

FCC TEST REPORT

FCC ID:2AXECLD230EKS-FPN2

Report Number..... : ZKT-211021L5583E

Date of Test..... Sep. 23, 2021 to Dec. 13, 2021

Date of issue : Dec. 14, 2021

Total number of pages 30

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 :
LD230EKS-FPN2

Ratings..... : Input: AC 100-240V-50/60Hz 1.0A Max
Output: DC 12.0V 3.0A 36.0W

Testing procedure and testing location:

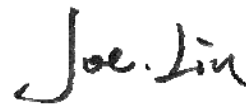
Testing Laboratory.....: **Shenzhen ZKT Technology Co., Ltd.**

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

Tested by (name + signature): **Alen He**



Reviewer (name + signature).....: **Joe Liu**



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



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1.VERSION

Report No.	Version	Description	Approved
ZKT-211021L5583E	Rev.01	Initial issue of report	Dec. 14, 2021

2.GENERAL INFORMATION

2.1 Description of Device (EUT)

EUT : ISS(interactive smart shelf)

Trademark : LG Display

Model Number : LD230EKS-FPN2

Model Difference : -

Power Supply : Input: AC 100-240V-50/60Hz 1.0A Max
Output: DC 12.0V 3.0A 36.0W

2.2 Tested auxiliary equipment

OUTSIDE SUPPORT EQUIPMENT						
N o.	Equipment	Model	Serial No.	Trade name	Data Cable	Power Cord
1	AC adaptor	GQ36-120300-AU	/	/	1m	Yes
2	Monitor	HA45NM140	/	DELL	/	Yes
3	HDMI Cable	spiron5570	/	/	1m	No
4	USB flash drive	USB25630	/	Kingston	1m	No
5	Micro USB cable	/				

2.3 Test Facility

Shenzhen ZKT Technology Co., Ltd.

Add. : 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

2.5 Test Instrument Used

Conducted emissions Test

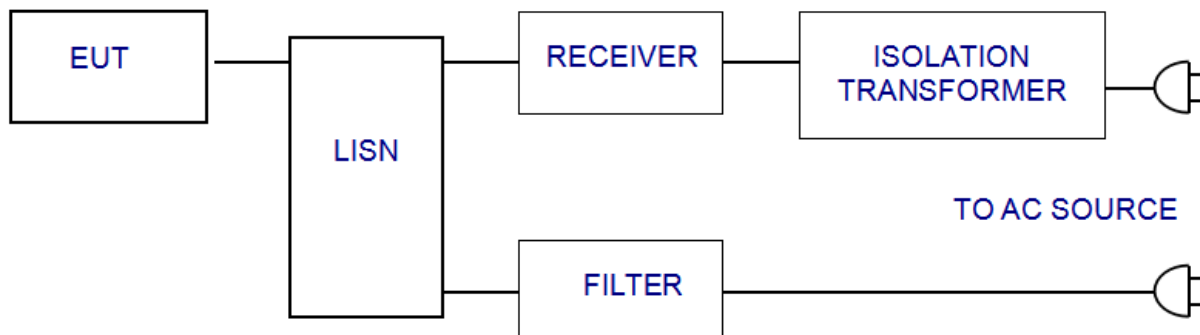
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Sep. 21, 2021	Sep. 20, 2022
2	LISN	CYBERTEK	EM5040A	E1850400149	Sep. 21, 2021	Sep. 20, 2022
3	Test Cable	N/A	C01	N/A	Sep. 21, 2021	Sep. 20, 2022
4	Test Cable	N/A	C02	N/A	Sep. 21, 2021	Sep. 20, 2022
5	EMI Test Receiver	R&S	ESRP3	101946	Sep. 21, 2021	Sep. 20, 2022
6	Absorbing Clamp	DZ	ZN23201	N/A	Sep. 21, 2021	Sep. 20, 2022

Radiated emissions Test (966 chamber)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Bilog Antenna	Schwarzbeck	VULB9168	00877	Sep. 21, 2021	Sep. 20, 2022
2	Loop Antenna	SCHWARZBECK	FMZB1519B	014	Sep. 21, 2021	Sep. 20, 2022
3	Test Cable	N/A	R-01	N/A	Sep. 21, 2021	Sep. 20, 2022
4	Test Cable	N/A	R-02	N/A	Sep. 21, 2021	Sep. 20, 2022
5	EMI Test Receiver	R&S	ESCI7	101169	Sep. 21, 2021	Sep. 20, 2022
6	Antenna Mast	EM	SC100_1	N/A	N/A	N/A
7	Turn Table	EM	SC100	N/A	N/A	N/A
8	Spectrum Analyzer	KEYSIGHT	9020A	MY5537083 5	Sep. 21, 2021	Sep. 20, 2022
9	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	1541	Sep. 21, 2021	Sep. 20, 2022
10	Horn Antenna (18GHz-40GHz)	A.H. System	SAS-574	588	Sep. 21, 2021	Sep. 20, 2022
11	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	N/A	Sep. 21, 2021	Sep. 20, 2022
12	Amplifier (1GHz-40GHz)	全聚达	DLE-161	097	Sep. 21, 2021	Sep. 20, 2022

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

For Class A devices:

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60

For Class B devices:

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.

3.5.4 See the table below for specific test modes

Test Mode	Description	Test voltage
Mode 1	Micro HDMI Output Display+ Micro USB Data Exchange	AC 120V/60Hz* AC 230V/50Hz
Mode 2	WIFI Link+ BT Link	AC 120V/60Hz AC 230V/50Hz
All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, (*)the worst data were recorded and reported.		

3.6 Test Procedure

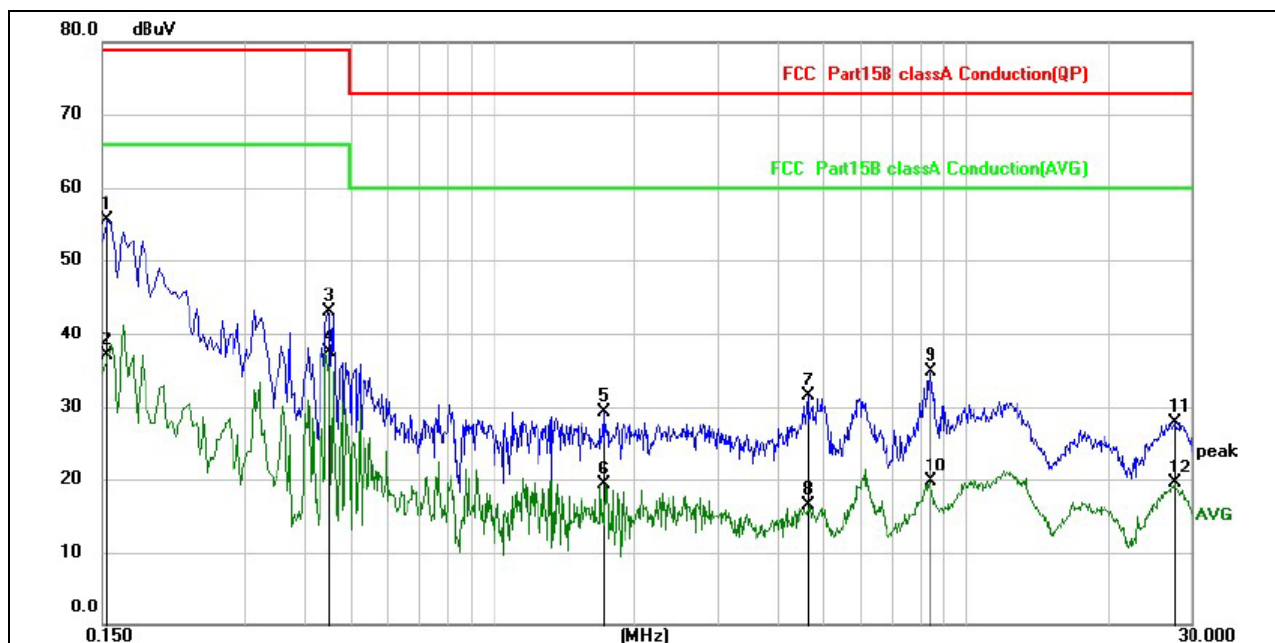
The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the **FCC PART 15 B** regulations during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

