FCC Test Report

Report No.: AGC10971200801FE04

FCC ID	:	2AW8K-ARCHLD
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Through Surface Wireless Charger
BRAND NAME	:	OE
MODEL NAME	:	ARC-H (LD), ARC-Hxx (xx)
APPLICANT	:	OE Electrics Limited
DATE OF ISSUE	:	Sep. 08, 2020
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 08, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	OE Electrics Limited
Address	OE House, Thomas Maddison lane, Calder Park, Wakefield, WF4 3GH, UK
Manufacturer	OE Electrics Limited
Address	OE House, Thomas Maddison lane, Calder Park, Wakefield, WF4 3GH, UK
Factory	SHENZHEN CIJI TECHNOLOGY CO.,LTD.
Address	Room 1807, Overseas Chinese Scholars Venture Building, No.29 Gaoxin South Ring Road, Nanshan District, Shenzhen, China
Product Designation	Through Surface Wireless Charger
Brand Name	OE
Test Model	ARC-H (LD)
Series Model	ARC-Hxx (xx)
Difference Description	All the series models are the same as the test model except for the model names and the color of appearance.
Date of test	Aug. 13, 2020 to Sep. 07, 2020
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with Section 15.207, 15.209, 15.203 of the FCC Part 15, Subpart C Rules.

The results of testing in this report apply to the product/system which was tested only.

Prepared By	Sky Dong (Project Engineer)	Sep. 07, 2020
Reviewed By	Max Zhang (Reviewer)	Sep. 08, 2020
Approved By	Forrest Lei (Authorized Officer)	Sep. 08, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	115-150 kHz
Test Frequency	127kHz
Maximum field strength	51.29dBuV/m(PK)@3m
Modulation	PWM
Number of channels	1
Antenna Designation	Coil Antenna (Met 15.203 Antenna requirement)
Hardware Version	V2.1
Software Version	V4.5.6
Power Supply	DC 19V by adapter

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Wireless charging Mode(Full load)
2	Wireless charging Mode(half load)
3	Wireless charging Mode(Null load)

Note:
1. The mode 1 was the worst case and only the data of the worst case record in this report.

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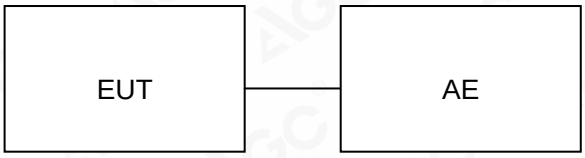
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure :



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Through Surface Wireless Charger	ARC-H (LD)	2AW8K-ARCHLD	EUT
2	Adapter	MX24Z1-1900940	Input:100-240V~50-60Hz, 0.7A Output:19V, 0.94A	AE
3	Wireless Load	N/A	10W	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.209	Radiated Emission	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2022
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Jan. 09, 2019	Jan. 08, 2021
Test software	FARA	EZ_EMC (Ver.RA-03A)	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1TEST LIMIT

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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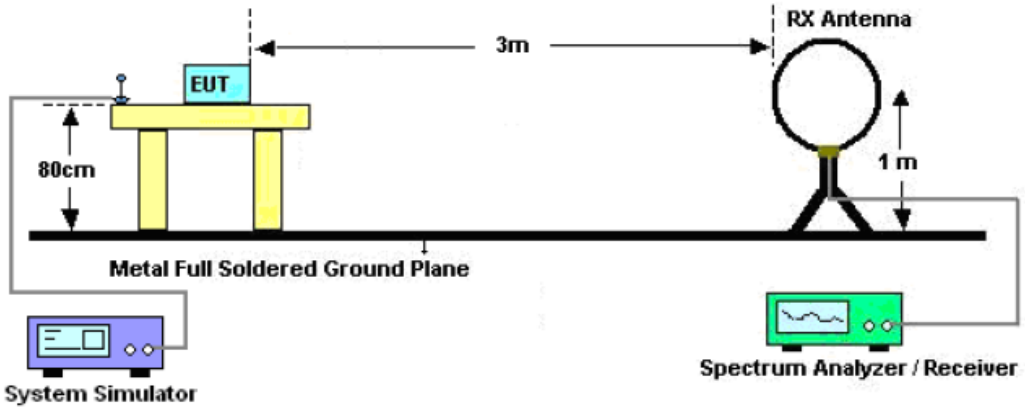
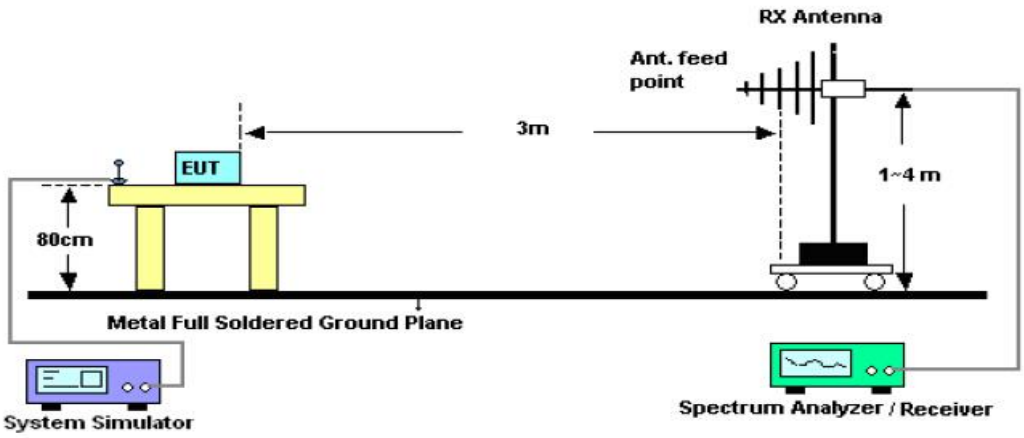
7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

Frequency MHz	Polarization	Reading dB(uV) PK	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail
0.127	Face	40.89	10.40	51.29	105.53	-54.24	Pass
0.127	Side	32.37	10.40	42.77	105.53	-62.76	Pass

Note1: The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported. The peak level of the emission is less than the average limit, so the average level shall be less than the limit without test.

Note 2: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)

Factor(dB/m)=Antenna Factor(dB/m)+Cable loss(dB)+Attenuation(dB)for Attenuator

Margin=Level-Limit

For 0.127MHz

Limit(dBuV/m)=20log(2400/F(kHz))+40log(300/3)=105.53dBuV/m.

