

Test Report of FCC CFR 47 Part 15 Subpart B On Behalf of

AOK Displays Manufacturing Co., Ltd

6th floor, Sanding Commerce building, Yangmei, Bantian, Longgang, Shenzhen

Product Name:	IR Thermometer	S.
Model/Type No.:	CTD2020	1
Prepared By:	Shenzhen Hongcai Testing	g Technology Co., Ltd. 🛛 🔨
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	Service Tel: 400-0066-989	× ×
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Tested Date:	July 06~21, 2020	
Issued Date:	July 22, 2020	A
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Tested By:	Macy Xie/ Macy	Xie
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1- GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Client Information

Applicant:	AOK Displays Manufacturing Co., Ltd
Address of applicant:	6th floor, Sanding Commerce buiding, Yangmei, Bantian, Longgang,
	Shenzhen
Manufacturer:	AOK Displays Manufacturing Co., Ltd
Address of Manufacturer:	6th floor, Sanding Commerce buiding, Yangmei, Bantian, Longgang,
× .	Shenzhen

General Description of E.U.T

EUT Name:	IR Thermometer	~	
Trade Mark:	N/A	30	
Test Model No.:	CTD2020	1	
Power Supply:	Input: DC 12 V, 0.03A, 0.36W, 60Hz		- K
Product Class:	Class A, apply to Class A limits		.G.
2	☑ Class B, apply to Class B limits		

Remark: * The test data gathered are from the production sample provided by the manufacturer. *WTH20H07047799E is produced on the basis of WTH20H07042941E*

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1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC PART15 Subpart B

This test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2014.

The tests were performed in order to determine compliance with FCC Part 15, Subpart B, section 15.107 and section 15.109 rules.

The objective of the manufacturer is to demonstrate compliance with the described standards above.

1.3 Test Summary

Table 1:

	Standard	Test Items	Status
1	Section 15.107	Conducted Emission (150KHz to 30MHz)	\square
2	Section 15.109	Radiation Emission (30MHz to 1000MHz)	\bowtie

Note: 🛛 Indicates that the test is applicable, 🗌 Indicates that the test is not applicable

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Radiated testing was performed at an antenna to EUT distance 3 meters.

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2- SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

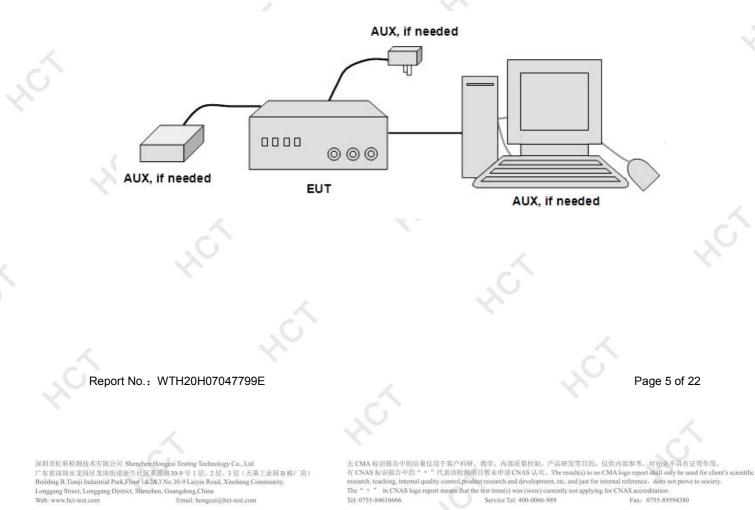
2.3 Equipment Modifications

The EUT tested was not modified by HCT.

2.4 Basic Configuration of Test System and General Test Procedures

Conducted Emissions: The EUT is placed on the table, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2014.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2014.





