

TEST REPORT

 CTK Co., Ltd. The First Leader of Global Regulatory Compliance	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9871 Fax: +82-31-624-9501	Report No.: CTK-2017-00259 Page (1) / (35) Pages	
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1. Client

- Name : Cresyn Co., Ltd.
- Address : 5 Gangnam-dearo 107-gil, Seocho-gu, Seoul, Korea
- Date of Receipt : 2017-01-20



2. Manufacturer

- Name : Cresyn Co., Ltd.
- Address : 5 Gangnam-dearo 107-gil, Seocho-gu, Seoul, Korea

3. Use of Report : For FCC DoC Report, IC Report

4. Test Sample / Model: Bluetooth Headset / BT 390

5. Date of Test : 2017-01-31

6. FCC ID : V2R-BT390

7. Test Standard(method) used : FCC Part 15 Subpart B ICES-003, Issue 6

8. Testing Environment: refer to 10 pages to 16 pages

9. Test Results : refer to 11 pages to 16 pages

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Choi Anjin: (Signature) EMC Test Engineer	Approved by Lee Eunwon: (Signature) Technical Manager
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2017-02-13

Republic of KOREA **CTK Co., Ltd.**

 CTK Co., Ltd. The Prime Leader of Global Regulatory Compliance	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9871 Fax: +82-31-624-9501	Report No.: CTK-2017-00259 Page (2) / (35) Pages	
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REPORT REVISION HISTORY

Date	Revision	Page No
2017-02-13	Issued (CTK-2017-00259)	All

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TABLE OF CONTENTS

REPORT REVISION HISTORY.....	2
1.0 General Product Description.....	4
1.1 Model Differences.....	4
1.2 Device Modifications	4
1.3 EUT Configuration(s)	5
1.4 Test Software	5
1.5 EUT Operating Mode(s)	5
1.6 Configuration.....	6
1.7 Calibration Details of Equipment Used for Measurement.....	7
1.8 Test Facility	7
1.9 Measurement Procedure	7
1.10 Laboratory Accreditations and Listings.....	8
1.11 Measurement Uncertainty.....	8
2.0 EMC Test Regulations/Standards.....	9
3.0 Results of Individual Test.....	10
3.1 Conducted Voltage Emissions of Mains ports.....	10
3.2 Radiated Electric Field Emissions (Below 1 GHz).....	16
3.3 Radiated Electric Field Emissions (Above 1 GHz).....	19
APPENDIX A - Test Setup Photos and Configuration.....	20
Conducted Voltage Emissions of Mains Ports.....	21
Radiated Electric Field Emissions (Below 1 GHz)	22
Radiated Electric Field Emissions (Above 1 GHz).....	24
APPENDIX B – EUT Photographs.....	25
EUT External Photographs	26
EUT Internal Photographs	29
PCB.....	30
LABEL.....	34
SET	35

1.0 General Product Description

No.	ITEM		APPLICATION	
1	Test Sample		Wireless Compact Headphones	
2	Model		BT 390	
3	Variant Model		-	
4	Dimensions (W x L x H)		144 mm × 65 mm × 174 mm	
5	Mobility		☒ Table-top ☐ Floor-standing ☐ Built-in ☒ Portable	
6	Maximum Clock Frequency		26 MHz	
7	Electrical Ratings	EUT	Input:	DC 3.7 V, 510 mAh(Battery)
			Output:	-
		AC/DC ADAPTER	Input:	AC 100 V - AC 240 V, 50 Hz - 60 Hz, 0.5 A
			Output:	DC 5 V, 2A
8	Test Voltage / Frequency		Voltage:	AC 120 V, 510 mAh (Battery)
			Frequency:	60 Hz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

[Charging Mode]

Device	Model No.	Serial No.	Manufacturer
AC/DC ADAPTER	EP-TA20KWK	R37G5TR9271HM3	HAEM VINA Co.,Ltd.

[Audio in Mode]

Device	Model No.	Serial No.	Manufacturer
Mobile Phone	GT-V7100	RV1D75MWW6B	Samusng Electronics Co., Ltd.

