	AVG
5		2160.753	46.74	-1.12	45.62	74.00	-28.38	peak
6		2160.753	33.40	-1.12	32.28	54.00	-21.72	AVG
7		2643.304	47.02	-0.10	46.92	74.00	-27.08	peak
8		2643.304	31.85	-0.10	31.75	54.00	-22.25	AVG
9		3955.770	41.06	4.62	45.68	74.00	-28.32	peak
10		3955.770	28.76	4.62	33.38	54.00	-20.62	AVG
11		4627.211	41.17	6.27	47.44	74.00	-26.56	peak
12	*	4627.211	28.45	6.27	34.72	54.00	-19.28	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.EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2





EUT Photo 3



EUT Photo 4





EUT Photo 5



EUT Photo 6





EUT Photo 7



EUT Photo 8



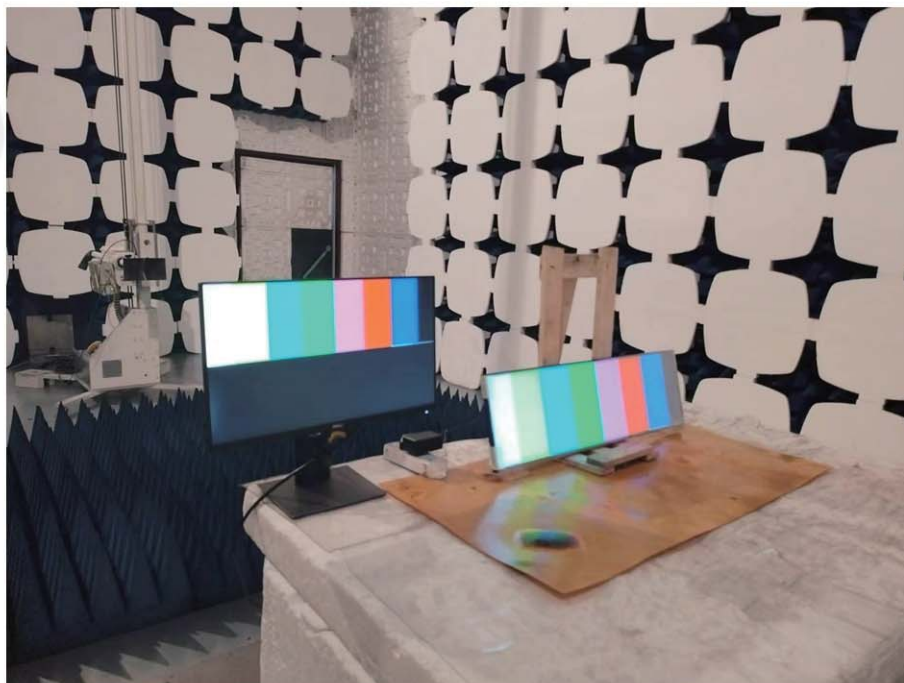


6.EUT TEST PHOTOGRAPHS

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CE



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