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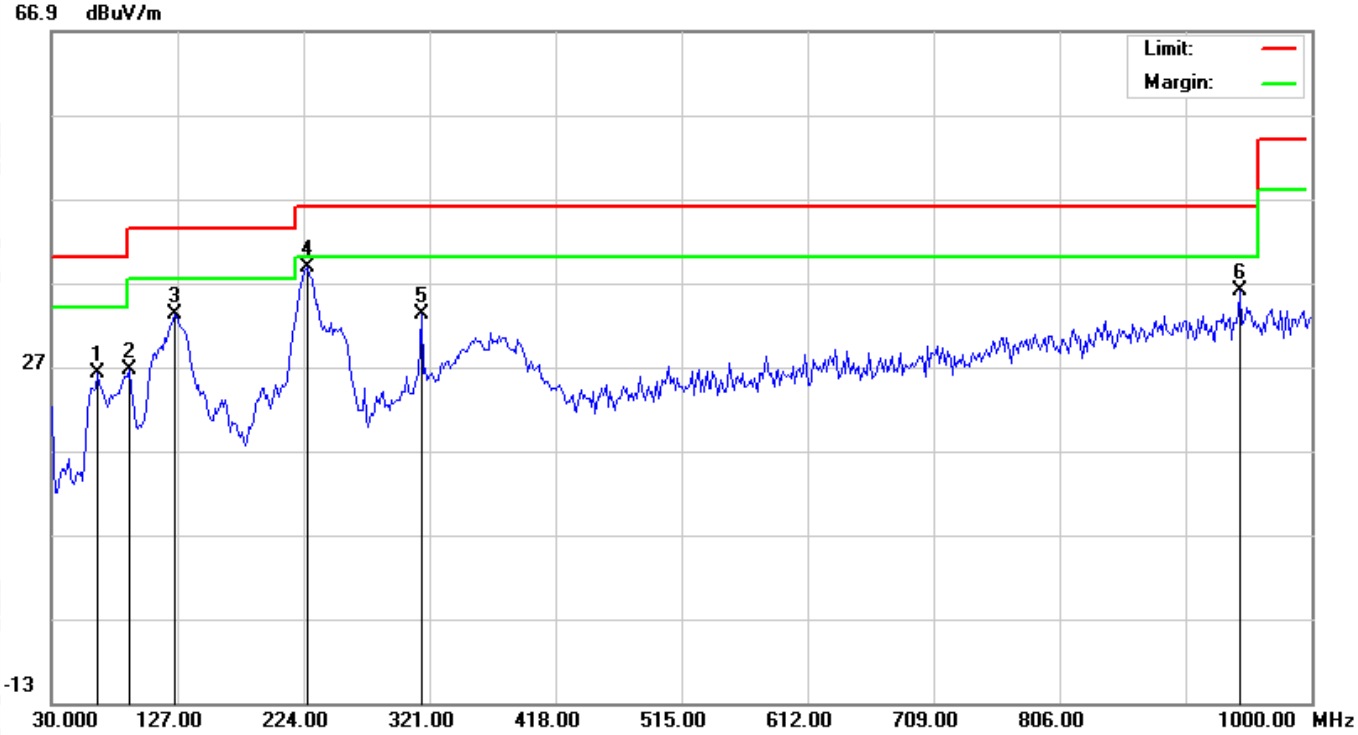
RADIATED EMISSION 30MHz- 1GHz

EUT：	Through Surface Wireless Charger	Model Name. ：	ARC-H (LD)
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC19V
Test Mode ：	Mode 1	Polarization :	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		65.5667	9.65	16.56	26.21	40.00	-13.79	peak
2		89.8167	11.55	14.98	26.53	43.50	-16.97	peak
3		125.3833	16.25	16.96	33.21	43.50	-10.29	peak
4	*	227.2333	22.38	16.48	38.86	46.00	-7.14	peak
5		314.5333	11.82	21.40	33.22	46.00	-12.78	peak
6		945.0333	3.92	32.09	36.01	46.00	-9.99	peak

RESULT: PASS

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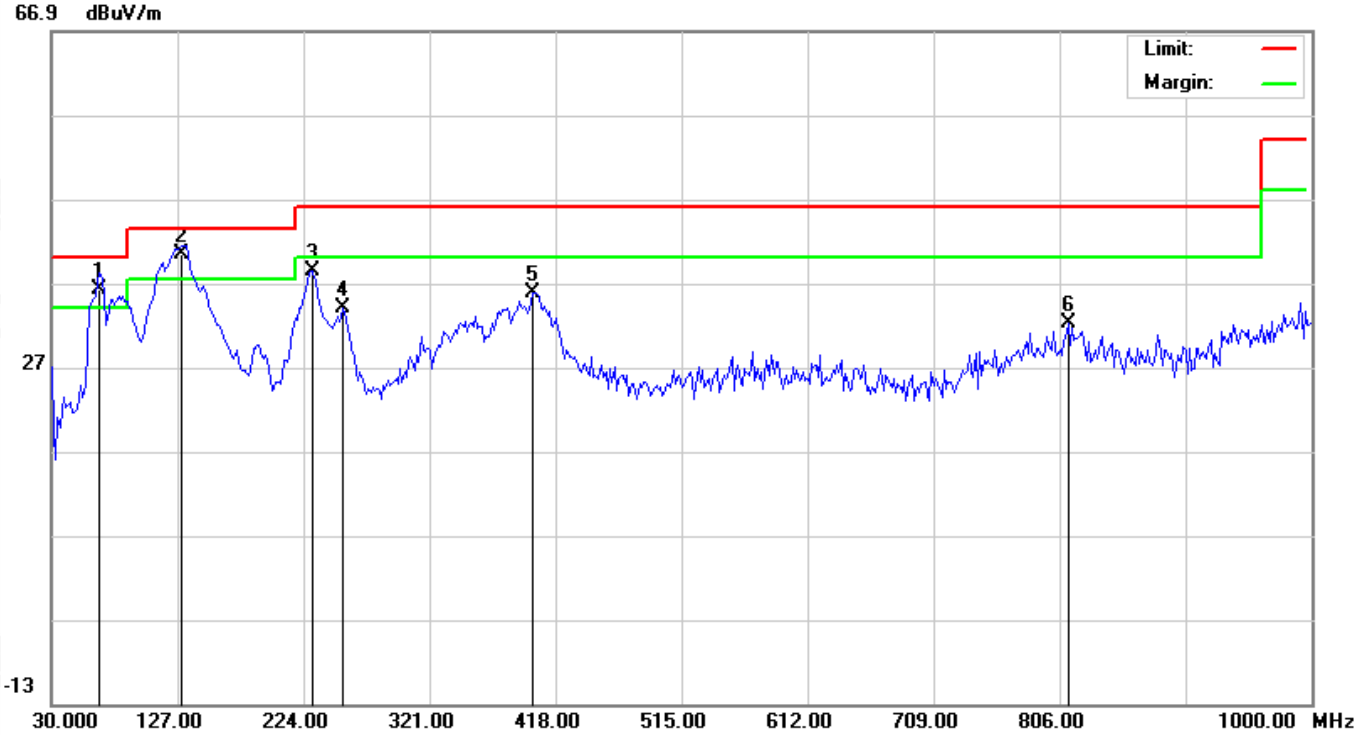
EUT：	Through Surface Wireless Charger	Model Name. ：	ARC-H (LD)
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC19V
Test Mode ：	Mode 1	Polarization :	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	!	67.1833	19.39	16.76	36.15	40.00	-3.85	QP
2	*	130.2332	21.86	18.61	40.47	43.50	-3.03	peak
3		230.4667	21.40	17.03	38.43	46.00	-7.57	peak
4		254.7167	15.63	18.40	34.03	46.00	-11.97	peak
5		400.2167	12.85	22.98	35.83	46.00	-10.17	peak
6		812.4667	2.19	30.07	32.26	46.00	-13.74	peak