☒ Cable Description

[Charging Mode]

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	Micro USB	AC/DC ADAPTER	USB	1.0	S	N
2	AC/DC ADAPTER	AC POWER	AC Mains	-	-	-	-

[Audio in Mode]

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	Audio in	Mobile Phone	Audio out	1.2	S	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

- ☐ EMC Test V 1.0
- ☐ Display Test Patterns - V1.5
- ☐ Ping.exe
- ☒ Not applicable

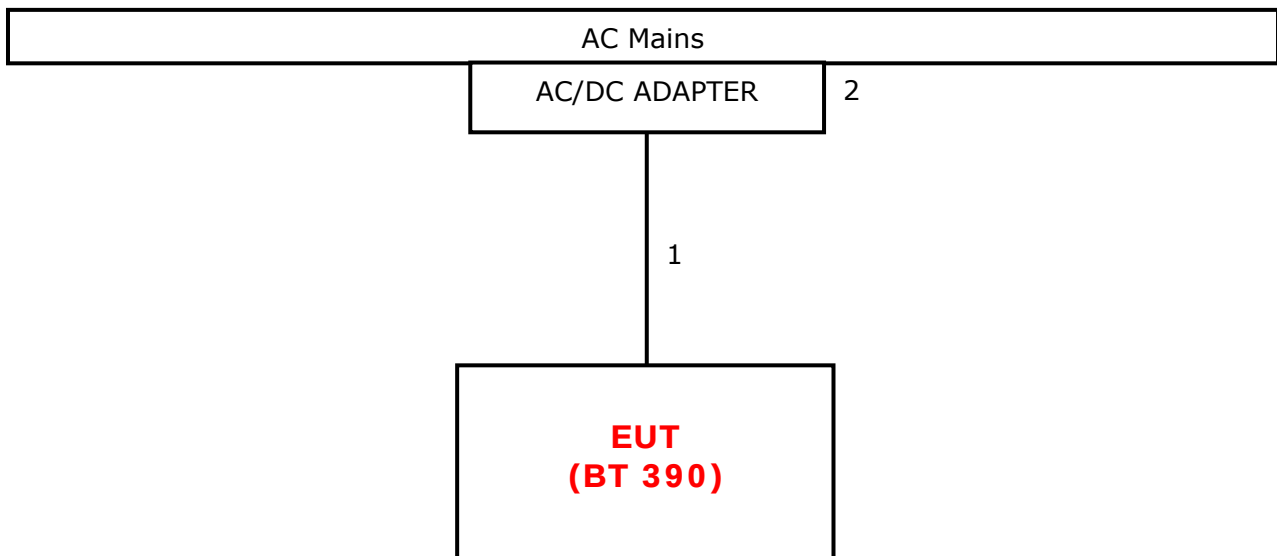
1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following condition s:

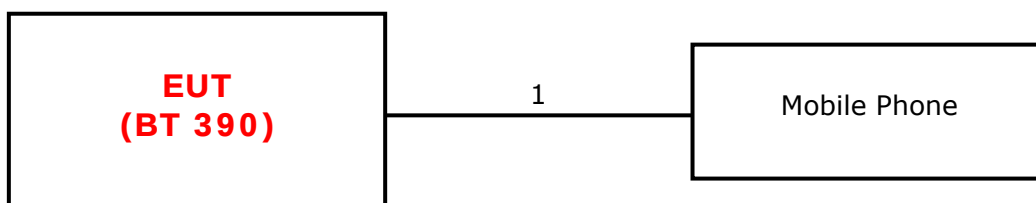
- ☒ Charging Mode
- ☒ Audio in Mode

1.6 Configuration

[Charging Mode]



[Audio in Mode]



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1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at (Ho-dong) 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.

Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Semi-Anechoic Chamber.

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

Note #1: These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

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1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	
CANADA	IC	ICES-003, Issue 6 EMI (Electromagnetic Interference / Emission)	8737A-2	

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	9 kHz to 150 kHz	2.20 dB (C.L.: Approx. 95 %, $k=2$)
Conducted Emission	150 kHz to 30 MHz	2.62 dB (C.L.: Approx. 95 %, $k=2$)
Disturbance Power	30 MHz to 300 MHz	3.46 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 MHz to 1000 MHz	4.02 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 GHz Above	4.98 dB (C.L.: Approx. 95 %, $k=2$)

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2.0 EMC Test Regulations / Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 15 Subpart B ICES-003, Issue 6 ☐ Class A ☒ Class B	Conducted Voltage Emissions	☒	☒ MET ☐ NOT MET
	Radiated Electric Field Emissions	☒	☒ MET ☐ NOT MET