2.5 General Description of Test Auxiliary

EUT Cable List and Details						
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite			
1		/	1 🔨			
	1	/	10			

Special Cable List and Details

Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite	
1	1	1	1	
1 20	1	1 1	1 🔨	

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
1		1	<u> </u>
<i< td=""><td></td><td>1</td><td></td></i<>		1	

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3- CONDUCTED EMISSION

3.1 Measurement Uncertainty

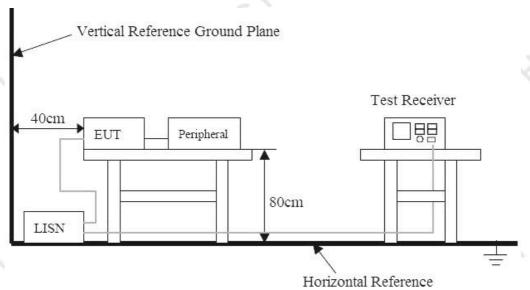
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN. The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.7 dB.

3.2 Limit of Conducted Emission

	Class B Equipment Limits		
Frequency Range (MHz)	Quasi-Peak (dBuV)	Average (dBuV)	
0.150~0.500	66~56	56~46	
0.500~5.000	56	46	
5.000~30.00	60	50	

NOTE 1: The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup



Ground Plane

The setup of EUT is according with ANSI C63.4-2014 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart B Section 15.107 Class B limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

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Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

3.5 Test Procedure

- 1. During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.
- 2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.
- All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB_μV of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

3.6 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	LG/EMC-05-001	EMI Test Receiver	R&S	ESCI	100687	2020-05-28	2021-05-27
2	LG/EMC-05-003	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	8128247	2020-05-28	2021-05-27
3	LG/EMC-05-002	10dB attenuator	SCHWARZBECK	9510-F061	9510-F06 1234	2020-05-31	2021-05-30

3.7 Test Data

Temperature:	22~26 (°C)	
Humidity:	50~65(%RH)	5
Barometric Pressure:	990~1030 (mbar)	
Operating Mode:	Charge	
Test Result:	Pass	

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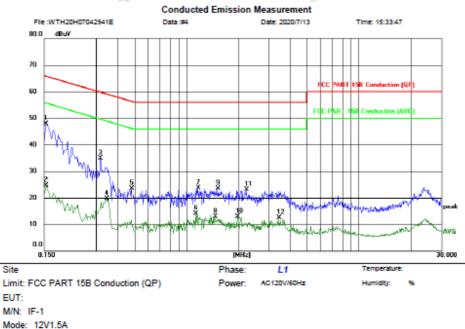
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Conducted Emission Test Data

EUT: M/N: **Operating Condition:** Test Site: Operator: **Test Specification:** Comment:

IR Thermometer CTD2020 Charge Shielded Room SX AC 120V/60Hz Live Line



Note: AC

No	. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment		Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1540	38.48	9.35	47.83	65.78	-17.95	QP	
2		0.1540	15.37	9.35	24.72	55.78	-31.06	AVG	
3		0.3180	24.98	9.92	34.90	59.76	-24.86	QP	
4		0.3460	9.79	9.88	19.67	49.06	-29.39	AVG	
5		0.4820	13.67	9.87	23.54	56.30	-32.76	QP	
6		1.1340	4.27	9.91	14.18	46.00	-31.82	AVG	
7		1.1700	13.70	9.91	23.61	56.00	-32.39	QP	
8		1.4660	2.62	10.35	12.97	46.00	-33.03	AVG	
9		1.5260	13.06	10.37	23.43	56.00	-32.57	QP	
10		1.9780	2.95	10.02	12.97	46.00	-33.03	AVG	
11		2.2300	13.04	10.04	23.08	56.00	-32.92	QP	
12		3.4300	2.09	10.41	12.50	46.00	-33.50	AVG	

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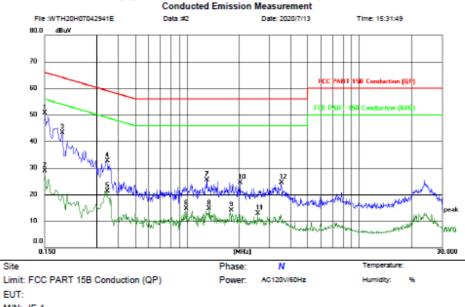
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Conducted Emission Test Data

