

FCC Test Report

Report No.: AGC07307210701FE04

FCC ID : 2ALU4DX510A13

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : GRAVITY PHONE HOLDER & WIRELESS CHARGER
2-IN-1 KIT

BRAND NAME : AUTO DRIVE

MODEL NAME : VCW-510Y

APPLICANT : Huizhou Artsun Industrial Company Limited

DATE OF ISSUE : Jul 29, 2021

STANDARD(S) : FCC Part 15 Rules

TEST PROCEDURE(S)

REPORT VERSION : V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 29, 2021	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

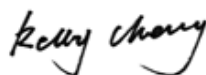
Applicant	Huizhou Artsun Industrial Company Limited
Address	No.2, Floor 14th, Unit one, Ruihe Commercial Square, No.1 Yandayi Road, Henan'an District, Huizhou 516007, Guangdong, China
Manufacturer	Huizhou Artsun Industrial Company Limited
Address	No.2, Floor 14th, Unit one, Ruihe Commercial Square, No.1 Yandayi Road, Henan'an District, Huizhou 516007, Guangdong, China
Factory	VOLANT ROC ELECTRONICS TECH CO., LTD
Address	A Building, QianLi Industrial Park, Sandong Town, Huizhou City 516025, Guangdong, China
Product Designation	GRAVITY PHONE HOLDER & WIRELESS CHARGER 2-IN-1 KIT
Brand Name	AUTO DRIVE
Test Model	VCW-510Y
Date of test	Jul. 21, 2021 to Jul. 29, 2021
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



Kelly Cheng
(Project Engineer)

Jul. 29, 2021

Reviewed By



Max Zhang
(Reviewer)

Jul. 29, 2021

Approved By



Forrest Lei
(Authorized Officer)

Jul. 29, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	111-205kHz
Test Frequency	131.5KHz
Maximum field strength	53.69dBuV/m(PK)@3m
Modulation	FSK
Number of channels	1
Antenna Designation	Coil Antenna (Met 15.203 Antenna requirement)
Hardware Version	V1.3
Software Version	V1.2.4
Power Supply	DC 5V-3A , DC 9V-2A, DC 12V-1.5A, DC 24V-2A
Wireless charger	10W (Max)

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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, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Wireless charging Mode(Full load) (Connect to adapter)
2	Wireless charging Mode(Half load) (Connect to adapter)
3	Wireless charging Mode(Null load) (Connect to adapter)
4	Wireless charging Mode(Full load) (Connect to car charger)
5	Wireless charging Mode(Half load) (Connect to car charger)
6	Wireless charging Mode(Null load) (Connect to car charger)
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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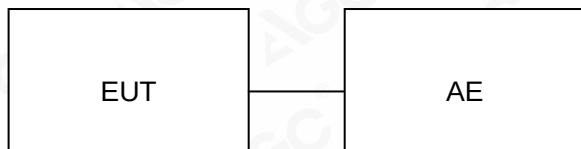
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure :



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	GRAVITY PHONE HOLDER & WIRELESS CHARGER 2-IN-1 KIT	VCW-510Y	2ALU4DX510A13	EUT
2	Wireless Load	N/A	15W	AE
3	Adapter	AD651	N/A	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	Sep. 29, 2020	Sep. 28, 2021
LISN	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 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, 2021	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ_EMC (Ver.RA-03A)	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1 TEST LIMIT

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/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(μ V)/m (Peak) 54.0 dB(μ V)/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

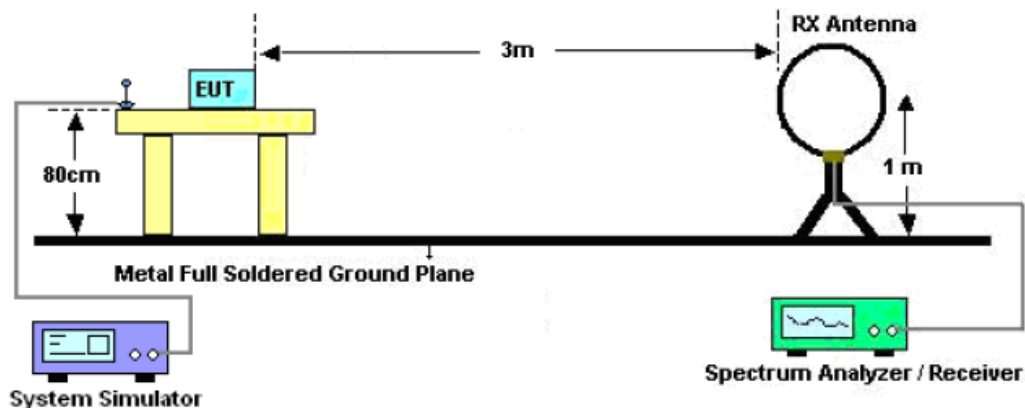
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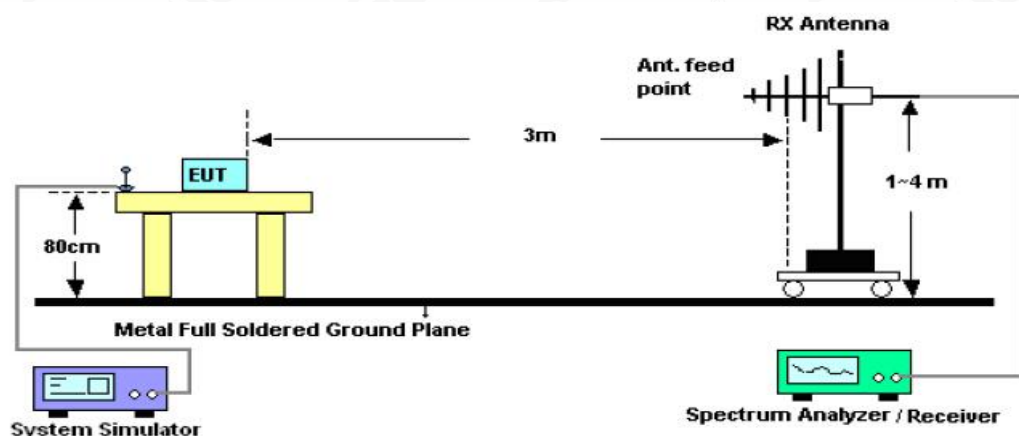