3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date

2017-01-31

Test Location

Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2016-02-25	2017-02-25	☐
LISN	ENV216	Rohde & Schwarz	101235	2016-05-14	2017-05-14	☐
LISN	ENV216	Rohde & Schwarz	101236	2016-05-14	2017-05-14	☐
EMI Test Receiver	ESR7	Rohde & Schwarz	101088	2016-05-14	2017-05-14	☒
LISN	ENV216	Rohde & Schwarz	101151	2016-11-01	2017-11-01	☒
LISN	ESH3-Z5	Rohde & Schwarz	100207	2016-11-01	2017-11-01	☐
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2016-10-31	2017-10-31	☐
LISN	ENV216	Rohde & Schwarz	101760	2016-02-05	2017-02-05	☐
LISN	NNLK 8121	SCHWARZBECK	8121-644	2016-05-14	2017-05-14	☐
Pulse Limiter	VTSD 9561-F	SCHWARZBECK	9561-F064	2016-05-13	2017-05-13	☐
LISN	ENV216	Rohde & Schwarz	101150	2016-02-05	2017-02-05	☐

Test Software

ESCI7, ESCI3 : EMC32 Ver. 8.50.0

ESR7 : EMC32 Ver. 8.53.0

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Setting

IF Band Width: 9 kHz

Climate Condition

Temperature: (20 ± 1) °C

Relative Humidity: (34 ± 1) %

Atmospheric Pressure: 99 kPa

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Report No.:
CTK-2017-00259
Page (11) / (35) Pages

Test Result

The requirements are: ☒ MET ☐ NOT MET

Test Mode	Frequency (MHz)	Measured Data (dB μ V)	Margin (dB)	Remark
Charging Mode	13.438 500	41.7	18.3	Quasi-peak

The Result is calculated by using the following formula;

* Result = Limit – Margin (Result included the correction factor)

* Correction factor = Cable Loss + Insertion loss of LISN

Test Data

[Charging Mode] [Line: L1]

EMI Auto Test(12)

1 / 2

Test Report

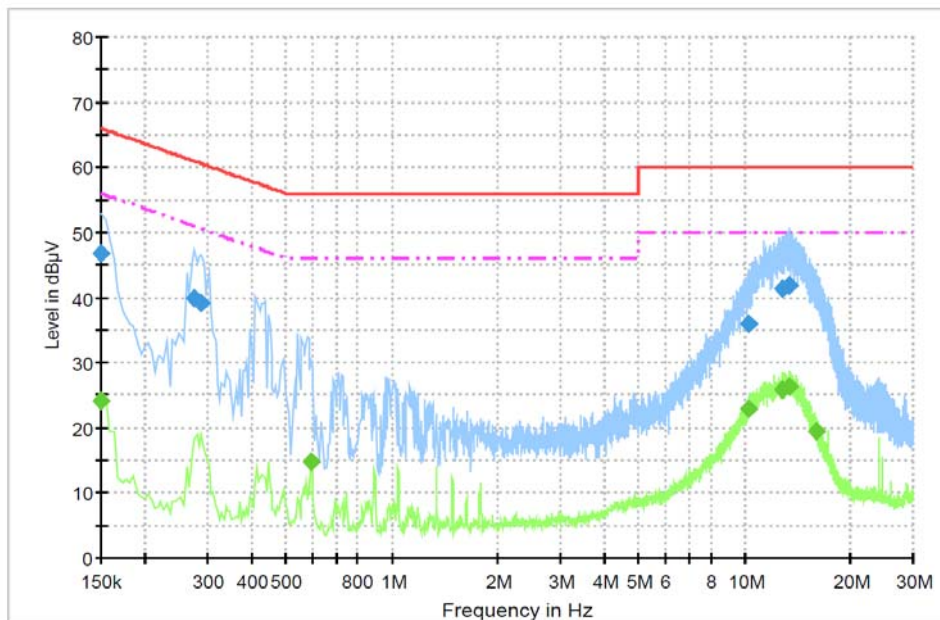
Common Information

Test Model Name: BT 390
Test Mode: Charging
Manufacturer: Cresyn Co., Ltd.
Tester: Choi Anjin

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101151) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESR 7 [ESR 7]
@ GPIB0 (ADR 23), SN 1316.3003K07/101088, FW 2.27 SP2
Signal Path: ESR 7-ENV216 FO(101151)
FW 1.0
Correction Table: 2CE Cable Loss
LISN: ENV216 FO(101151)
Correction Table (Line 0): ENV216_FO_N(101151)
Correction Table (Line 1): ENV216_FO_L1(101151)