EUT: M/N: Operating Condition: Test Site: Operator: Test Specification: Comment:

IR Thermometer CTD2020 Charge Shielded Room SX AC 120V/60Hz Neutral Line



Limit: FCC PART 15B Conduction (QI EUT: M/N: IF-1 Mode: 12V1.5A Note: AC

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1500	41.15	9.61	50.76	66.00	-15.24	QP	
2	0.1500	19.34	9.61	28.95	56.00	-27.05	AVG	
3	0.1900	33.46	9.83	43.29	64.04	-20.75	QP	
4	0.3460	22.57	10.10	32.67	59.06	-26.39	QP	
5	0.3460	11.19	10.10	21.29	49.06	-27.77	AVG	
6	0.9860	4.48	10.25	14.73	46.00	-31.27	AVG	
7	1.3060	15.25	10.33	25.58	56.00	-30.42	QP	
8	1.3420	4.33	10.35	14.68	46.00	-31.32	AVG	
9	1.8020	3.76	10.42	14.18	46.00	-31.82	AVG	
10	2.0380	14.19	10.40	24.59	56.00	-31.41	QP	
11	2.5740	2.45	10.47	12.92	46.00	-33.08	AVG	
12	3.5100	13.99	10.47	24.46	56.00	-31.54	QP	

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4- RADIATED EMISSION

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is +4.0 dB.

4.2 Limit of Radiated Emission

Below 1GHz Class B Equipment Limits									
Frequency (MHz) Distance (Meters) Quasi-Peak (dBμV/n									
30 ~ 88	3	40							
88~216	3	43.5							
216 ~ 960	3	46							
960 ~ 1000	3	54							

NOTE 1 The lower limit shall apply at the transition frequency.

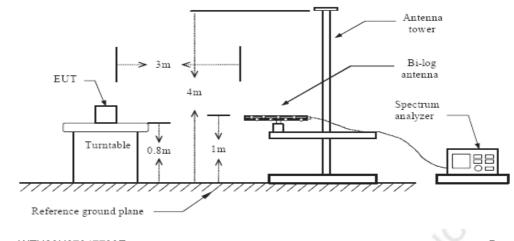
NOTE 2 Additional provisions may be required for cases where interference occurs.

Above 1GHz Class B Equipment Limits											
Frequency (GHz) Distance (Meters) Average (dBμV/m) Peak (dBμV/m)											
1~6	3	54	74								
NOTE 1 The lower limit shall apply at the transition frequency											

NOTE 1 The lower limit shall apply at the transition frequency

4.3 EUT Setup

Below 1 GHz



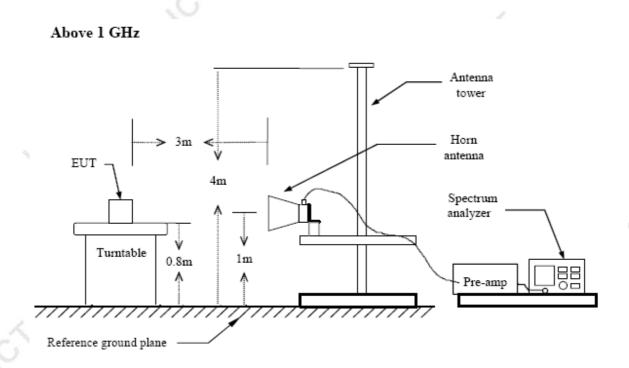
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The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the AANSI C63.4-2014. The specification used was the FCC Part 15 Subpart B Section 15.109 limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

The test receiver was set with the following configurations:

Test Receiver Setting below 1000MHz:

Detector	Peak & Quasi-Peak
IF Band Width	
Frequency Range	
Turntable Rotated	0 to 360 degrees

Test Receiver Setting above 1000MHz:

Detector	Peak & Average
IF Band Width	
Frequency Range	
	0 to 360 degrees
Antenna Position:	.6

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Height.....1m to 4m Polarity......Horizontal and Vertical

4.5 Test Procedure

- 1. Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.
- All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB_μV of specification limits), and are distinguished with a "QP" in the data table.