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

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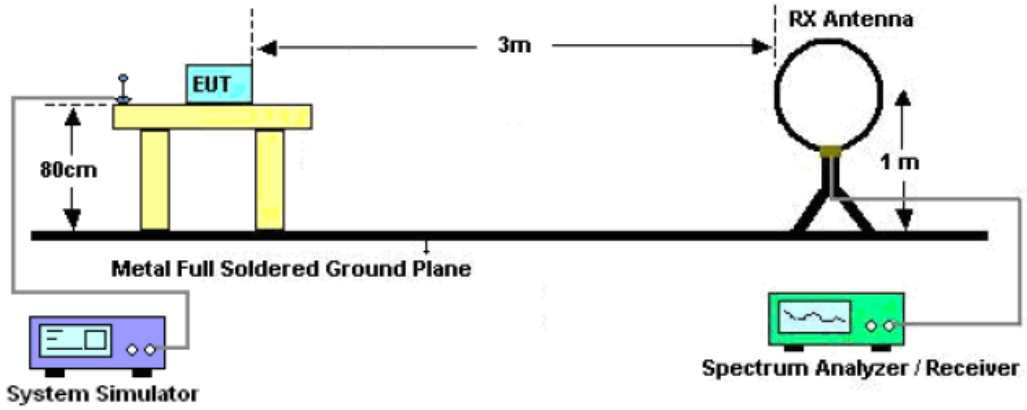
8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2, Set the EUT Work on operation frequency.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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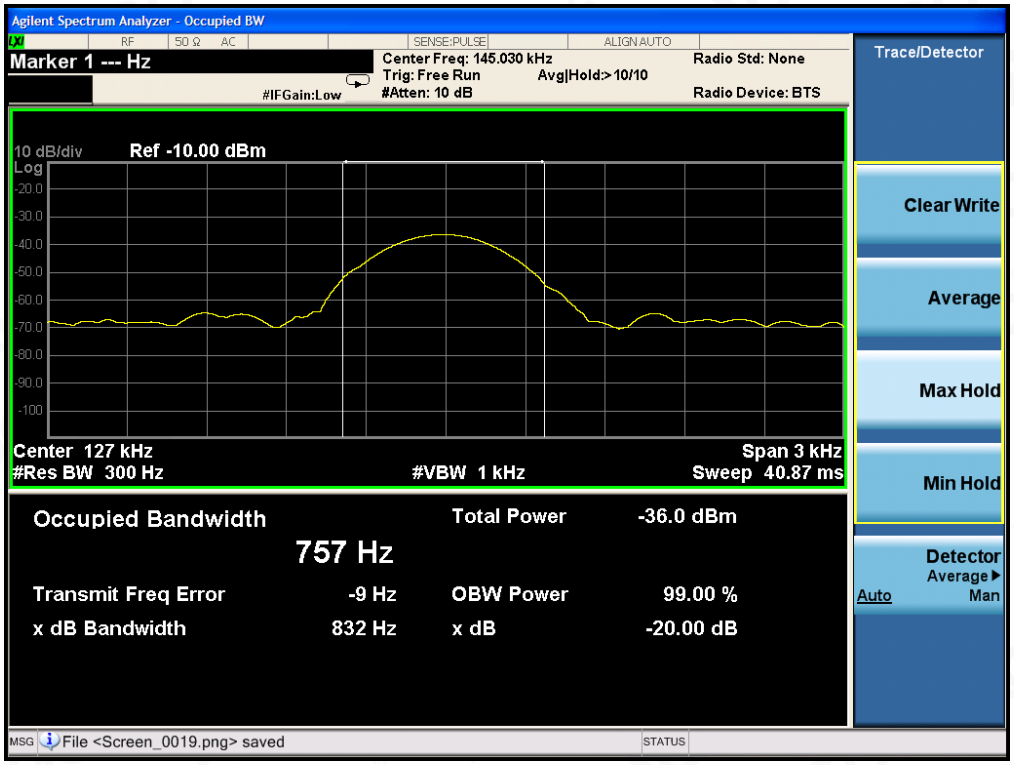
8.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	FSK

Test Data (Hz)		Criteria
Operate Channel	832	PASS

TEST PLOT OF BANDWIDTH



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9. FCC LINE CONDUCTED EMISSION TEST

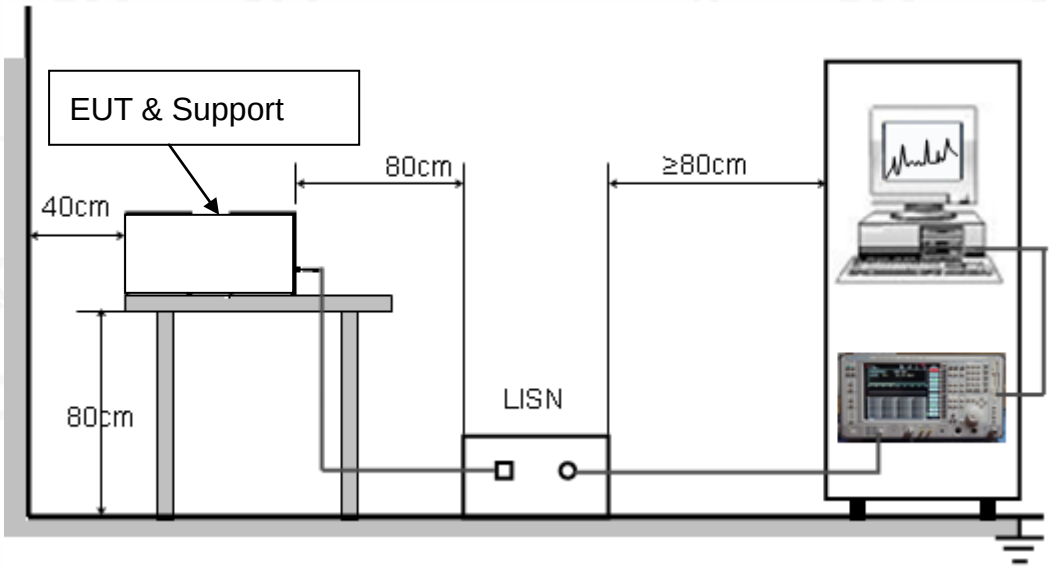
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

9.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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9.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

9.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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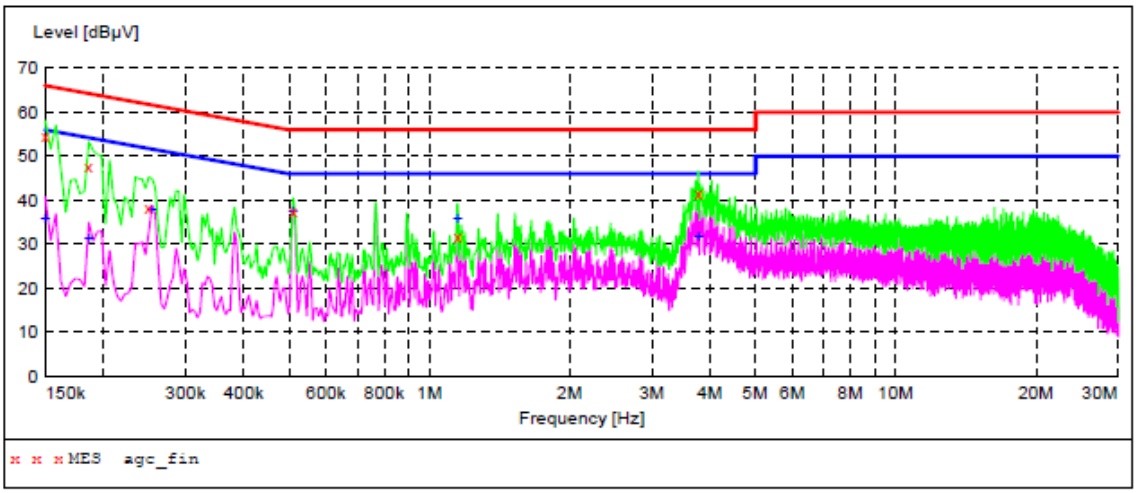
9.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