Class B_L1



1/31/2017

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EMI Auto Test(12)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	46.7	1000.0	9.000	On	L1	9.8	19.3	66.0
0.276000	39.8	1000.0	9.000	On	L1	9.7	21.2	60.9
0.289500	39.1	1000.0	9.000	On	L1	9.7	21.4	60.5
10.207500	36.0	1000.0	9.000	On	L1	9.9	24.0	60.0
12.817500	41.4	1000.0	9.000	On	L1	9.9	18.6	60.0
13.438500	41.7	1000.0	9.000	On	L1	10.0	18.3	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	24.2	1000.0	9.000	On	L1	9.8	31.8	56.0
0.591000	14.9	1000.0	9.000	On	L1	9.9	31.1	46.0
10.297500	22.8	1000.0	9.000	On	L1	9.9	27.2	50.0
12.804000	25.9	1000.0	9.000	On	L1	9.9	24.1	50.0
13.402500	26.4	1000.0	9.000	On	L1	10.0	23.6	50.0
15.904500	19.5	1000.0	9.000	On	L1	10.0	30.5	50.0

1/31/2017

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[Charging Mode] [Line : Neutral]

EMI Auto Test(12)

1 / 2

Test Report

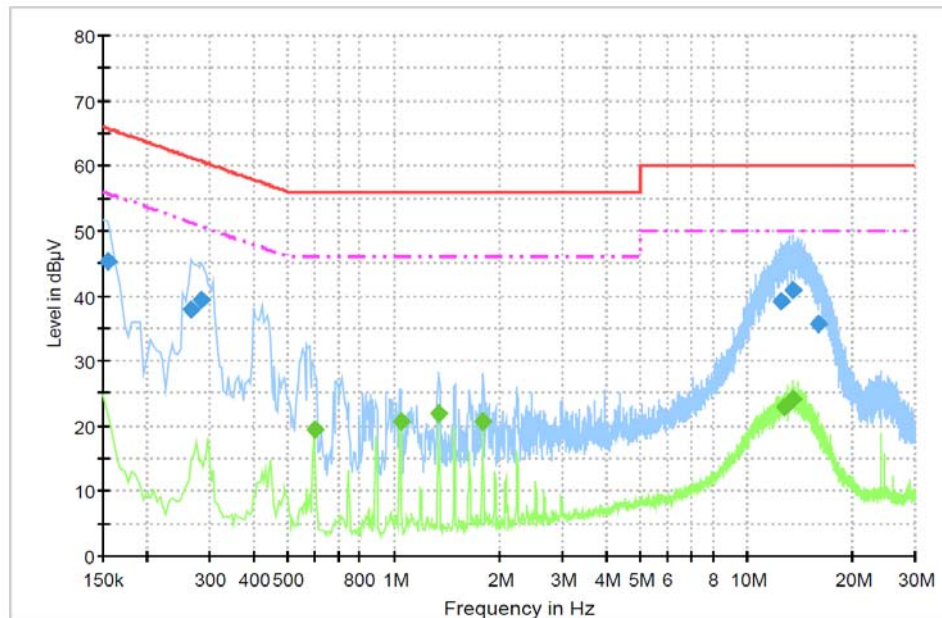
Common Information

Test Model Name: BT 390
Test Mode: Charging
Manufacturer: Cresyn Co., Ltd.
Tester: Choi Anjin

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101151) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESR 7 [ESR 7]
@ GPIB0 (ADR 23), SN 1316.3003K07/101088, FW 2.27 SP2
Signal Path: ESR 7-ENV216 FO(101151)
FW 1.0
Correction Table: 2CE Cable Loss
LISN: ENV216 FO(101151)
Correction Table (Line 0): ENV216_FO_N(101151)
Correction Table (Line 1): ENV216_FO_L1(101151)

Class B_N



1/31/2017

11:51:23

EMI Auto Test(12)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154500	45.2	1000.0	9.000	On	N	9.9	20.5	65.8
0.267000	37.8	1000.0	9.000	On	N	9.8	23.4	61.2
0.285000	39.4	1000.0	9.000	On	N	9.8	21.3	60.7
12.552000	39.1	1000.0	9.000	On	N	10.0	20.9	60.0
13.470000	40.8	1000.0	9.000	On	N	10.1	19.2	60.0
16.026000	35.6	1000.0	9.000	On	N	10.1	24.4	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.595500	19.5	1000.0	9.000	On	N	10.0	26.5	46.0
1.045500	20.7	1000.0	9.000	On	N	9.8	25.3	46.0
1.338000	22.0	1000.0	9.000	On	N	9.8	24.0	46.0
1.788000	20.8	1000.0	9.000	On	N	9.8	25.2	46.0
12.777000	22.8	1000.0	9.000	On	N	10.0	27.2	50.0
13.537500	24.1	1000.0	9.000	On	N	10.1	25.9	50.0