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of $7dB\mu V$ means the emission is $7dB\mu V$ below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Limit – Corr. Ampl.

4.7 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	LG/EMC-02-001	EMI Test Receiver	R&S	ESCI	100687	2020-05-28	2021-05-27
2	LG/EMC-02-007	Broadband Logarithmic Period Antenna	SCHWARZBECK	VULB 9162	16	2019-08-08	2021-08-07
3	LG/EMC-02-003	Horn Antenna	A.H.	AH-118		2019-06-27	2021-06-21
4	LG/EMC-02-004	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2020-05-31	2021-05-30
5	LG/EMC-02-005	Preamplifier	Agilent	8447D	/	2020-05-28	2021-05-27

4.8 Test Data

Temperature:	22~26(°C)	ć
Humidity:	50~65(%RH)	
Barometric Pressure:	990~1030 (mbar)	
Operating Mode:	Charge/Discharge	9
Test Result:	Pass	

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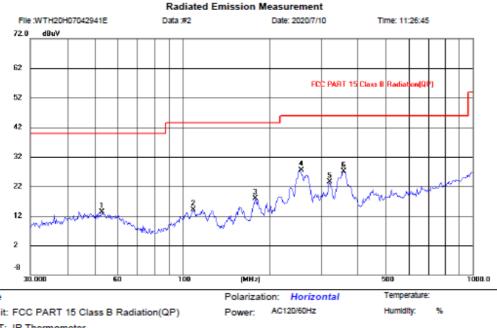
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Radiated Emission Test Data of Below 1GHz

EUT: M/N: Operating Condition: Test Site: Operator: Test Specification: Comment: IR Thermometer CTD2020 Charge CHAMBER SX AC 120V/60Hz Polarization: Horizontal



Site

Limit: FCC PART 15 Class B Radiation(QP) EUT: IR Thermometer M/N: IF-1 Mode:

bl-t

Note:

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin			
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1	52.9453	26.78	-13.46	13.32	40.00	-26.68	QP		
2	109.0286	29.64	-15.47	14.17	43.50	-29.33	QP		
3	178.1327	35.06	-17.07	17.99	43.50	-25.51	QP		
4 *	254.7284	41.15	-13.72	27.43	46.00	-18.57	QP		
5	321.0608	35.66	-12.19	23.47	46.00	-22.53	QP		
6	359.1860	38.47	-11.35	27.12	46.00	-18.88	QP		

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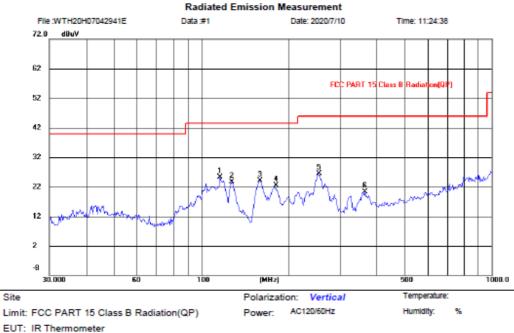
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Radiated Emission Test Data of Below 1GHz

EUT: M/N: **Operating Condition:** Test Site: Operator: **Test Specification:** Comment:

IR Thermometer CTD2020 Charge CHAMBER SX AC 120V/60Hz Polarization: Vertical



Site

EUT: IR Thermometer M/N: IF-1

Mode:

Note:

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment		Margin			
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1 *	116.1321	42.50	-17.10	25.40	43.50	-18.10	QP		
2	127.2176	41.66	-17.86	23.80	43.50	-19.70	QP		
3	159.2251	42.27	-18.13	24.14	43.50	-19.36	QP		
4	179.3864	39.25	-16.78	22.47	43.50	-21.03	QP		
5	252.9482	40.31	-13.81	26.50	46.00	-19.50	QP		
6	366.8231	31.87	-11.55	20.32	46.00	-25.68	QP		