7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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7.4. TEST RESULT

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
0.1315	Face	43.29	10.40	53.69	105.23	-51.54	Pass
0.1315	Side	36.16	10.40	46.56	105.23	-58.67	Pass
0.1321	Face	36.15	13.50	49.65	105.19	-55.54	Pass
0.1321	Side	30.77	13.50	44.27	105.19	-60.92	Pass
0.1332	Face	18.54	12.50	31.04	105.11	-74.07	Pass
0.1332	Side	15.32	12.50	27.82	105.11	-77.29	Pass

RADIATED EMISSION BELOW 30MHZ

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: $\text{Level(dBuV/m)} = \text{Reading(dBuV)} + \text{Factor(dB/m)}$

$\text{Factor(dB/m)} = \text{Antenna Factor(dB/m)} + \text{Cable loss(dB)} + \text{Attenuation(dB) for Attenuator}$

$\text{Margin} = \text{Level} - \text{Limit}$

For 0.1315MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 105.23\text{dBuV/m.}$

For 0.1321MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 105.19\text{dBuV/m.}$

For 0.1332MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 105.11\text{dBuV/m.}$

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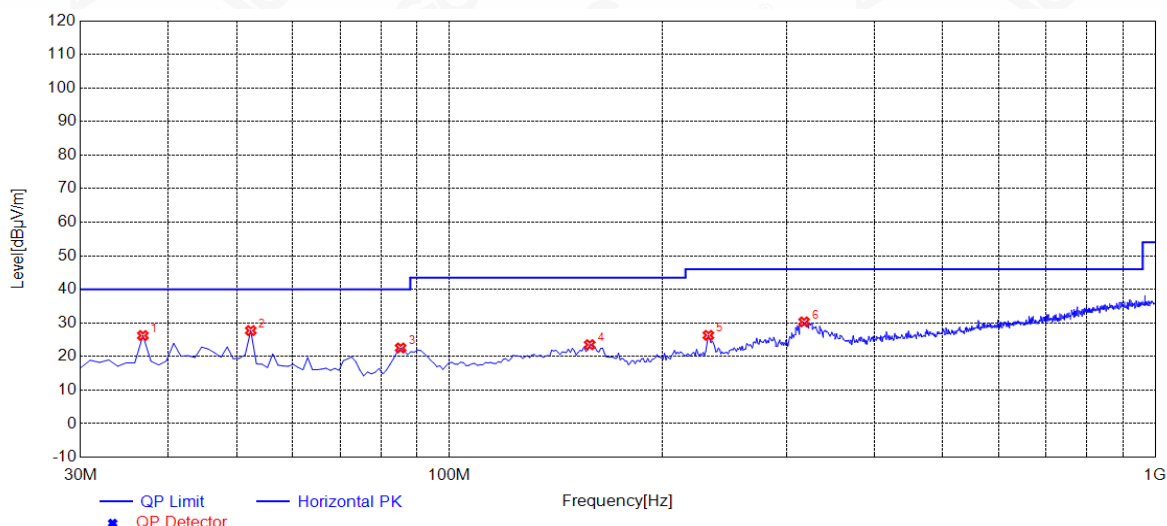
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RADIATED EMISSION 30MHz- 1GHz

EUT :	GRAVITY PHONE HOLDER & WIRELESS CHARGER 2-IN-1 KIT	Model Name.	VCW-510Y
Temperature :	25 °C	Relative Humidity:	60%
Pressure :	1010 hPa	Test Voltage :	DC 24V
Test Mode :	Mode 1	Polarization :	Horizontal



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	26.24	11.16	40.00	13.76	100	63	Horizontal
2	52.3100	27.72	11.49	40.00	12.28	100	326	Horizontal
3	85.2900	22.55	7.20	40.00	17.45	100	357	Horizontal
4	158.0400	23.52	14.93	43.50	19.98	100	305	Horizontal
5	232.7300	26.31	14.25	46.00	19.69	100	156	Horizontal
6	318.0900	30.32	16.61	46.00	15.68	100	188	Horizontal

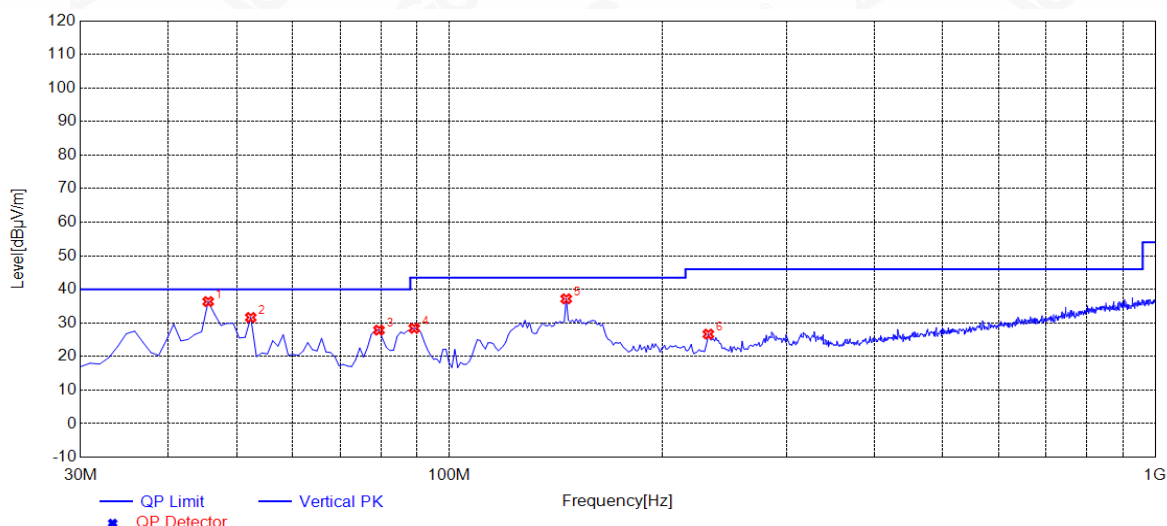
RESULT: PASS

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EUT :	GRAVITY PHONE HOLDER & WIRELESS CHARGER 2-IN-1 KIT	Model Name.	VCW-510Y
Temperature :	25 °C	Relative Humidity:	60%
Pressure :	1010 hPa	Test Voltage :	DC 24V
Test Mode :	Mode 1	Polarization :	Vertical