2020/9/2 18:17

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	54.70	9.3	66	11.3	QP	L1	GND
0.186000	47.70	9.3	64	16.5	QP	L1	GND
0.250000	38.40	9.3	62	23.4	QP	L1	GND
0.510000	37.60	9.3	56	18.4	QP	L1	GND
1.150000	31.90	9.3	56	24.1	QP	L1	GND
3.774000	41.50	9.4	56	14.5	QP	L1	GND

MEASUREMENT RESULT: "agc_fin2"

2020/9/2 18:17

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	35.70	9.3	56	20.3	AV	L1	GND
0.186000	31.30	9.3	54	22.9	AV	L1	GND
0.254000	37.90	9.3	52	13.7	AV	L1	GND
0.510000	37.50	9.3	46	8.5	AV	L1	GND
1.150000	35.90	9.3	46	10.1	AV	L1	GND
3.770000	31.70	9.4	46	14.3	AV	L1	GND

RESULT: PASS

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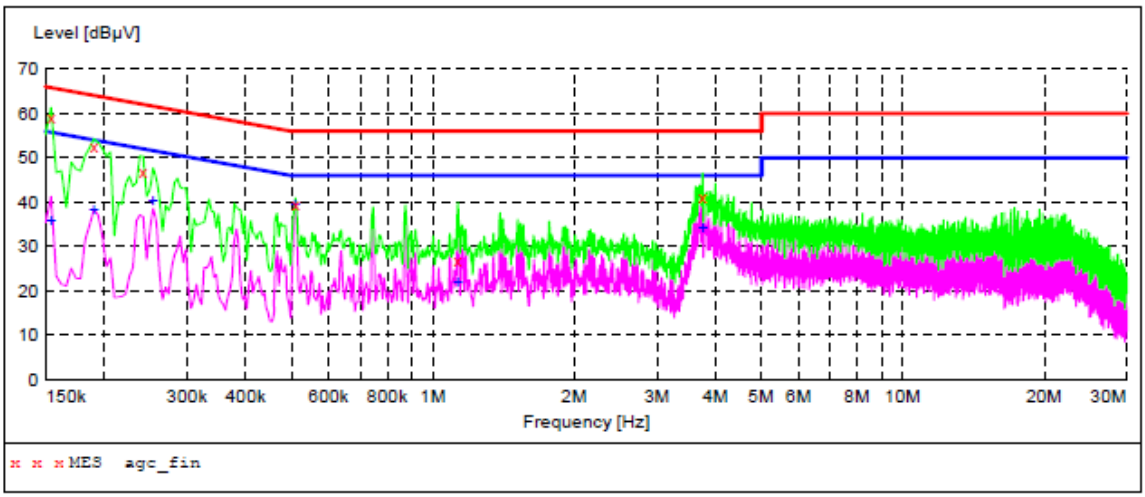
LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

2020/9/2 18:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154000	59.10	9.3	66	6.7	QP	N	GND
0.190000	52.50	9.3	64	11.5	QP	N	GND
0.242000	46.80	9.3	62	15.2	QP	N	GND
0.510000	39.60	9.3	56	16.4	QP	N	GND
1.130000	26.70	9.3	56	29.3	QP	N	GND
3.746000	41.00	9.4	56	15.0	QP	N	GND

MEASUREMENT RESULT: "agc_fin2"

2020/9/2 18:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154000	35.80	9.3	56	20.0	AV	N	GND
0.190000	38.20	9.3	54	15.8	AV	N	GND
0.254000	40.50	9.3	52	11.1	AV	N	GND
0.510000	39.70	9.3	46	6.3	AV	N	GND
1.130000	21.90	9.3	46	24.1	AV	N	GND
3.746000	34.20	9.4	46	11.8	AV	N	GND