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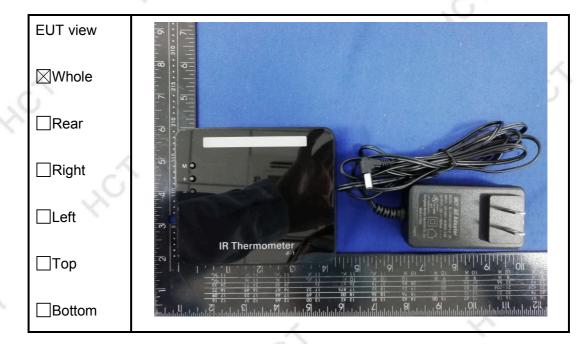
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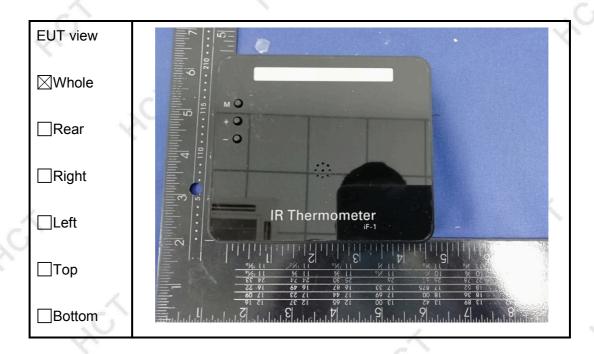
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APPENDIX A - EUT PHOTOGRAPHS



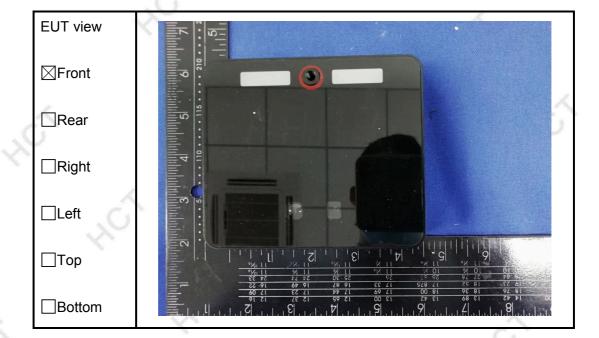


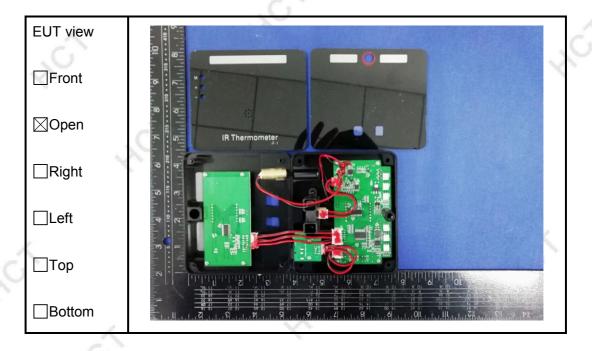
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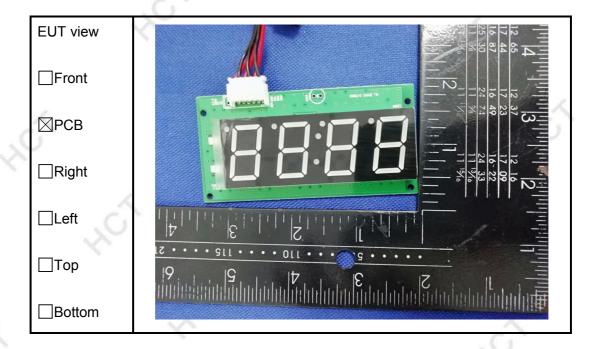