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	45.5200	36.35	11.80	40.00	3.65	100	267	Vertical
2	52.3100	31.62	11.49	40.00	8.38	100	1	Vertical
3	79.4700	27.85	7.26	40.00	12.15	100	116	Vertical
4	89.1700	28.41	7.26	43.50	15.09	100	1	Vertical
5	146.4000	37.18	14.88	43.50	6.32	100	358	Vertical
6	232.7300	26.66	14.25	46.00	19.34	100	105	Vertical

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Limit-Level

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

All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.

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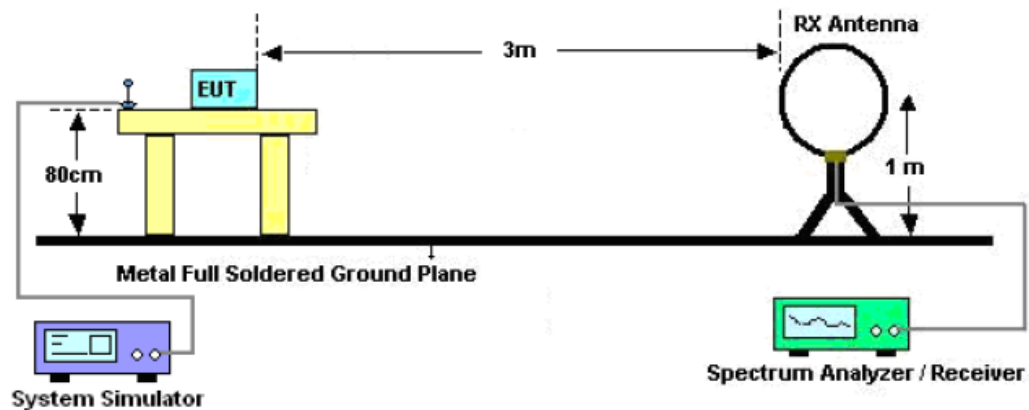


8. 20DB BANDWIDTH

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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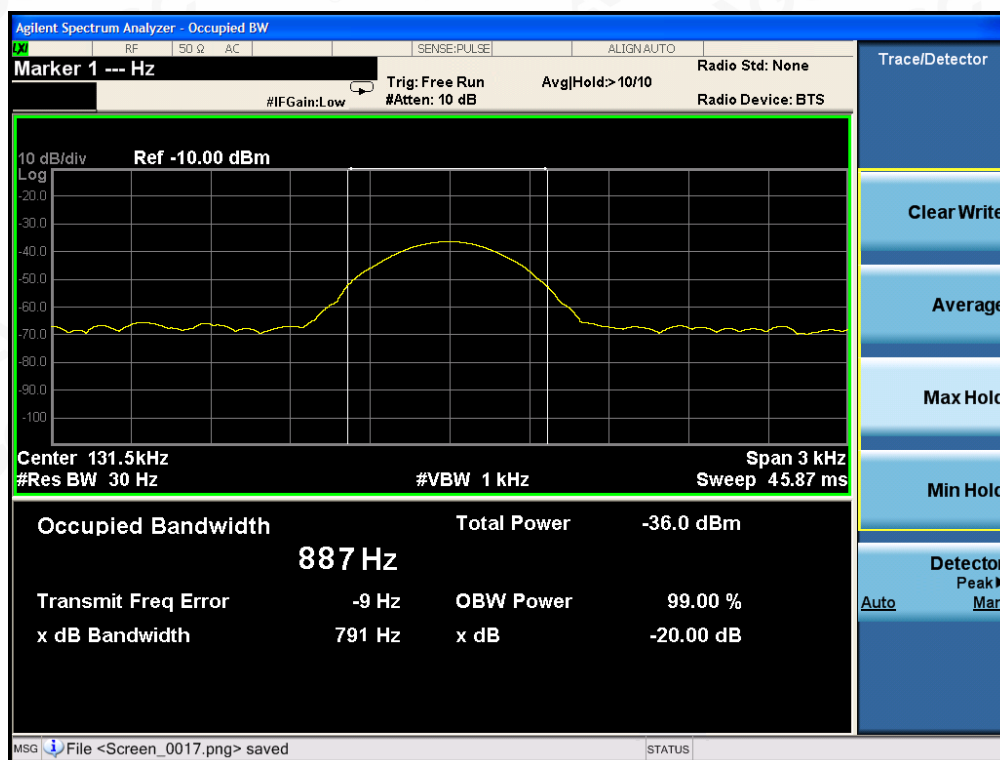


8.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	FSK

Test Data (Hz)		Criteria
Operate Channel	791	PASS

TEST PLOT OF BANDWIDTH



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9. FCC LINE CONDUCTED EMISSION TEST