1/31/2017

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3.2 Radiated Electric Field Emissions (Below 1 GHz)

Test Date

2017-01-31

Test Location

10 m SAC (test distance : ☐ 10 m, ☒ 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2016-11-01	2017-11-01	☒
Bilog Antenna	CBL6111C	Schaffner	2551	2015-04-24	2017-04-24	☒
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50-2	2016-11-01	2017-11-01	☒
Amplifier	310	Sonoma Instrument Co.	291721	2016-02-02	2017-02-02	☒

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Setting

IF Band Width: 120 kHz

Climate Condition

Temperature: (22 ± 1) °C

Relative Humidity: (36 ± 1) %

Atmospheric Pressure: 99 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

Test mode	Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
Charging Mode	45.641	18.8	21.2	Quasi-peak
Audio in Mode	952.591	30.3	15.7	Quasi-peak

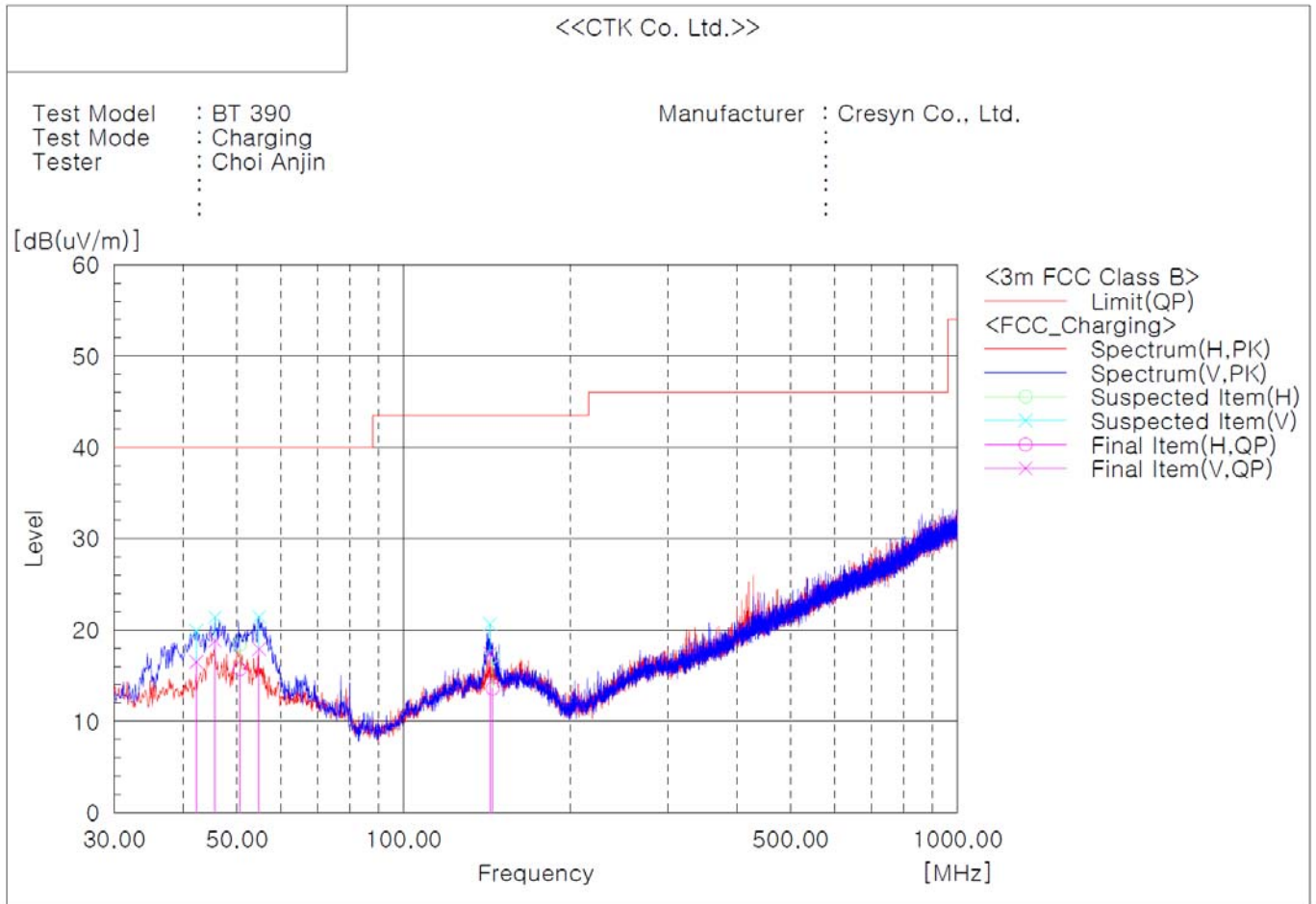
The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator – Amp Gain