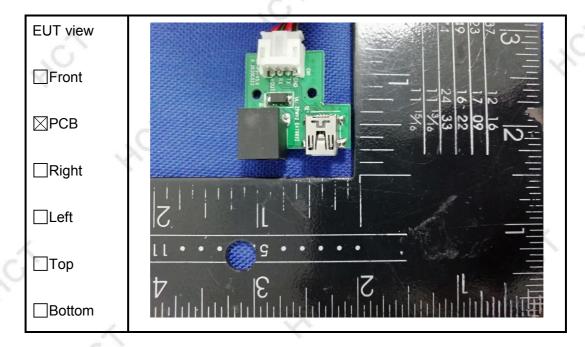


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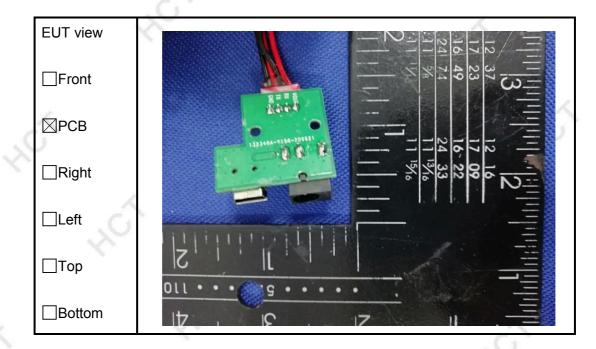


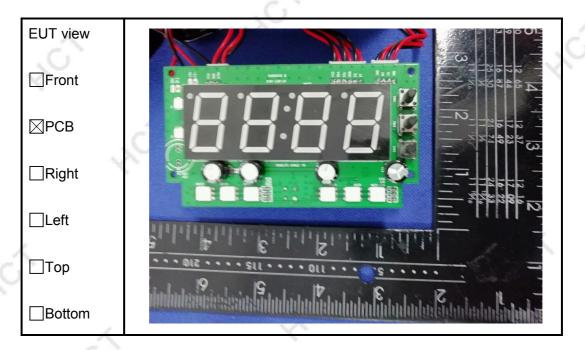


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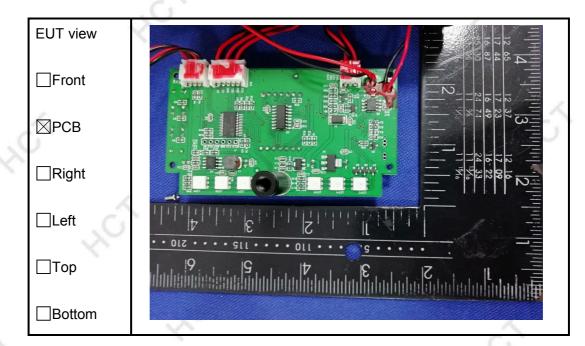


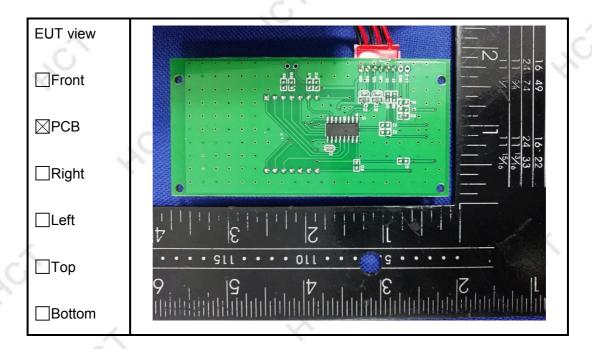


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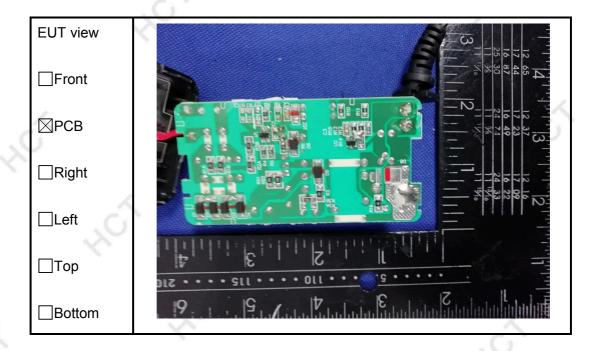




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APPENDIX B - TEST SETUP PHOTOGRAPHS

Conducted Emission



Radiated Disturbance of Below 1G



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