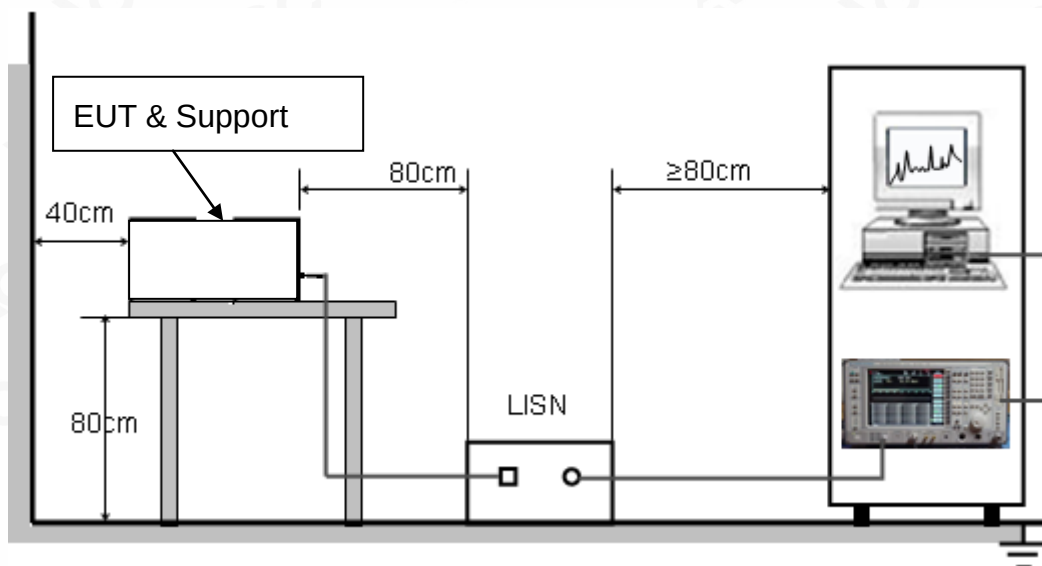
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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/60Hz power 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.

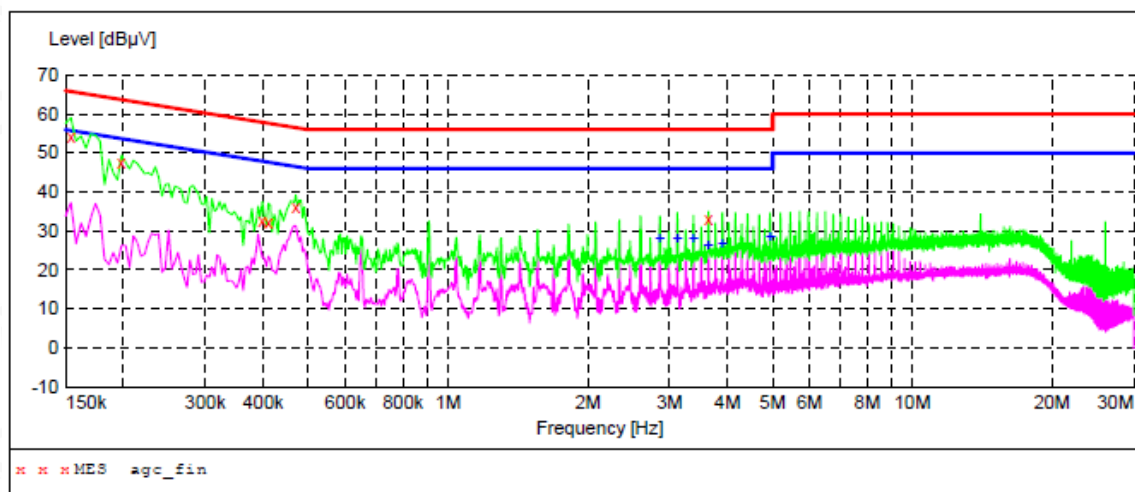
9.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

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.



9.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

2021/7/24 17:26

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.154000	54.10	6.9	66	11.7	QP	L1
0.198000	47.40	6.6	64	16.3	QP	L1
0.398000	32.80	5.7	58	25.1	QP	L1
0.410000	32.30	5.7	58	25.3	QP	L1
0.470000	36.20	5.5	57	20.3	QP	L1
3.638000	33.10	6.5	56	22.9	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2021/7/24 17:26

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
2.858000	28.10	6.5	46	17.9	AV	L1
3.118000	28.00	6.5	46	18.0	AV	L1
3.378000	28.40	6.5	46	17.6	AV	L1
3.638000	26.50	6.5	46	19.5	AV	L1
3.898000	26.80	6.5	46	19.2	AV	L1
4.938000	28.60	6.6	46	17.4	AV	L1

RESULT: PASS

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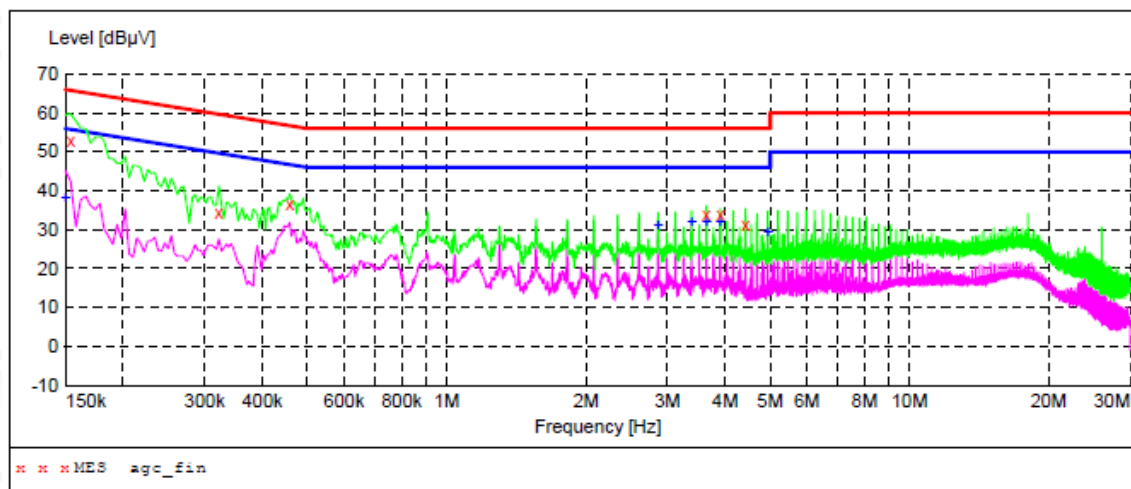
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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

2021/7/24 17:30

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.154000	52.80	6.9	66	13.0	QP	N
0.322000	34.30	5.9	60	25.4	QP	N
0.458000	36.40	5.5	57	20.3	QP	N
3.642000	34.10	6.5	56	21.9	QP	N
3.902000	33.90	6.5	56	22.1	QP	N
4.422000	31.10	6.5	56	24.9	QP	N