Temperature:	24℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1

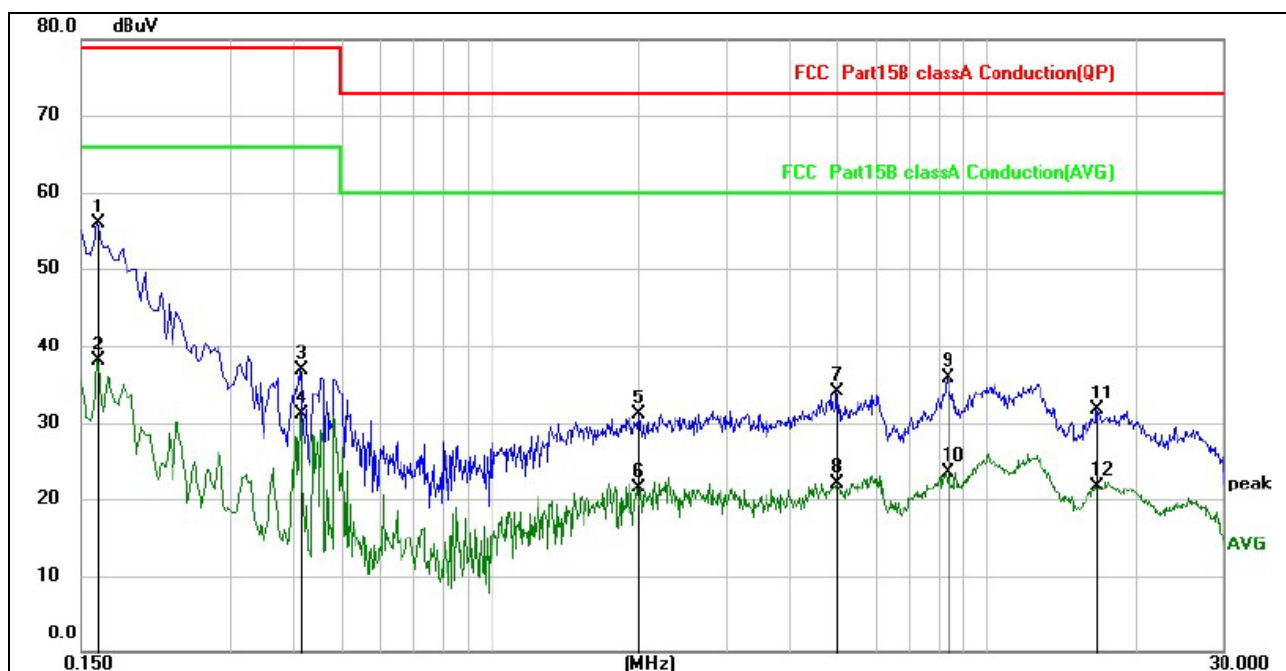


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1	*	0.1539	45.60	9.96	55.56	79.00	-23.44	QP
2		0.1539	27.14	9.96	37.10	66.00	-28.90	AVG
3		0.4500	33.06	9.96	43.02	79.00	-35.98	QP
4		0.4500	27.64	9.96	37.60	66.00	-28.40	AVG
5		1.7180	19.25	10.00	29.25	73.00	-43.75	QP
6		1.7180	9.27	10.00	19.27	60.00	-40.73	AVG
7		4.6500	21.44	10.15	31.59	73.00	-41.41	QP
8		4.6500	6.42	10.15	16.57	60.00	-43.43	AVG
9		8.3700	24.26	10.59	34.85	73.00	-38.15	QP
10		8.3700	9.04	10.59	19.63	60.00	-40.37	AVG
11		27.6500	16.74	11.26	28.00	73.00	-45.00	QP
12		27.6500	8.29	11.26	19.55	60.00	-40.45	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. Measurement Level = Reading level + Correct Factor

Temperature:	24°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1



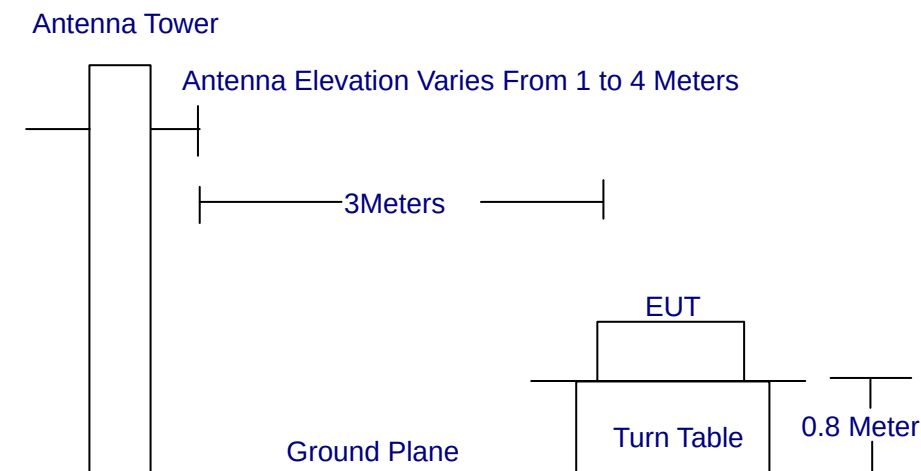
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector
1	*	0.1620	45.85	9.96	55.81	79.00	-23.19	QP
2		0.1620	28.07	9.96	38.03	66.00	-27.97	AVG
3		0.4140	27.00	9.96	36.96	79.00	-42.04	QP
4		0.4140	21.21	9.96	31.17	66.00	-34.83	AVG
5		1.9980	21.19	10.01	31.20	73.00	-41.80	QP
6		1.9980	11.43	10.01	21.44	60.00	-38.56	AVG
7		4.9820	23.97	10.17	34.14	73.00	-38.86	QP
8		4.9820	11.95	10.17	22.12	60.00	-37.88	AVG
9		8.3340	25.39	10.59	35.98	73.00	-37.02	QP
10		8.3340	13.00	10.59	23.59	60.00	-36.41	AVG
11		16.6780	20.62	11.03	31.65	73.00	-41.35	QP
12		16.6780	10.60	11.03	21.63	60.00	-38.37	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. Measurement Level = Reading level + Correct Factor

4. RADIATION EMISSION TEST

4.1 Block Diagram of Test Setup



4.2 Test Standard

FCC PART 15 B

4.3 Radiation Limit

For Class A devices:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dB μ V/m)
30 ~ 88	3	49.0
88 ~ 216	3	54.0
216 ~ 960	3	56.0
960 ~ 1000	3	60.0

For Class B devices:

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.

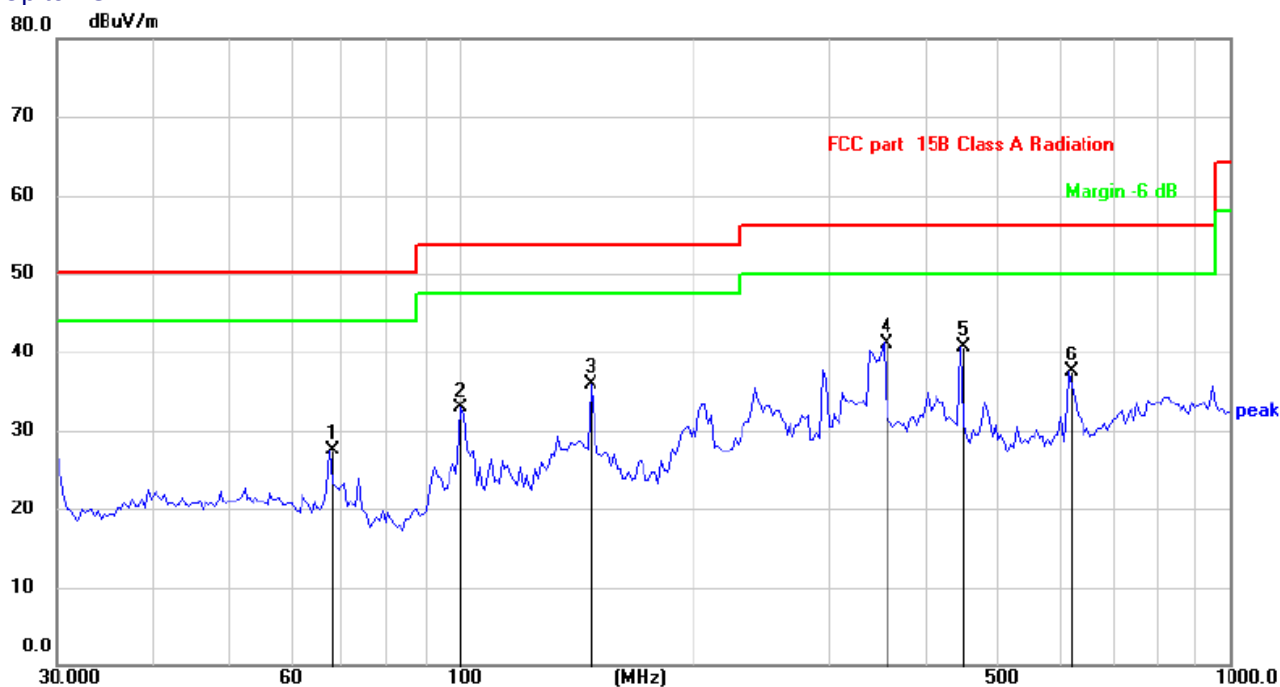
4.7 Test Result

PASS

Please refer to the following page.