RESULT: PASS

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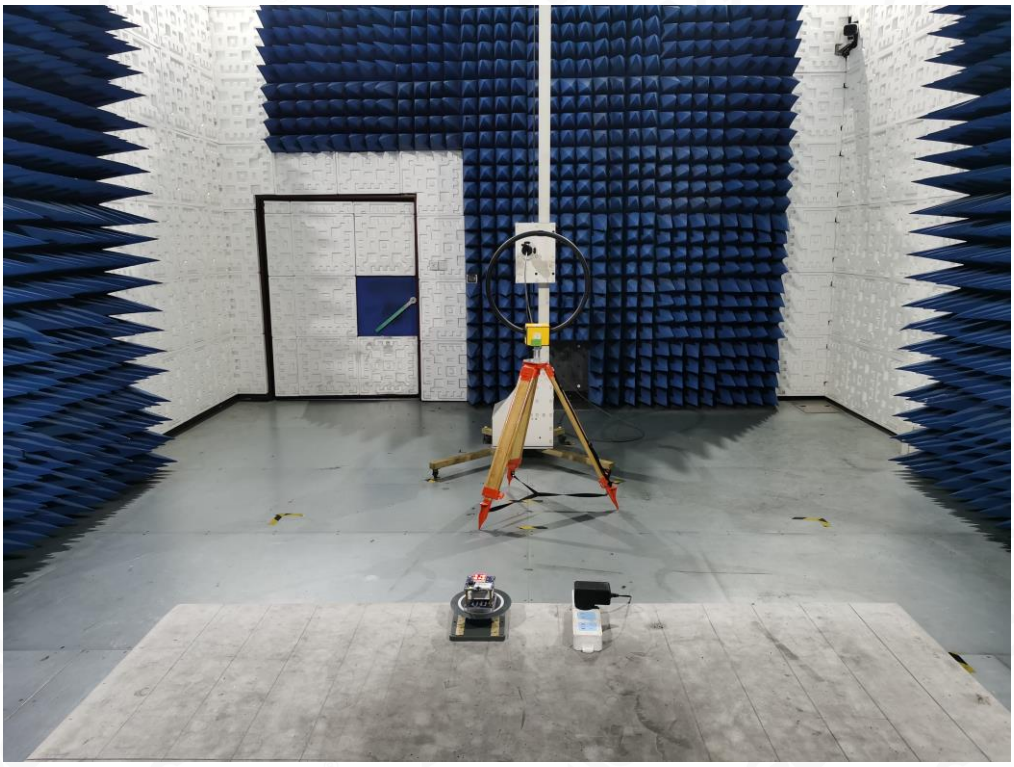
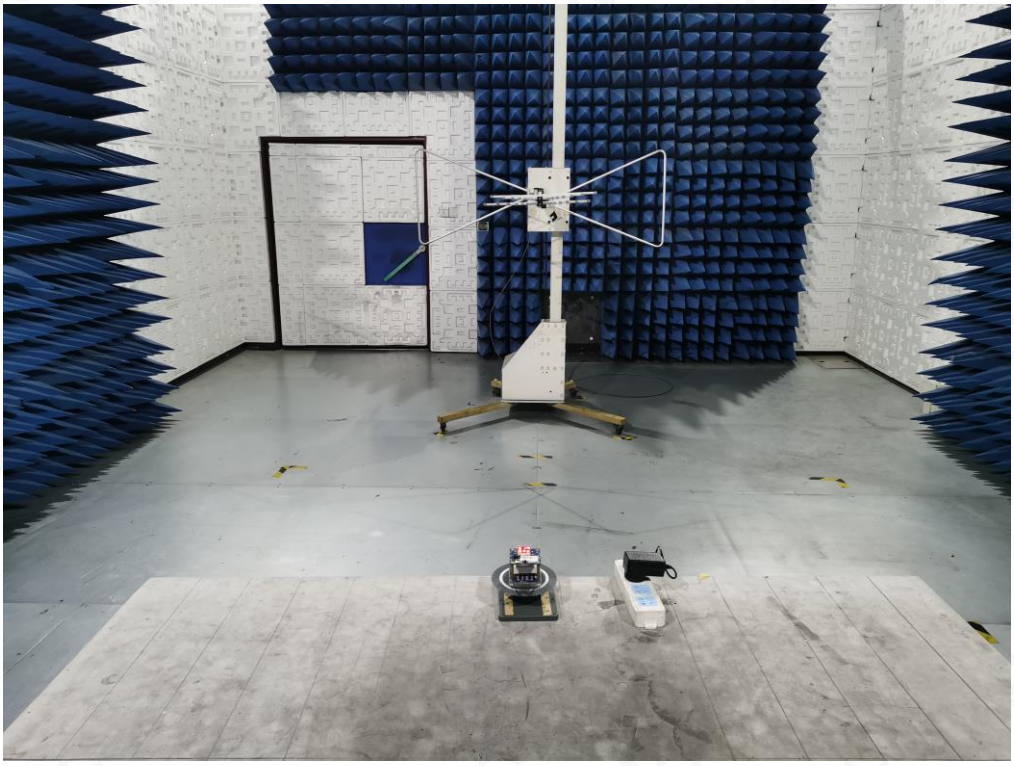
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ





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FCC LINE CONDUCTED EMISSION TEST SETUP

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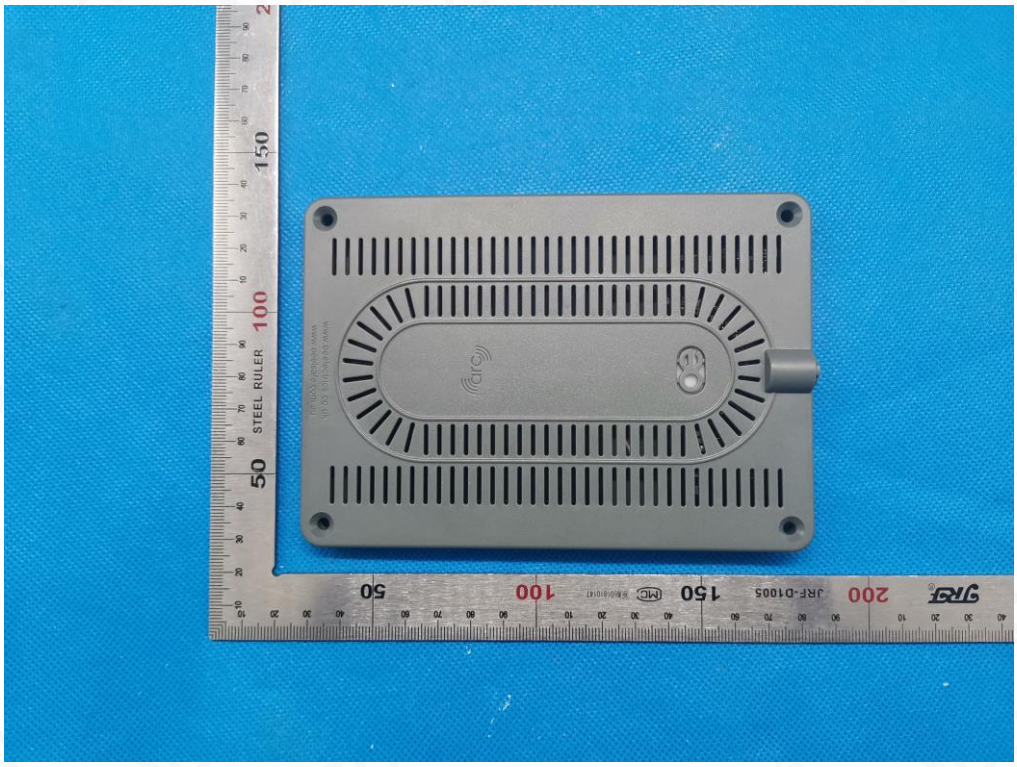
APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