MEASUREMENT RESULT: "agc_fin2"

2021/7/24 17:30

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line
0.150000	38.50	6.9	56	7.5	AV	N
2.862000	31.50	6.5	46	14.5	AV	N
3.382000	32.00	6.5	46	14.0	AV	N
3.642000	32.10	6.5	46	13.9	AV	N
3.902000	32.00	6.5	46	14.0	AV	N
4.942000	29.50	6.6	46	16.5	AV	N

RESULT: PASS

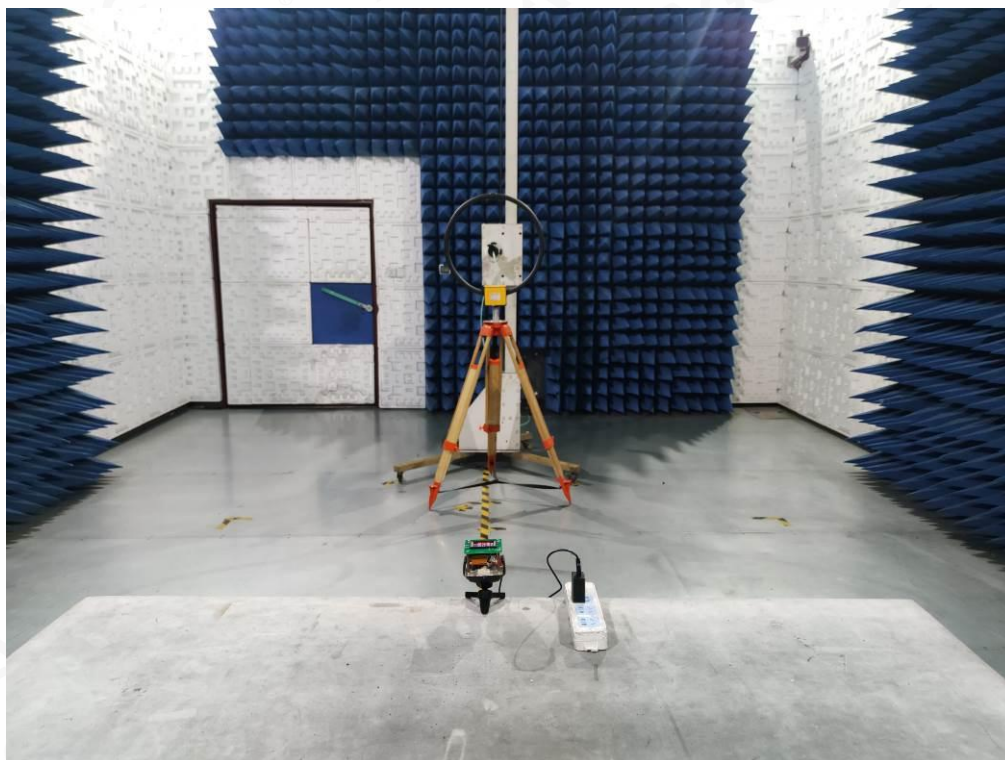
Note: All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.

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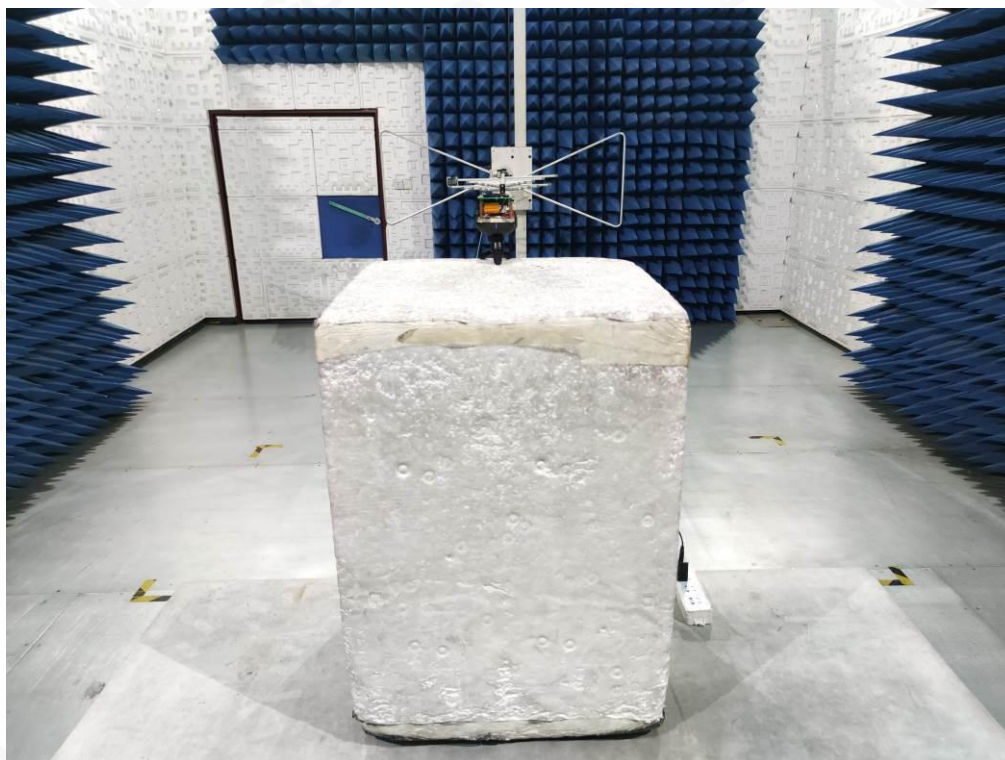


APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP 9kHz-30MHZ



FCC RADIATED EMISSION TEST SETUP 30MHz-1GHZ



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FCC LINE CONDUCTED EMISSION TEST SETUP



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APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT



EXTERNAL VIEW-1 OF EUT



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EXTERNAL VIEW-2 OF EUT



EXTERNAL VIEW-3 OF EUT



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EXTERNAL VIEW-4 OF EUT



EXTERNAL VIEW-5 OF EUT



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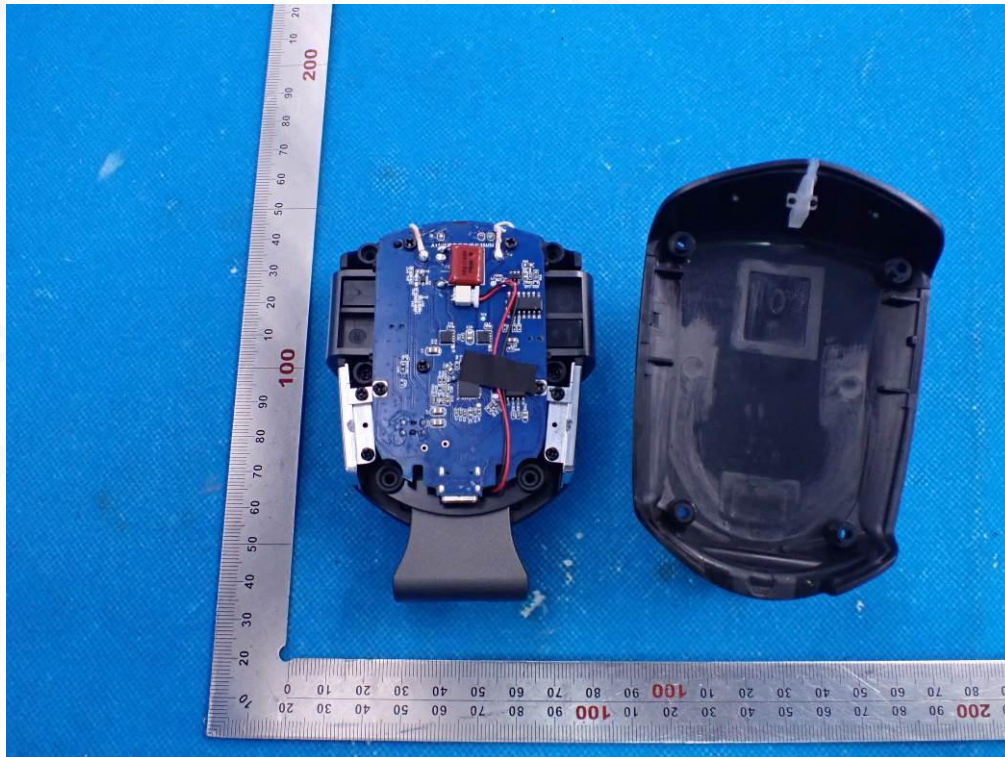
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EXTERNAL VIEW-6 OF EUT