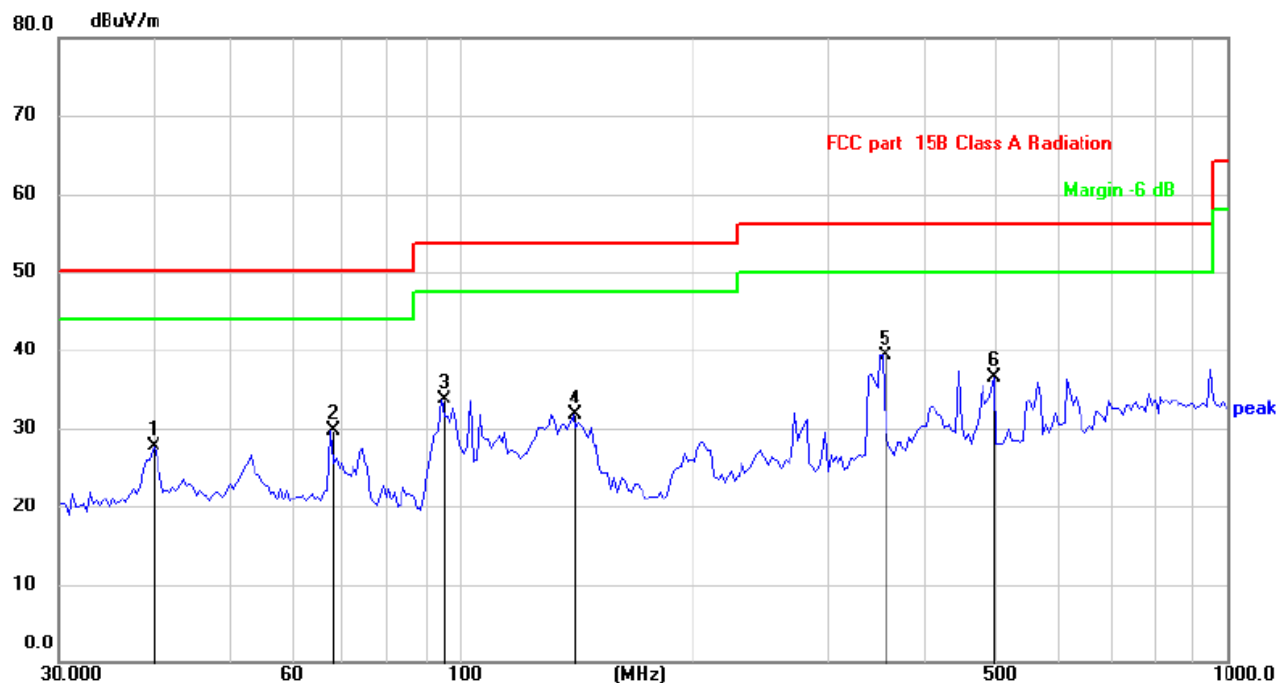
Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1

Up to 1GHz:



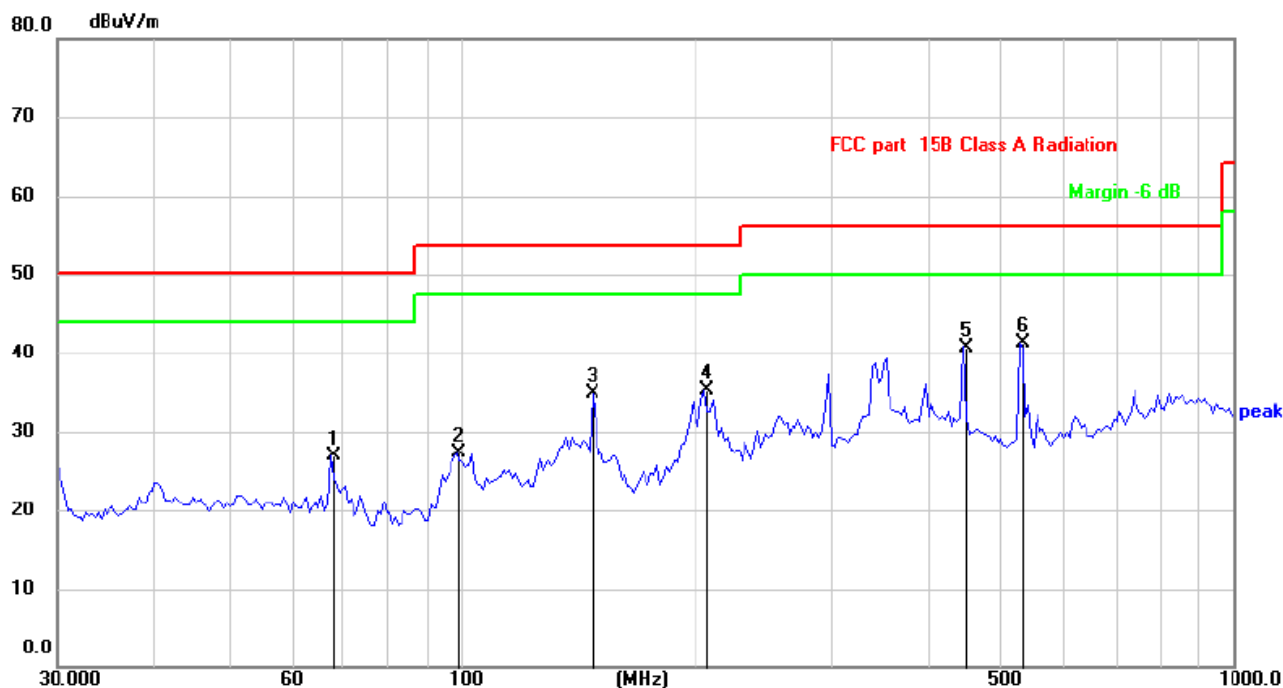
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		67.7939	35.12	-7.54	27.58	50.00	-22.42	QP
2		100.5806	41.57	-8.60	32.97	53.50	-20.53	QP
3		147.9214	41.33	-5.49	35.84	53.50	-17.66	QP
4	*	355.4273	44.46	-3.26	41.20	56.00	-14.80	QP
5		446.4141	41.35	-0.57	40.78	56.00	-15.22	QP
6		617.4534	34.78	2.81	37.59	56.00	-18.41	QP

Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		40.0644	33.00	-5.27	27.73	50.00	-22.27	QP
2		67.7939	37.18	-7.54	29.64	50.00	-20.36	QP
3		94.5941	42.95	-9.23	33.72	53.50	-19.78	QP
4		140.3421	37.05	-5.44	31.61	53.50	-21.89	QP
5	*	355.4273	42.55	-3.26	39.29	56.00	-16.71	QP
6		495.9344	35.89	0.61	36.50	56.00	-19.50	QP