TOP VIEW OF EUT



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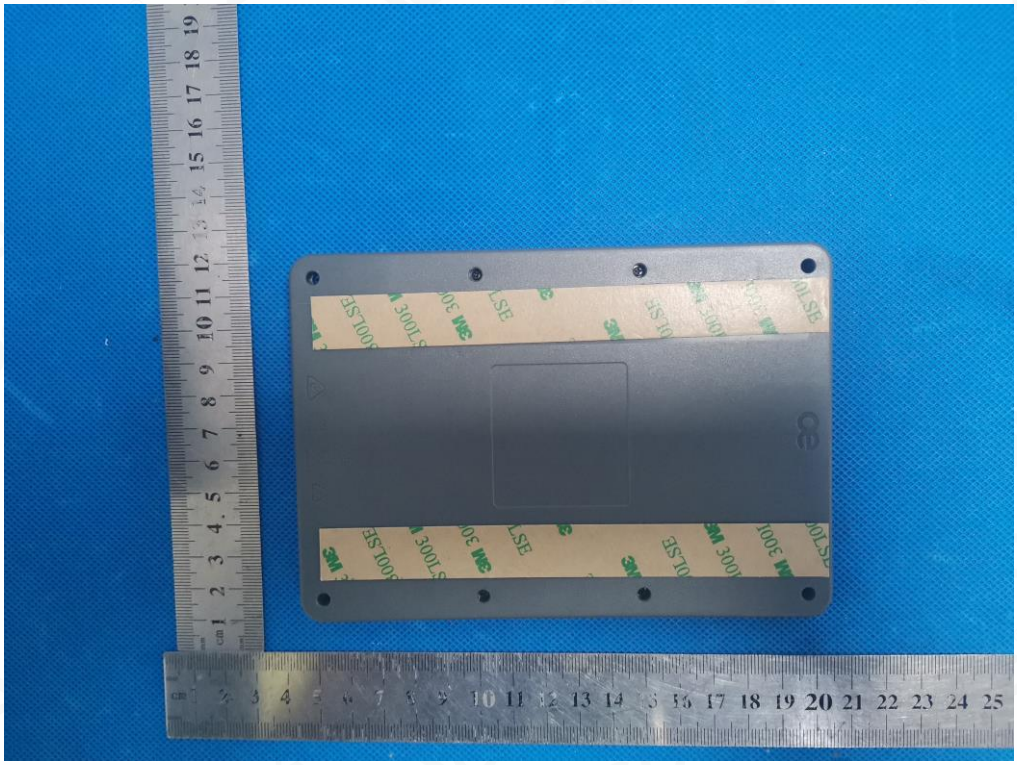
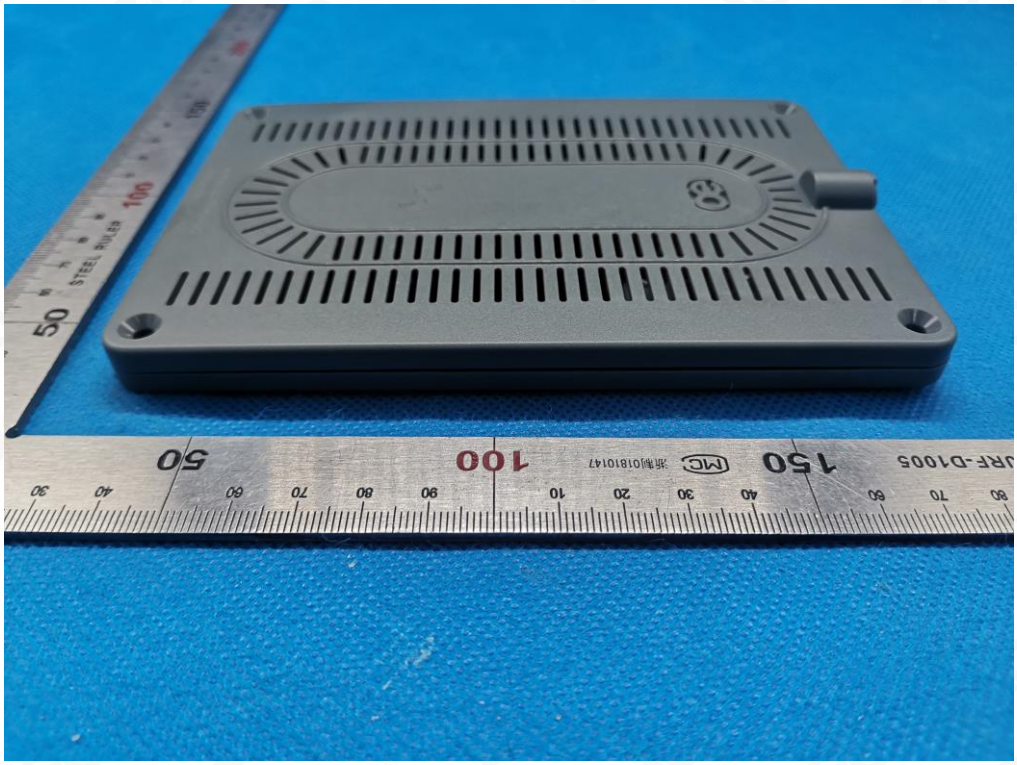
BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



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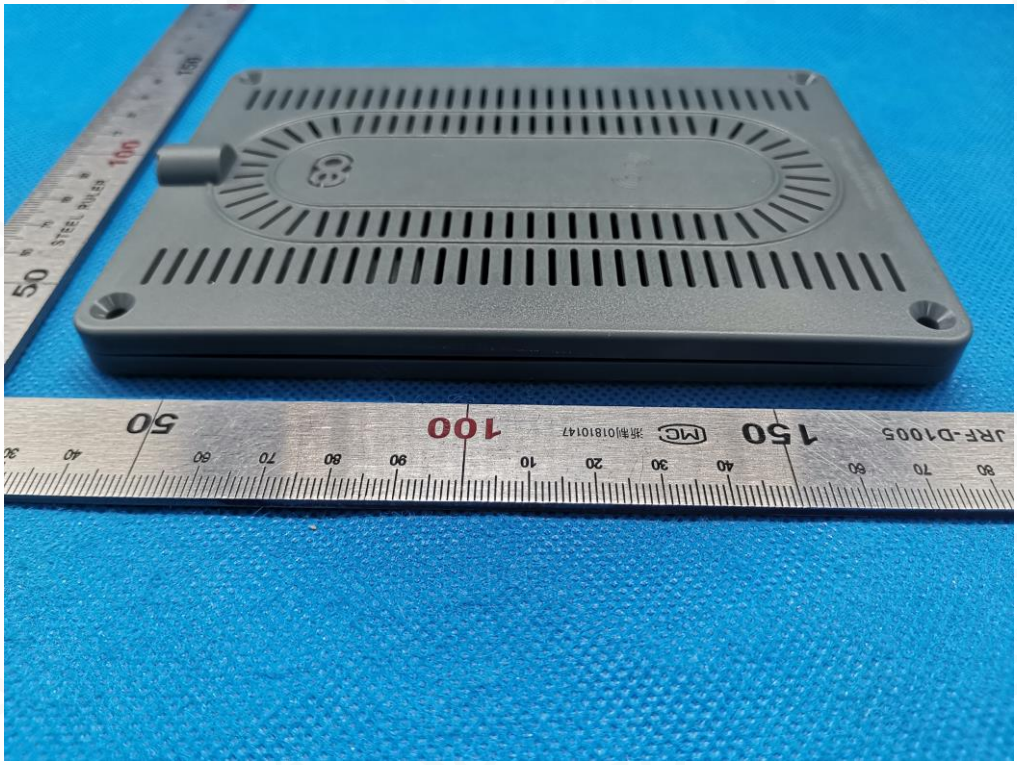
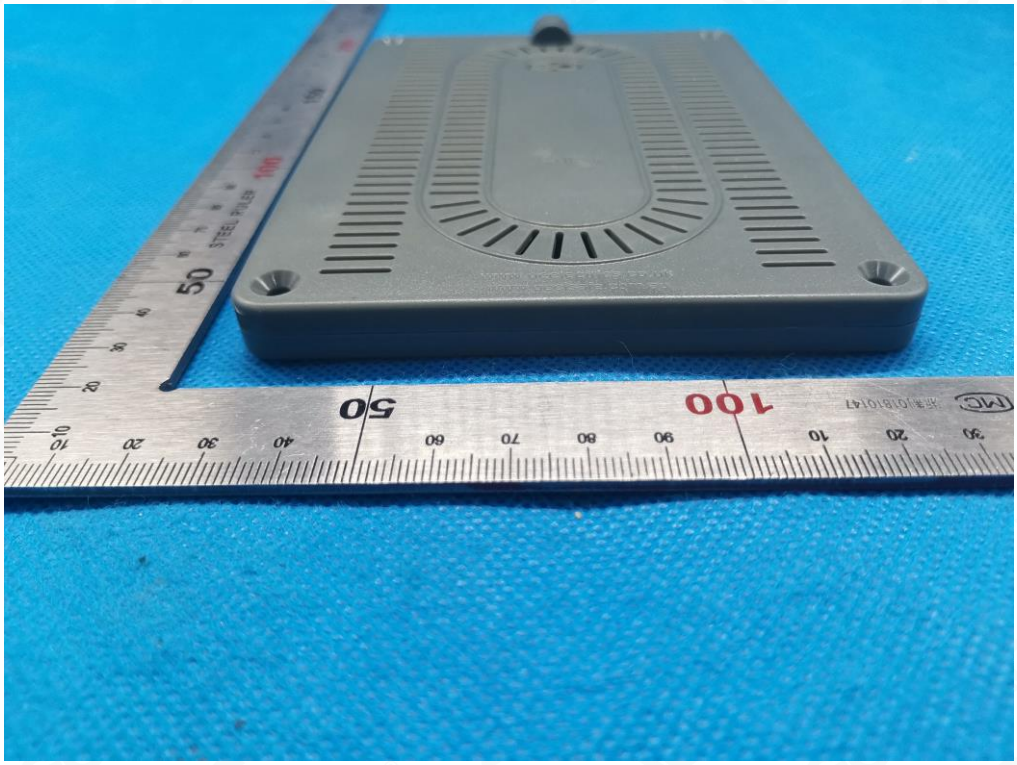
BACK VIEW OF EUT