INTERNAL VIEW-1 OF EUT

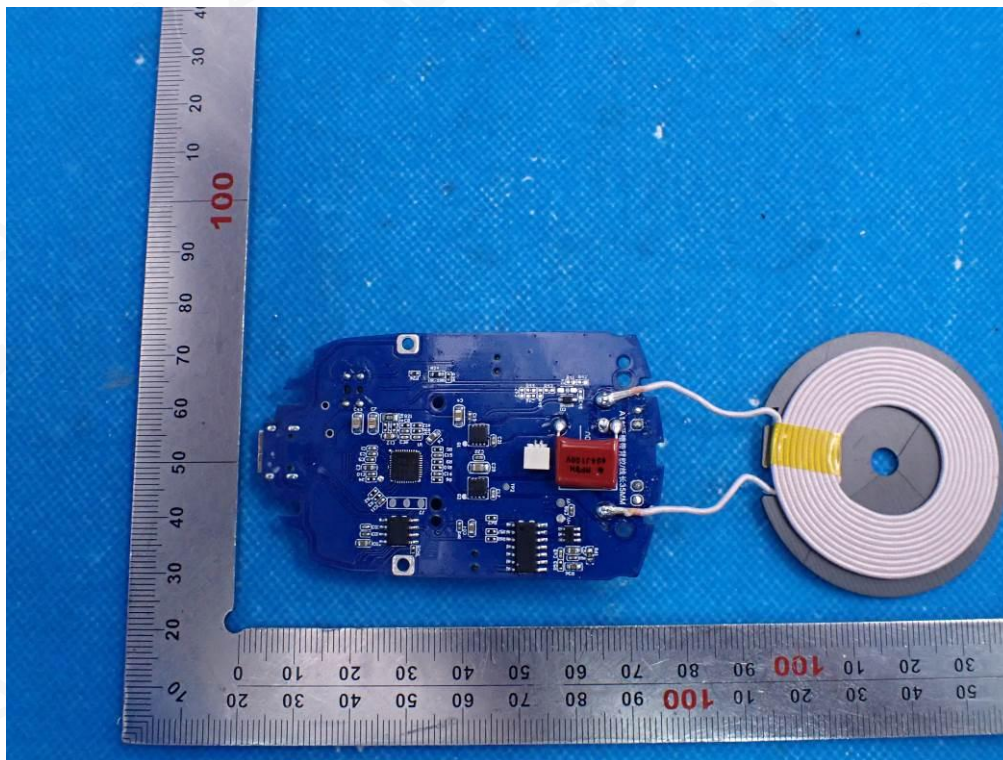


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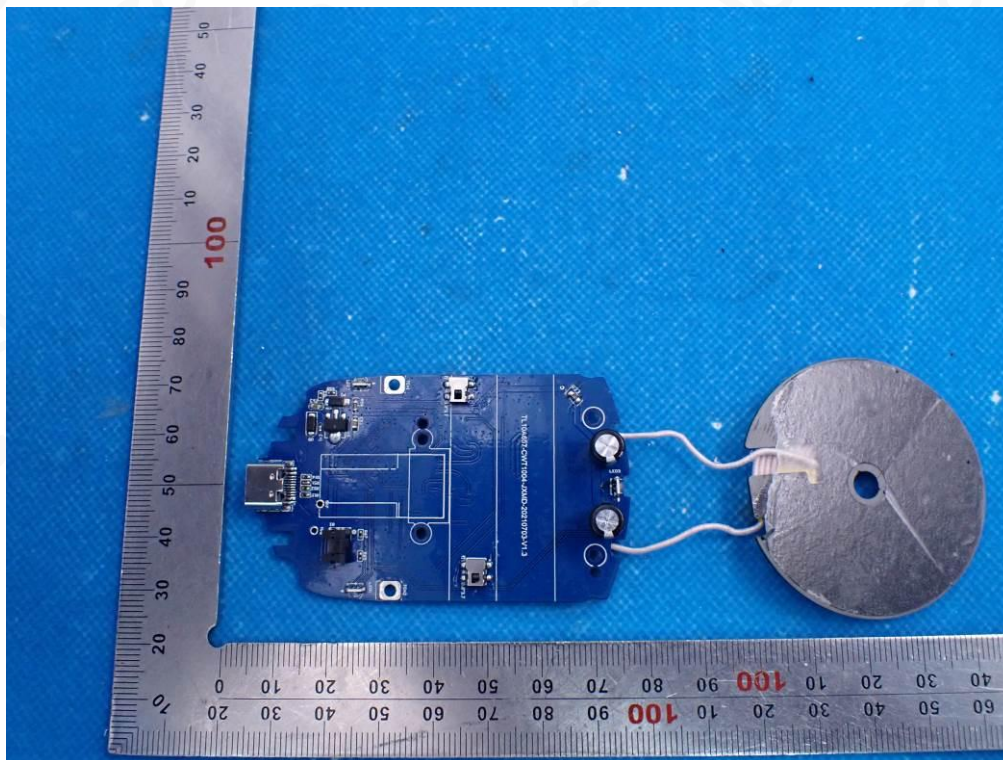
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INTERNAL VIEW-2 OF EUT



INTERNAL VIEW-3 OF EUT

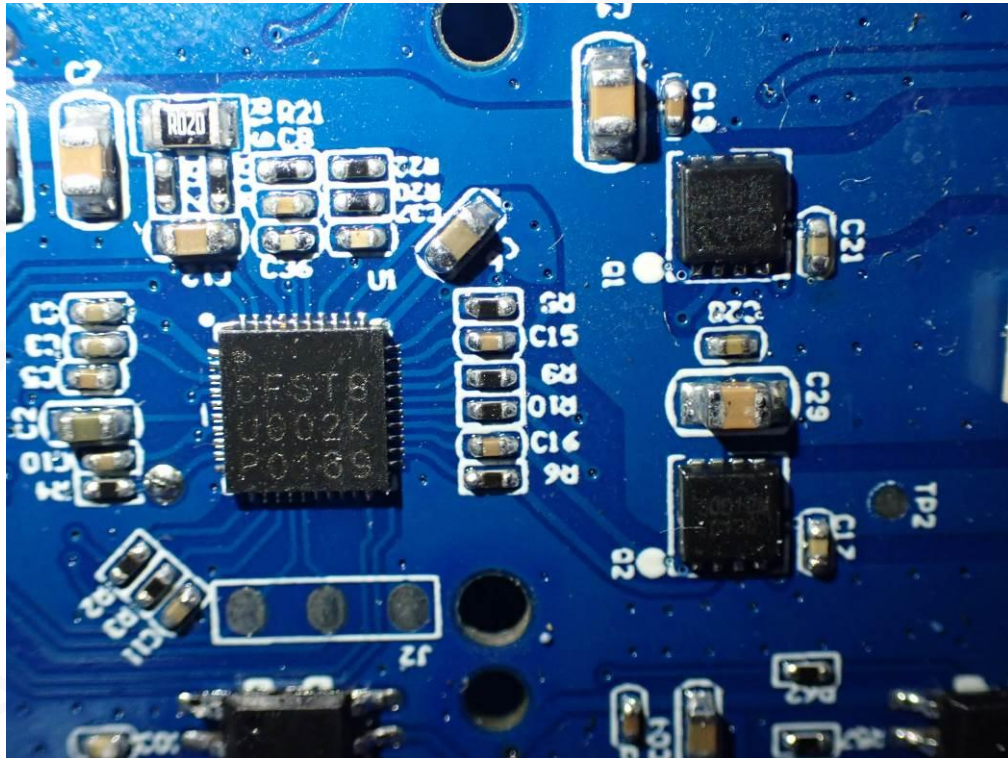


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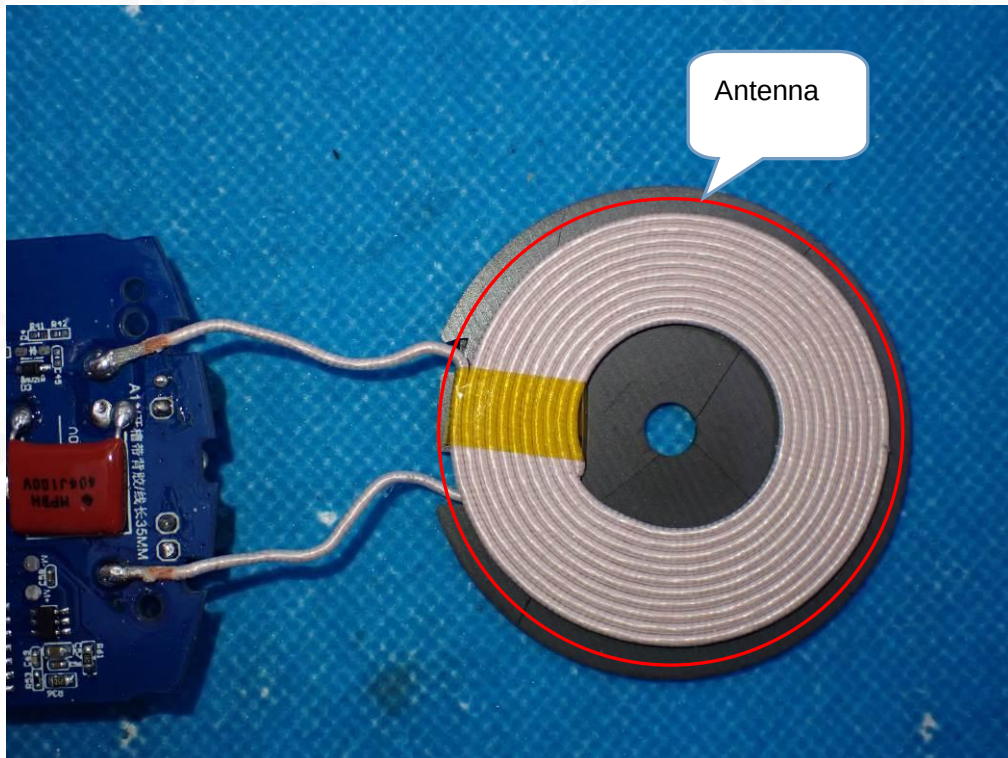
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INTERNAL VIEW-4 OF EUT