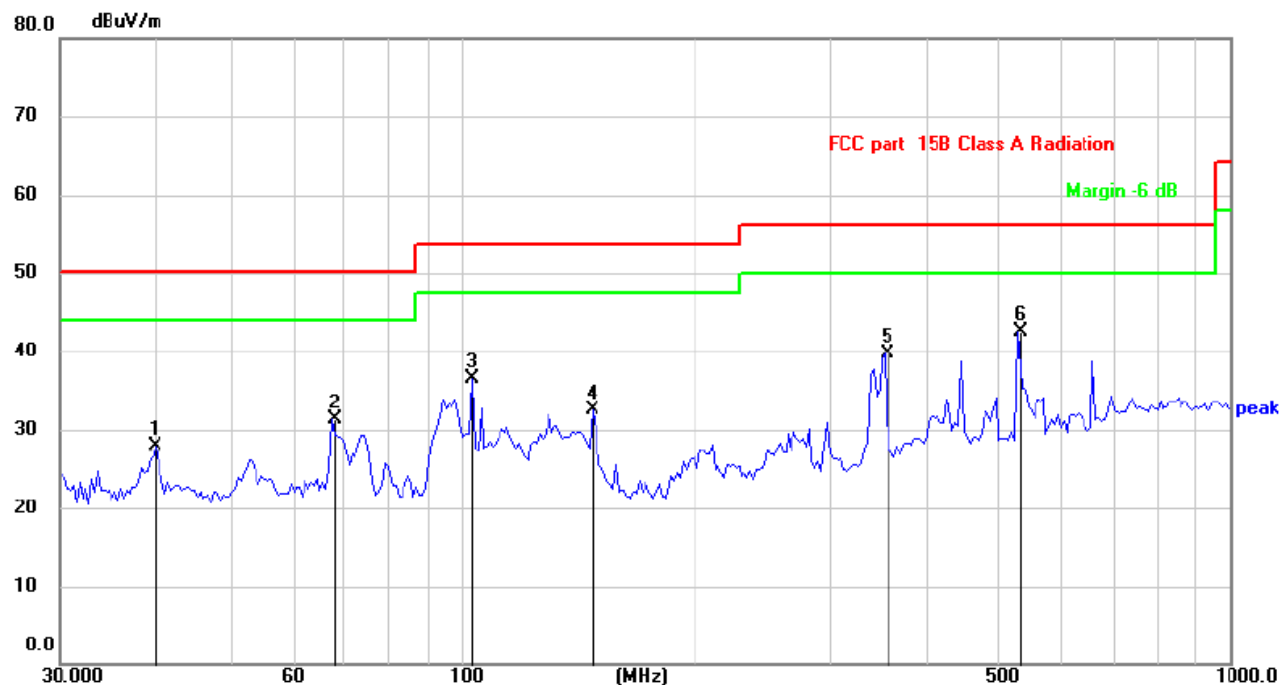
Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode2



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		67.7939	34.44	-7.54	26.90	50.00	-23.10	QP
2		98.8326	35.99	-8.77	27.22	53.50	-26.28	QP
3		147.9214	40.36	-5.49	34.87	53.50	-18.63	QP
4		206.3976	43.17	-7.77	35.40	53.50	-18.10	QP
5		446.4141	41.37	-0.57	40.80	56.00	-15.20	QP
6	*	527.3205	39.99	1.22	41.21	56.00	-14.79	QP

Radiation Emission Test Data

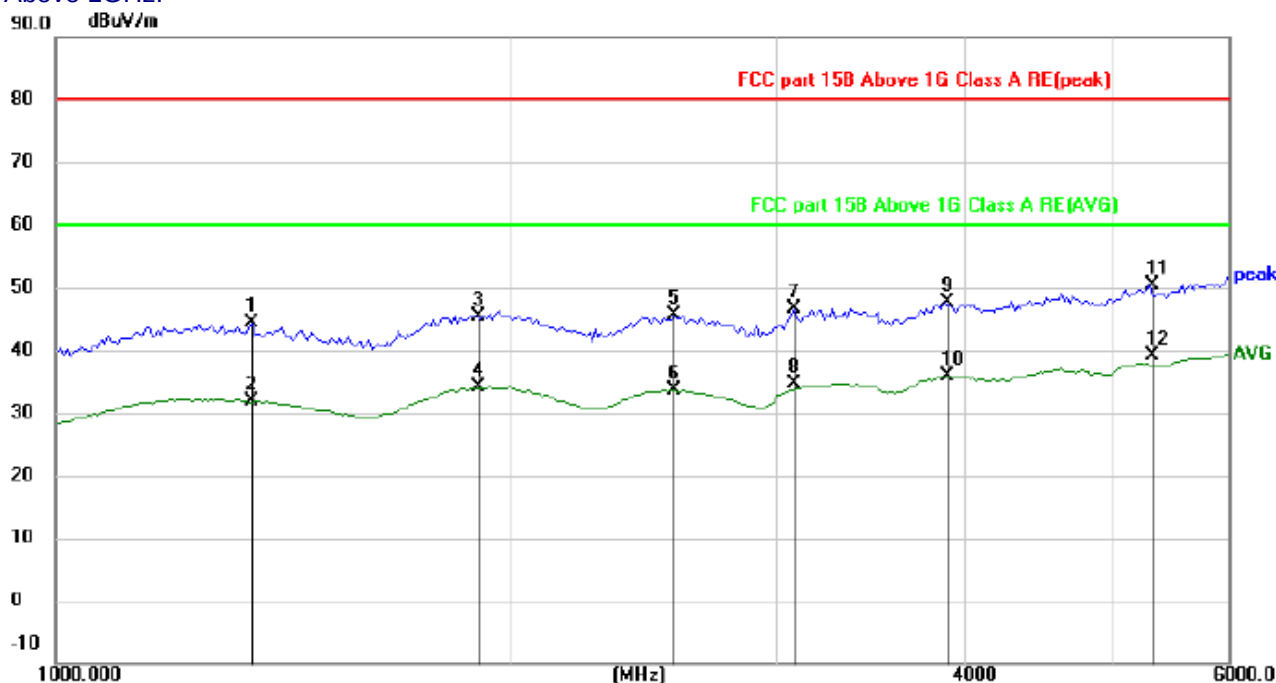
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode2



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		40.0644	33.15	-5.27	27.88	50.00	-22.12	QP
2		67.7939	38.89	-7.54	31.35	50.00	-18.65	QP
3		103.2609	44.95	-8.43	36.52	53.50	-16.98	QP
4		147.9214	38.03	-5.49	32.54	53.50	-20.96	QP
5		355.4273	42.88	-3.26	39.62	56.00	-16.38	QP
6	*	527.3205	41.26	1.22	42.48	56.00	-13.52	QP

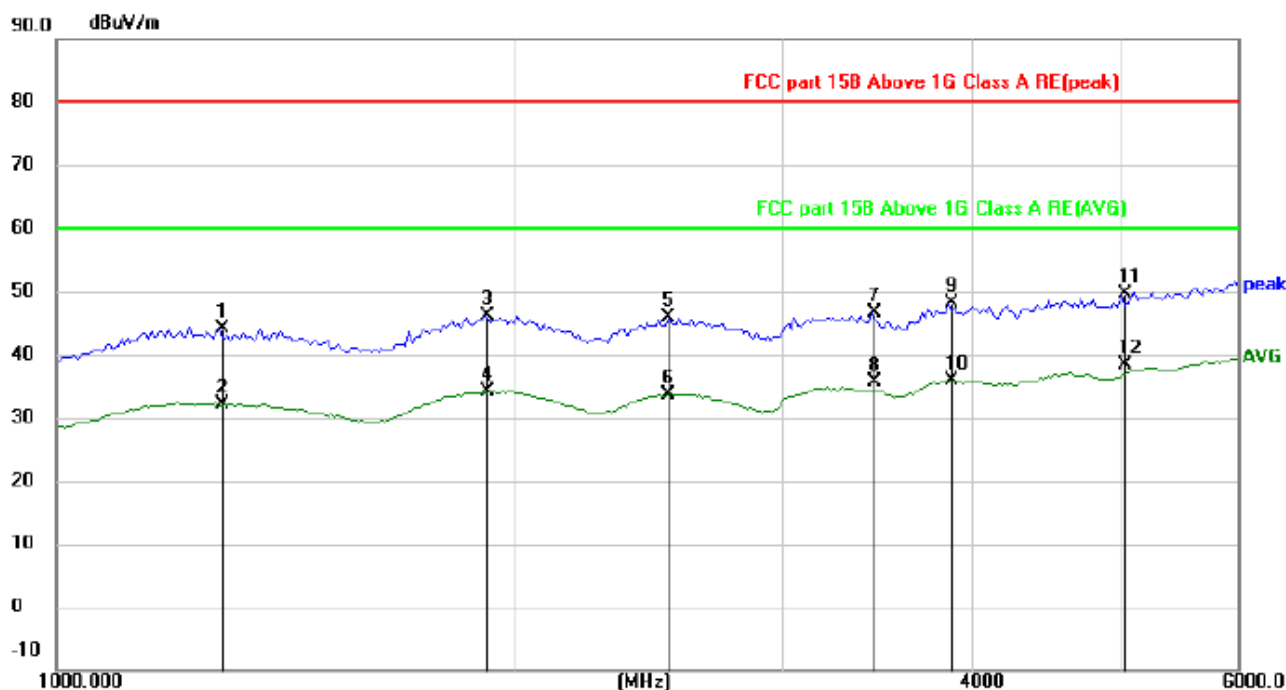
Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1