LEFT VIEW OF EUT



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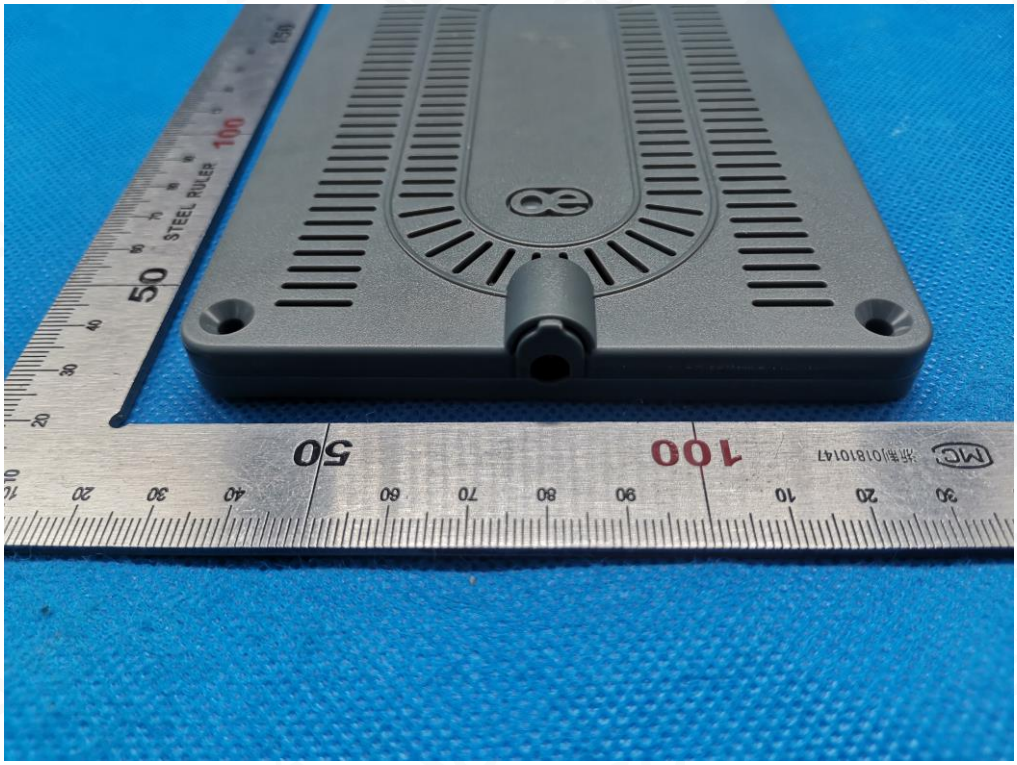
RIGHT VIEW OF EUT



VIEW OF EUT (PORT)

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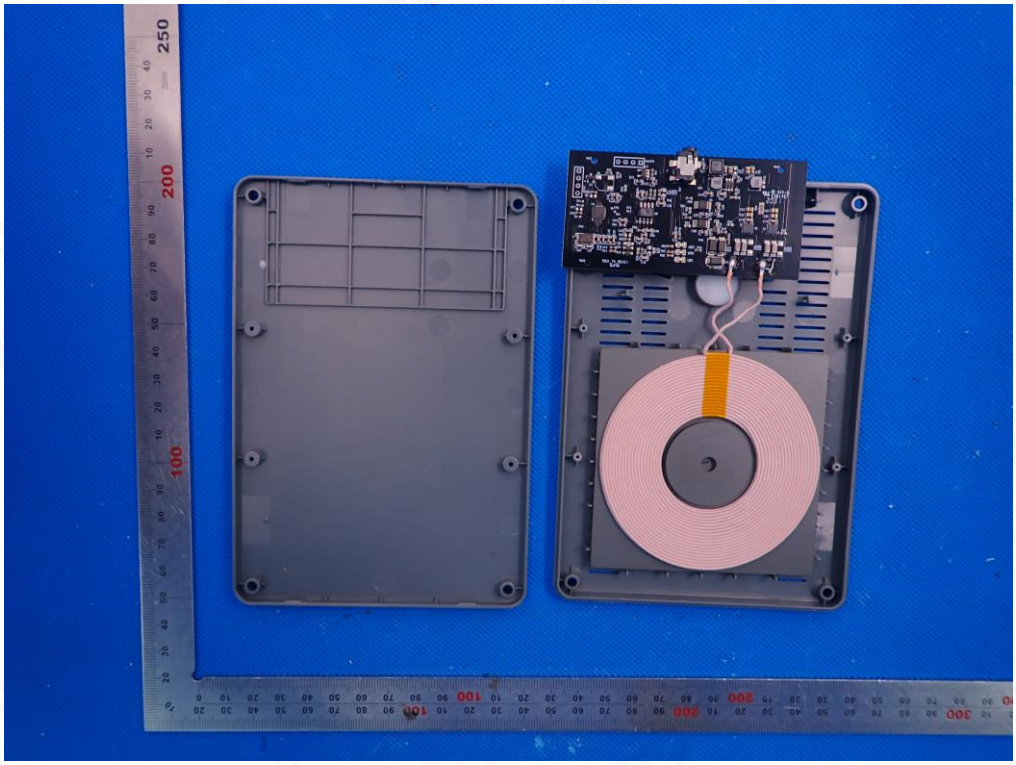
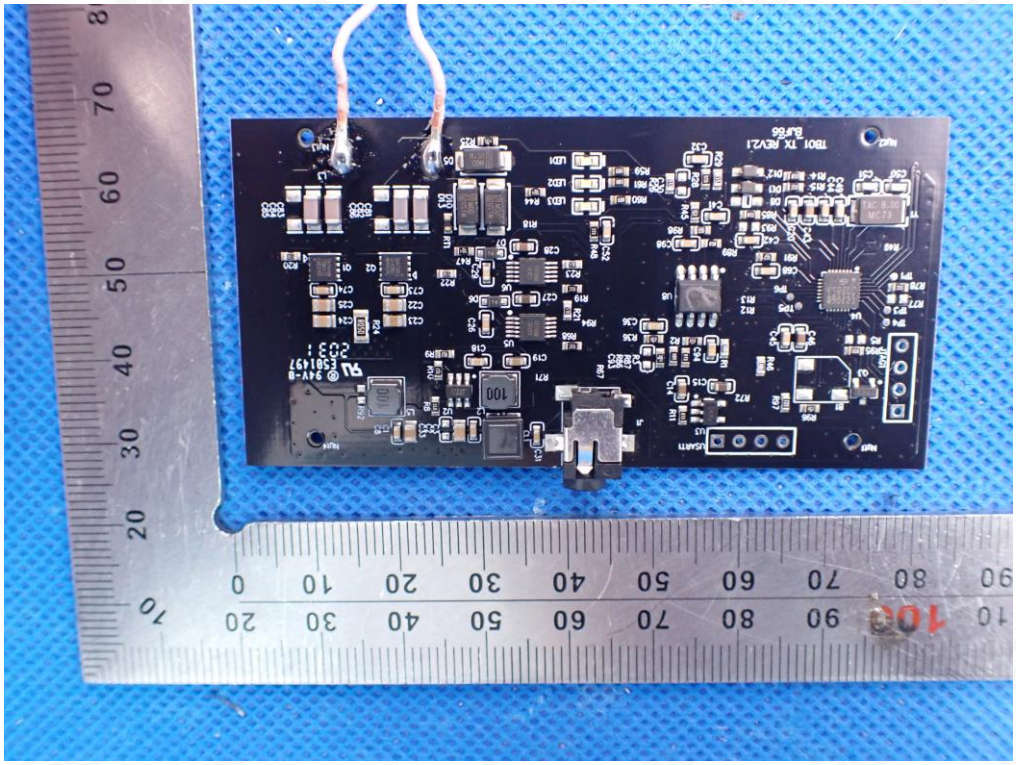
OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1