INTERNAL VIEW-5 OF EUT

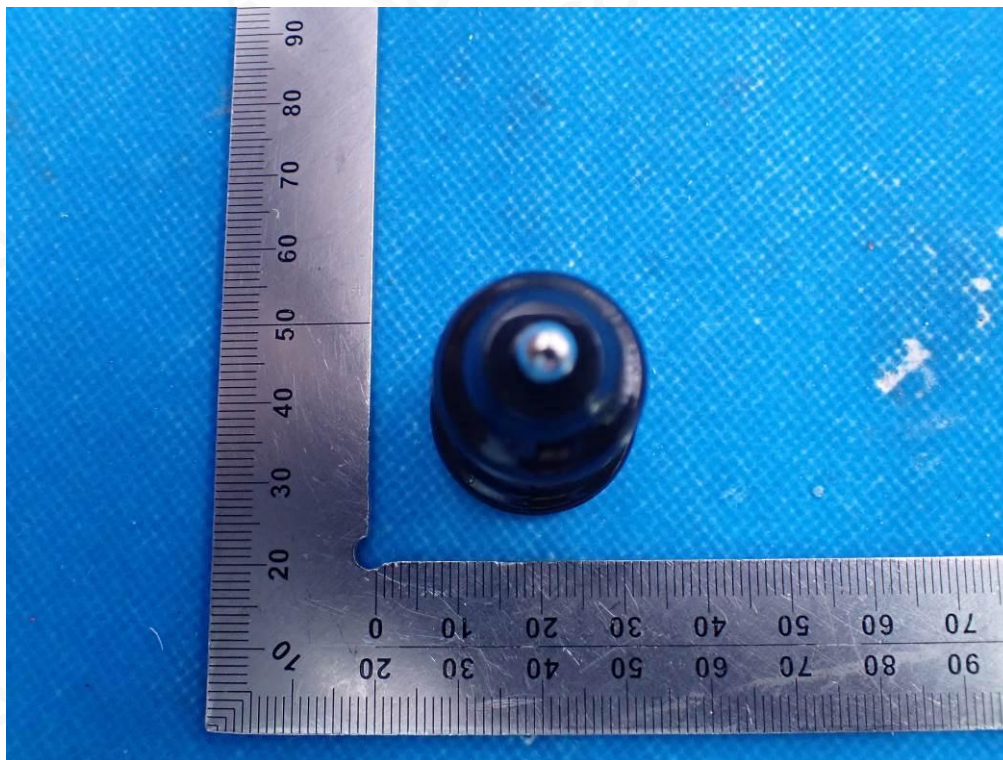


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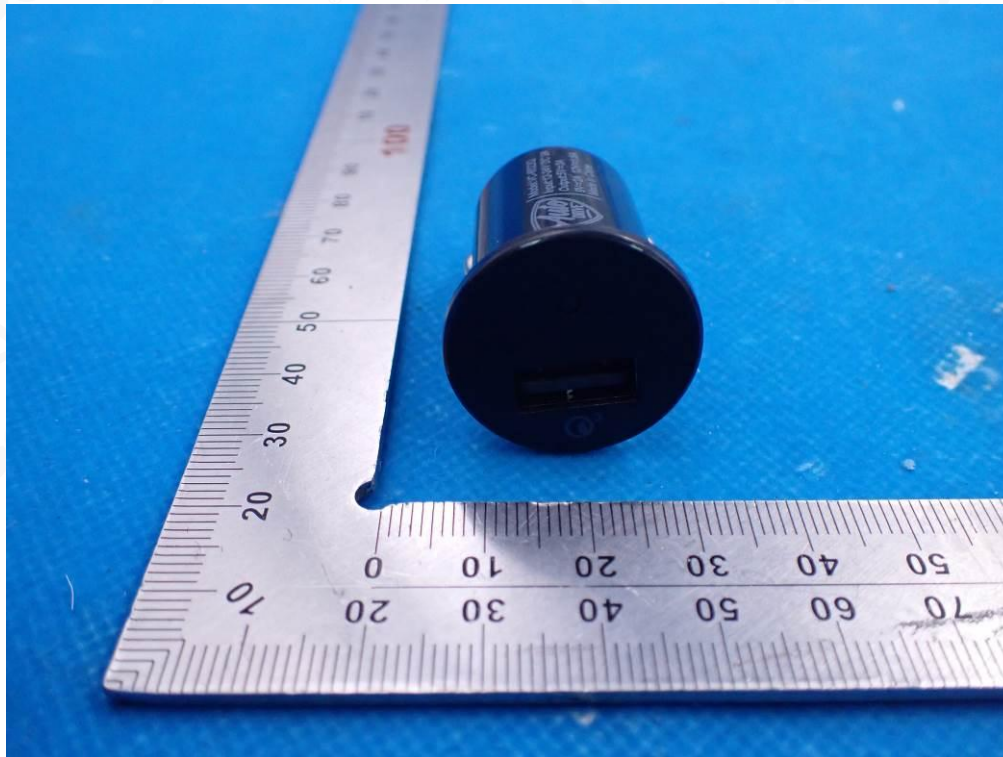
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EXTERNAL VIEW-1 OF EUT



EXTERNAL VIEW-2 OF EUT



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