Above 1GHz:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1350.020	45.92	-1.64	44.28	80.00	-35.72	peak
2		1350.020	33.46	-1.64	31.82	60.00	-28.18	AVG
3		1897.532	43.97	1.49	45.46	80.00	-34.54	peak
4		1897.532	32.63	1.49	34.12	60.00	-25.88	AVG
5		2573.207	43.15	2.51	45.66	80.00	-34.34	peak
6		2573.207	31.04	2.51	33.55	60.00	-26.45	AVG
7		3091.970	43.56	3.16	46.72	80.00	-33.28	peak
8		3091.970	31.50	3.16	34.66	60.00	-25.34	AVG
9		3885.524	41.86	5.73	47.59	80.00	-32.41	peak
10		3885.524	30.21	5.73	35.94	60.00	-24.06	AVG
11		5316.503	40.95	9.31	50.26	80.00	-29.74	peak
12	*	5316.503	29.87	9.31	39.18	60.00	-20.82	AVG

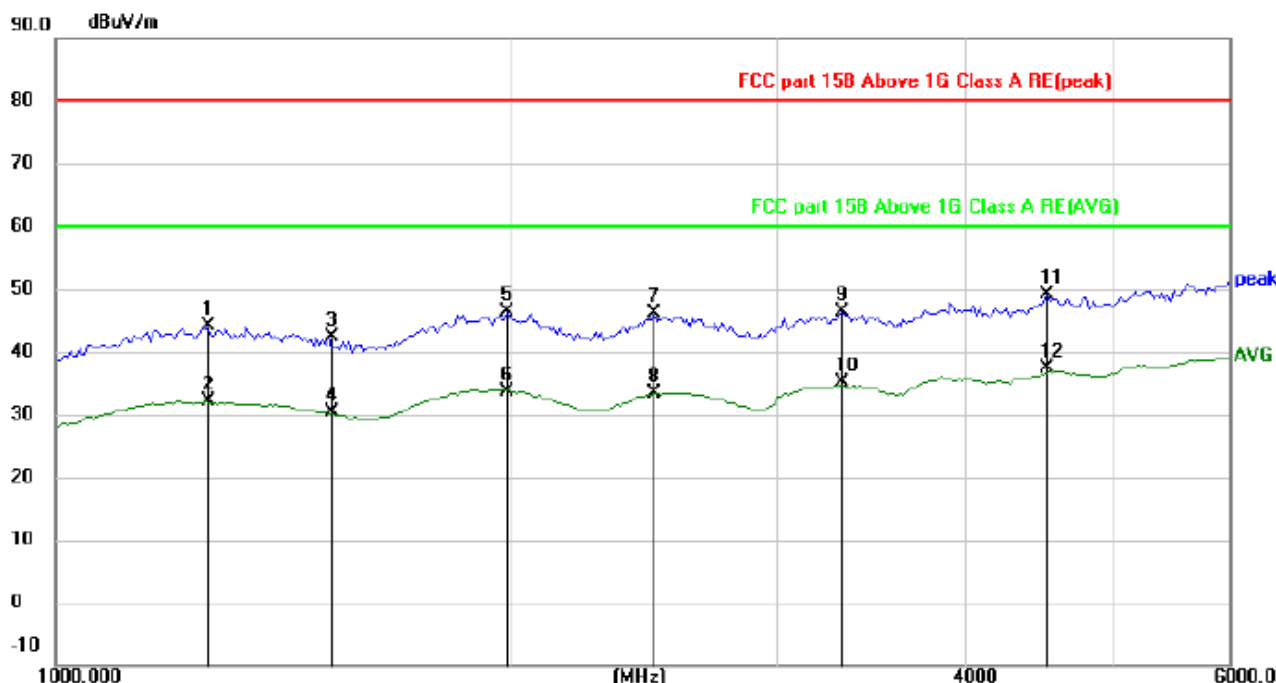
Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1279.369	46.33	-2.15	44.18	80.00	-35.82	peak
2		1279.369	34.31	-2.15	32.16	60.00	-27.84	AVG
3		1914.608	44.47	1.58	46.05	80.00	-33.95	peak
4		1914.608	32.52	1.58	34.10	60.00	-25.90	AVG
5		2527.512	43.47	2.47	45.94	80.00	-34.06	peak
6		2527.512	31.27	2.47	33.74	60.00	-26.26	AVG
7		3442.900	42.26	4.29	46.55	80.00	-33.45	peak
8		3442.900	31.23	4.29	35.52	60.00	-24.48	AVG
9		3868.158	42.41	5.67	48.08	80.00	-31.92	peak
10		3868.158	30.21	5.67	35.88	60.00	-24.12	AVG
11		5038.271	41.26	8.46	49.72	80.00	-30.28	peak
12	*	5038.271	30.00	8.46	38.46	60.00	-21.54	AVG