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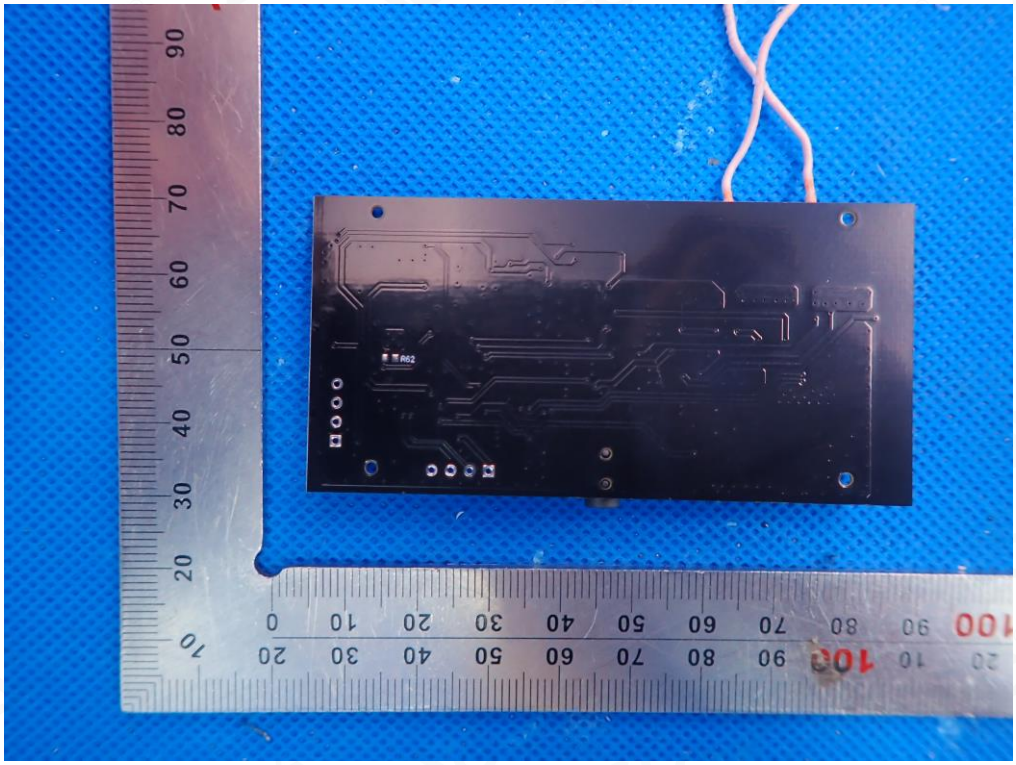
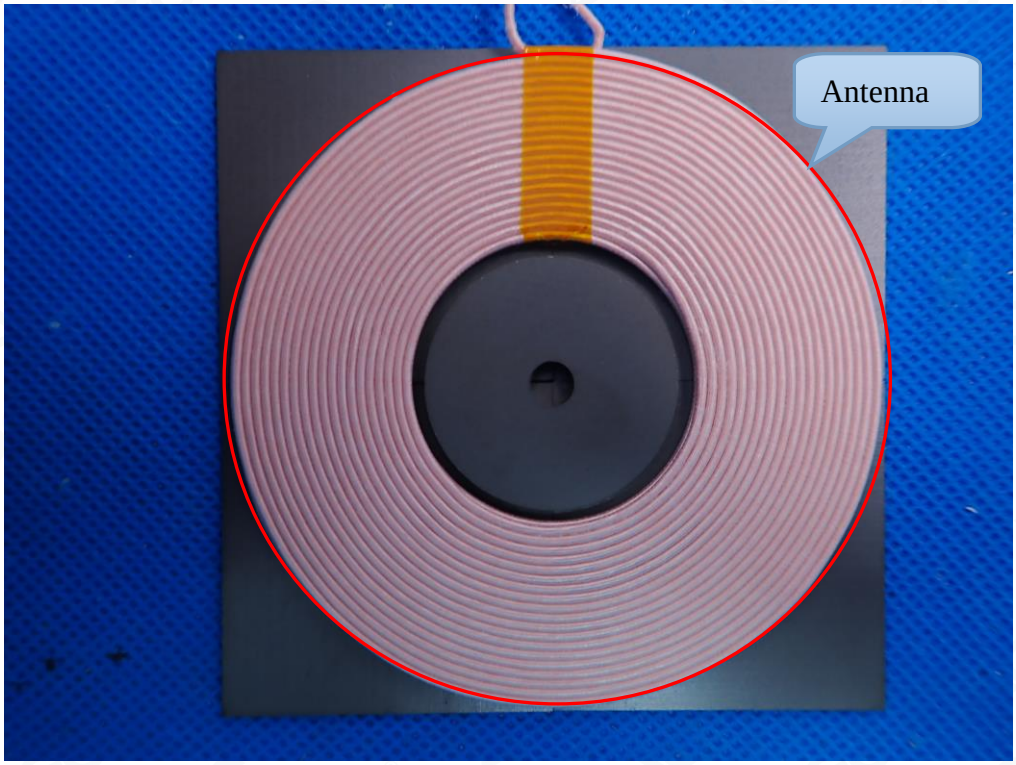
INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



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VIEW OF ADAPTER

----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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