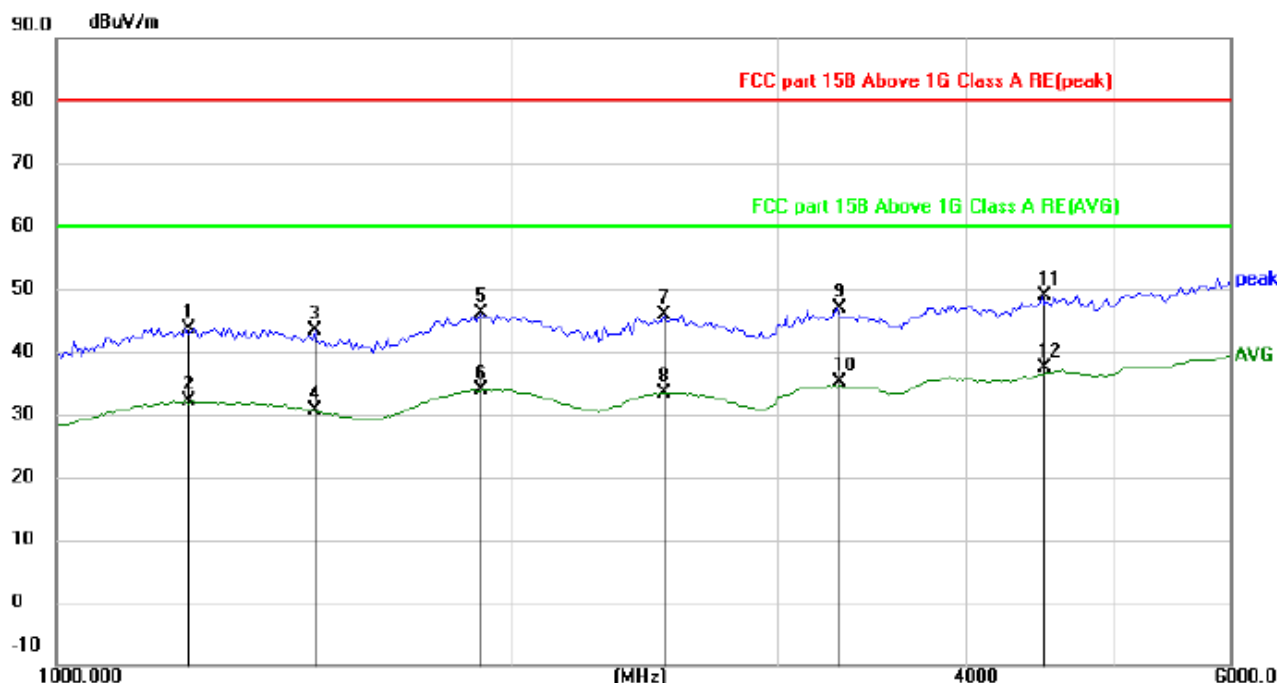
Radiation Emission Test Data

Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode2



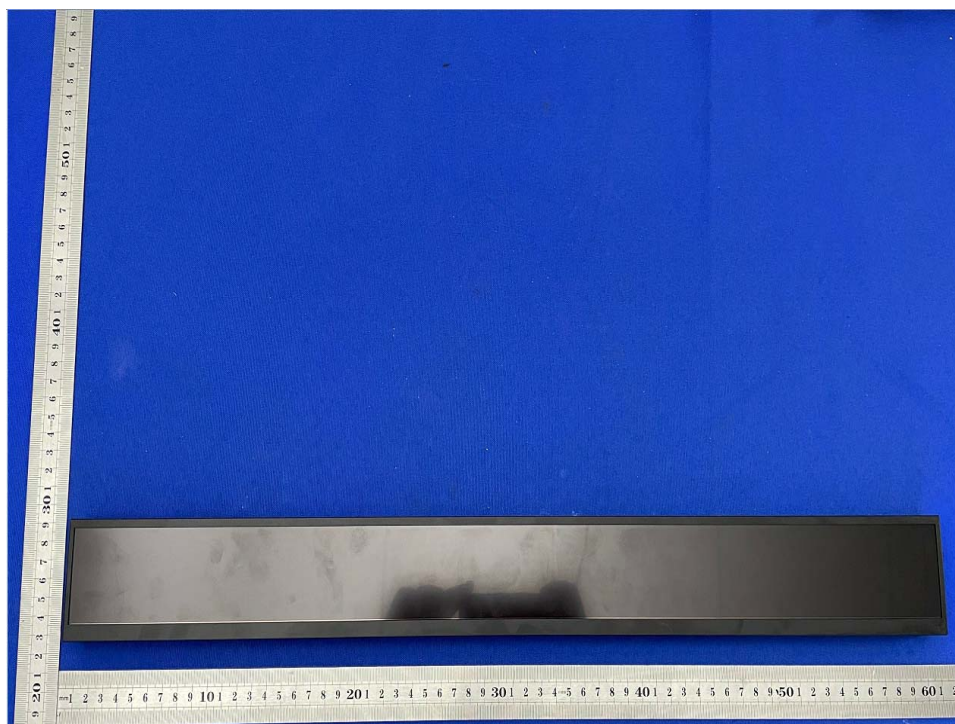
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1256.650	46.36	-2.24	44.12	80.00	-35.88	peak
2		1256.650	34.29	-2.24	32.05	60.00	-27.95	AVG
3		1516.772	42.96	-0.58	42.38	80.00	-37.62	peak
4		1516.772	31.01	-0.58	30.43	60.00	-29.57	AVG
5		1993.371	44.29	2.00	46.29	80.00	-33.71	peak
6		1993.371	31.51	2.00	33.51	60.00	-26.49	AVG
7		2493.774	43.80	2.44	46.24	80.00	-33.76	peak
8		2493.774	31.03	2.44	33.47	60.00	-26.53	AVG
9		3321.707	42.40	3.90	46.30	80.00	-33.70	peak
10		3321.707	31.30	3.90	35.20	60.00	-24.80	AVG
11		4545.041	41.90	7.32	49.22	80.00	-30.78	peak
12	*	4545.041	30.08	7.32	37.40	60.00	-22.60	AVG

Radiation Emission Test Data			
Temperature:	24℃	Relative Humidity:	60%
Pressure:	1009hPa	Phase :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode2



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1217.858	46.11	-2.39	43.72	80.00	-36.28	peak
2		1217.858	34.46	-2.39	32.07	60.00	-27.93	AVG
3		1483.178	44.21	-0.76	43.45	80.00	-36.55	peak
4		1483.178	31.48	-0.76	30.72	60.00	-29.28	AVG
5		1906.051	44.59	1.53	46.12	80.00	-33.88	peak
6		1906.051	32.39	1.53	33.92	60.00	-26.08	AVG
7		2527.512	43.48	2.47	45.95	80.00	-34.05	peak
8		2527.512	30.96	2.47	33.43	60.00	-26.57	AVG
9		3292.082	42.96	3.81	46.77	80.00	-33.23	peak
10		3292.082	31.37	3.81	35.18	60.00	-24.82	AVG
11		4504.505	41.58	7.23	48.81	80.00	-31.19	peak
12	*	4504.505	30.11	7.23	37.34	60.00	-22.66	AVG

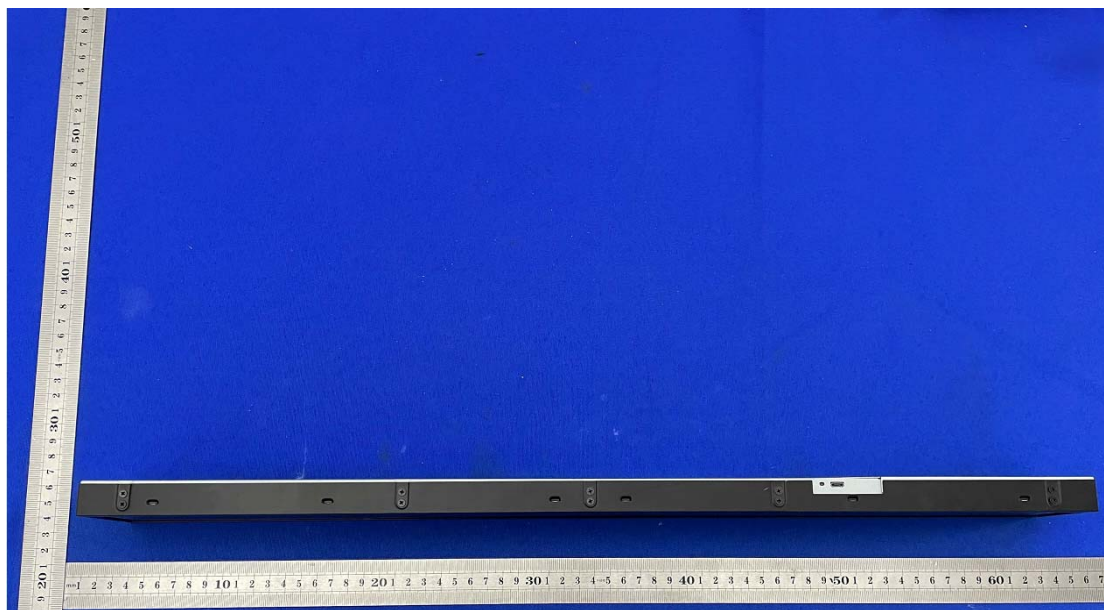
5.EUT Photographs
EUT Photo 1



EUT Photo 2



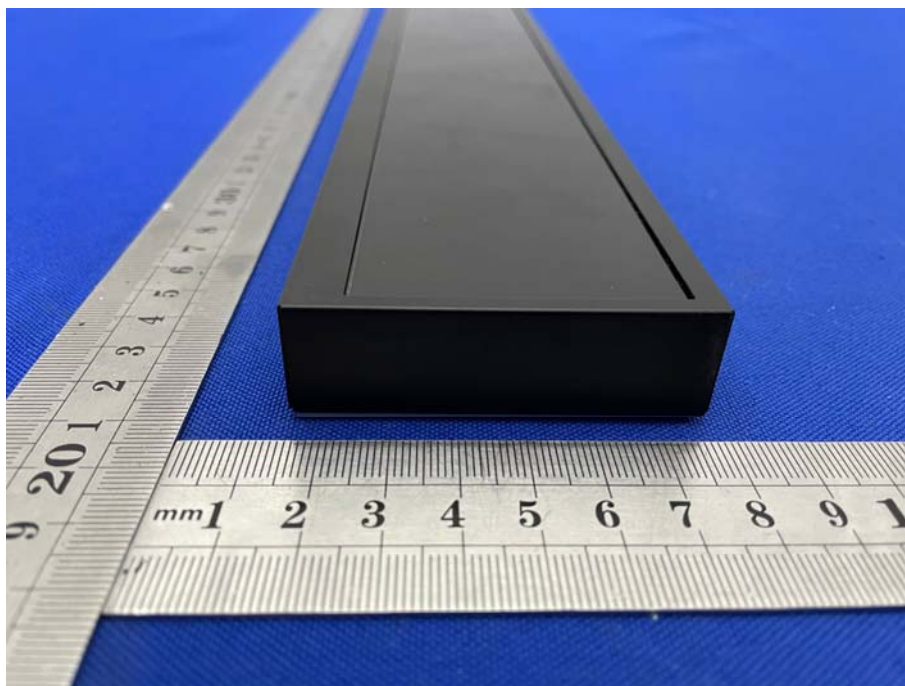
EUT Photo 3



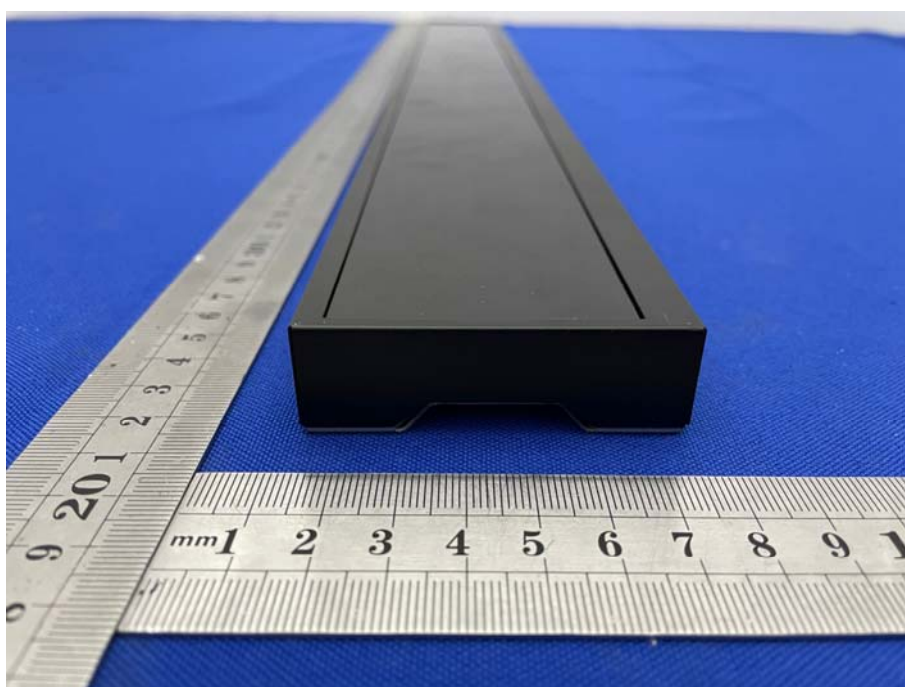
EUT Photo 4



EUT Photo 5



EUT Photo 6



EUT Photo 7



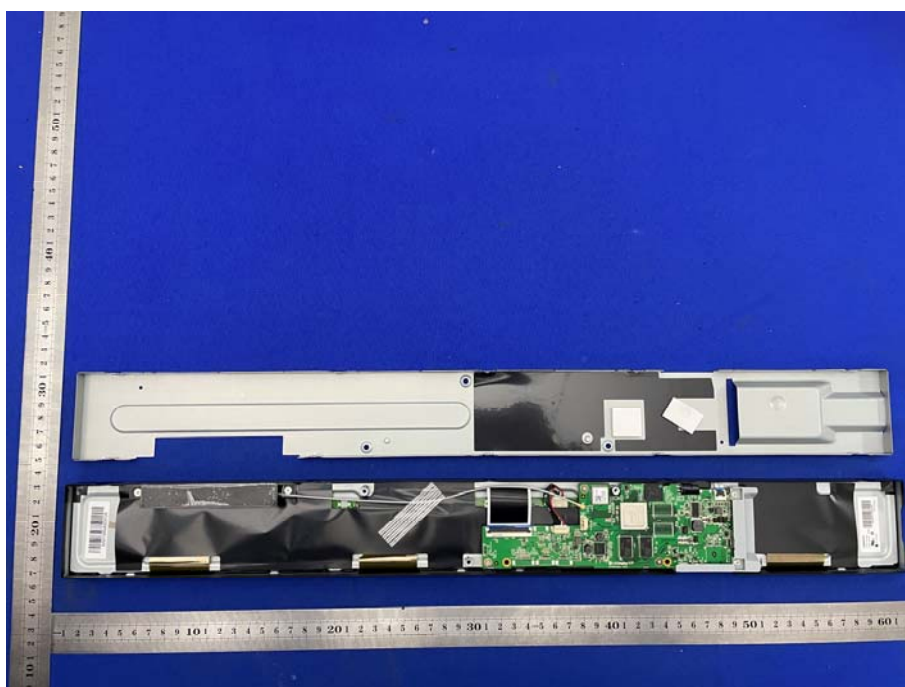
EUT Photo 8



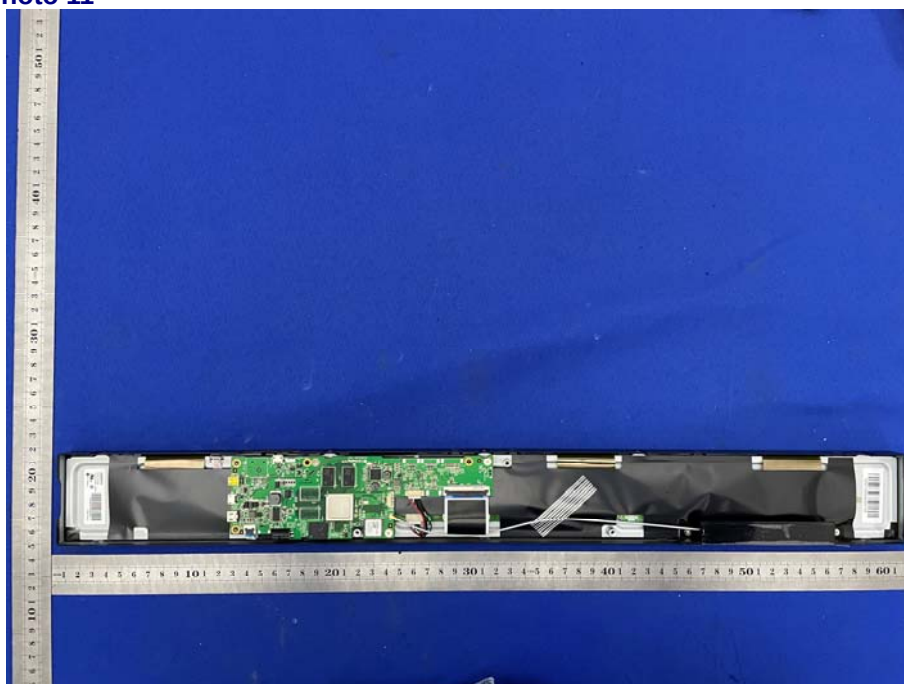
EUT Photo 9



EUT Photo 10



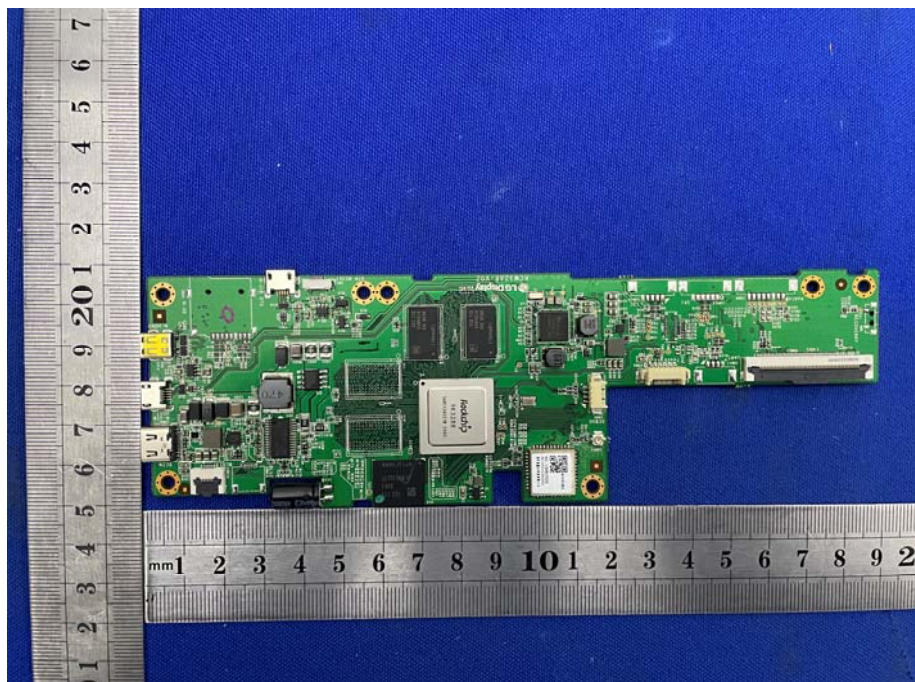
EUT Photo 11



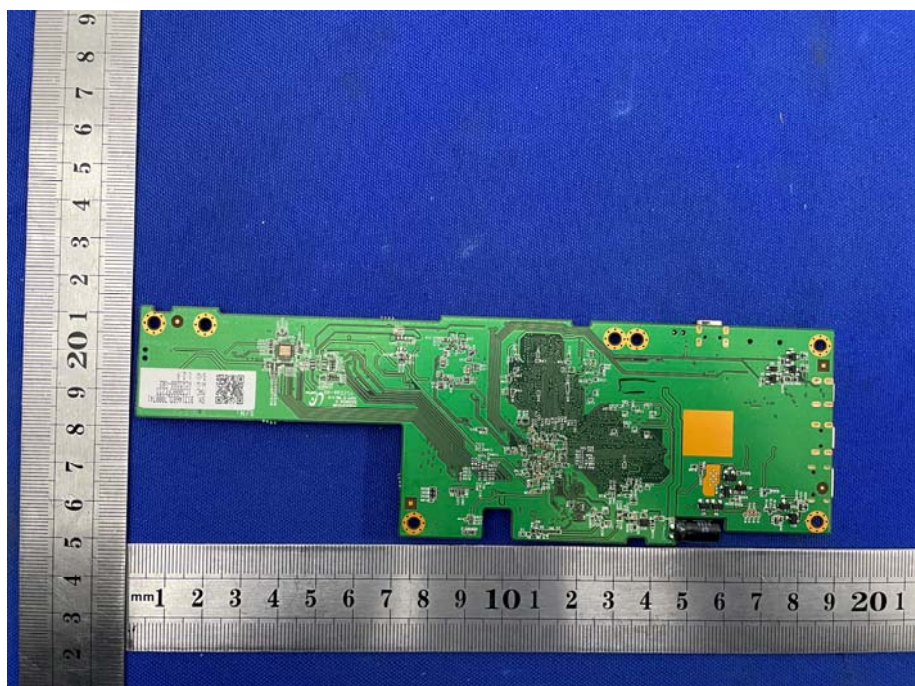
EUT Photo 12



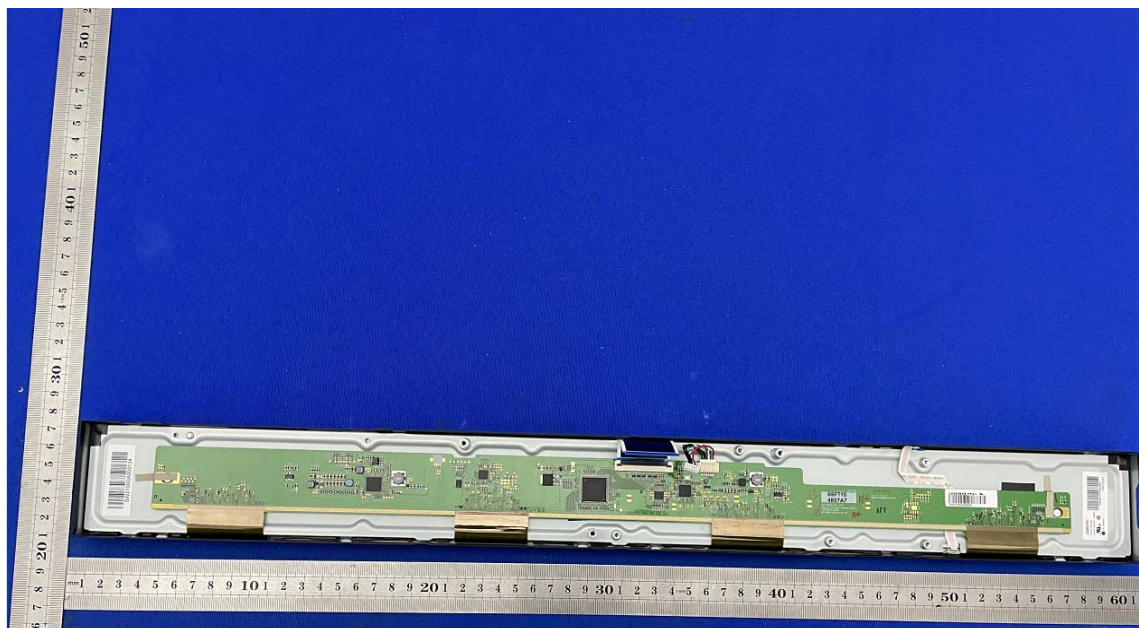
EUT Photo13



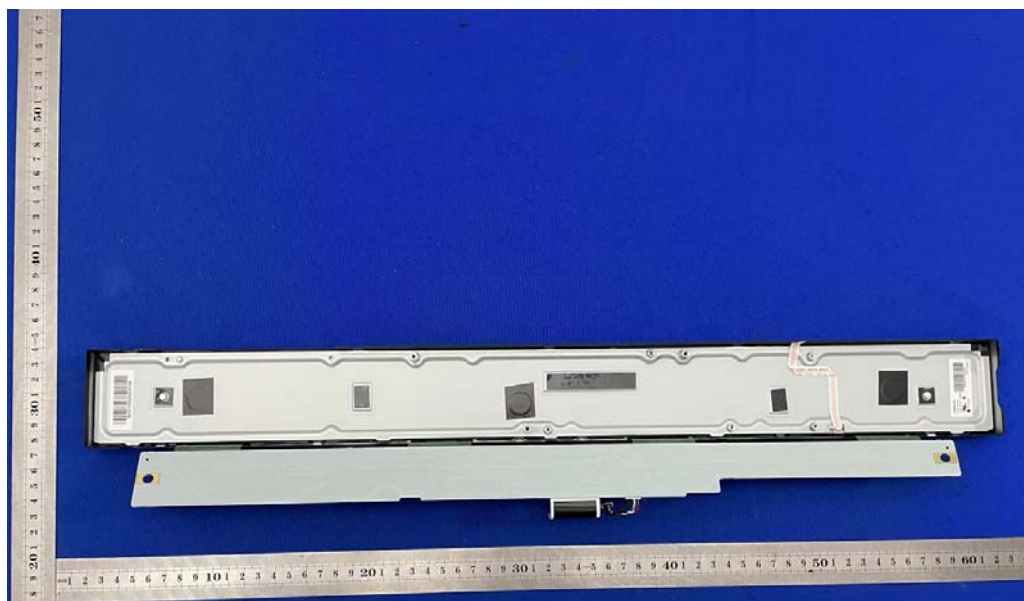
EUT Photo 14



EUT Photo 15



EUT Photo 16



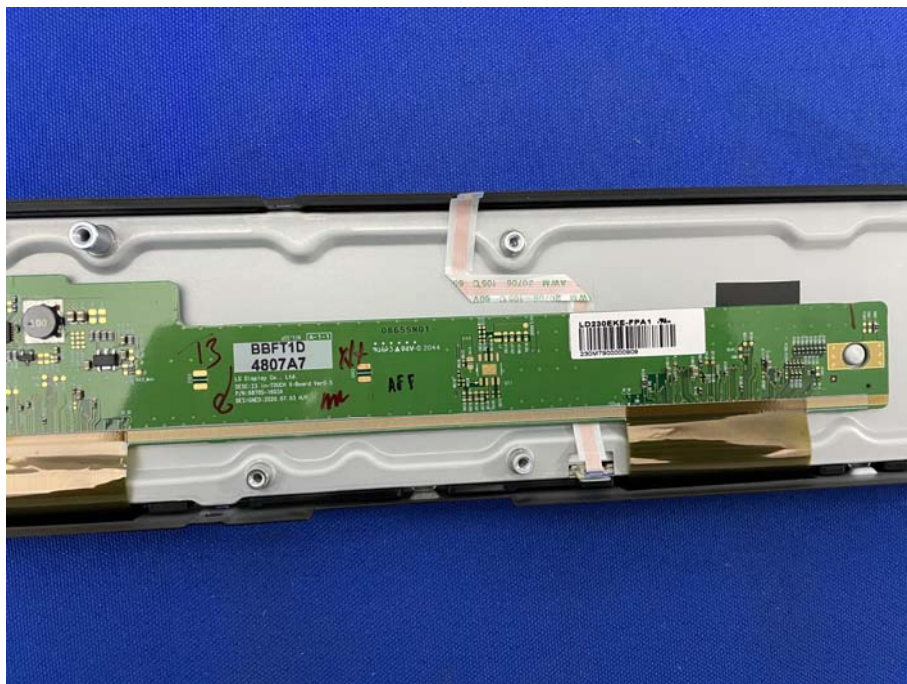
EUT Photo 17



EUT Photo 18



EUT Photo 19



EUT Photo 20



6.EUT TEST PHOTOGRAPHS

RE



RE (above 1GHz)



CE



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