Test Data

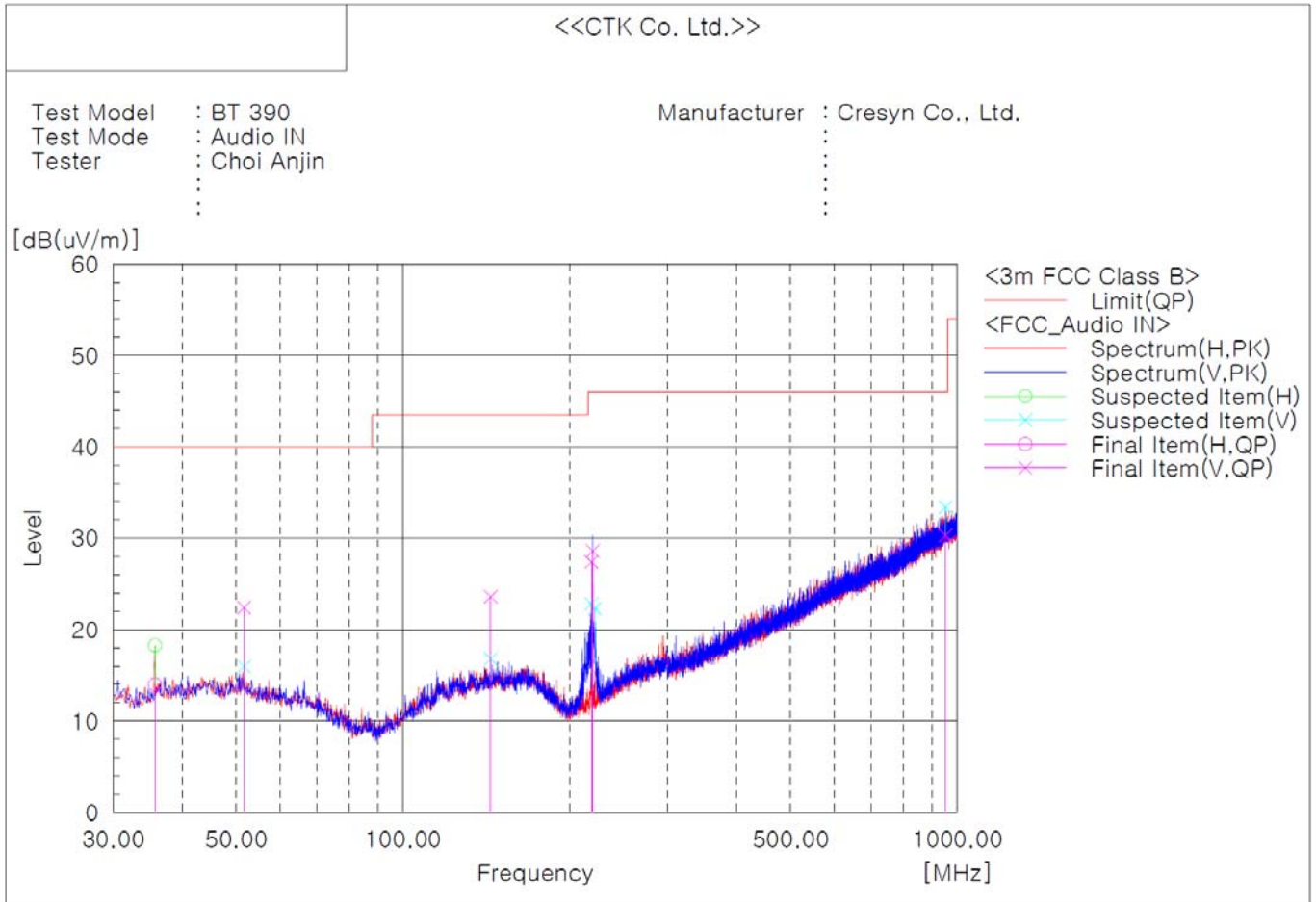
[Charging Mode]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	42.246	V	28.8	-12.3	16.5	40.0	23.5	100.0	199.0
2	45.641	V	31.1	-12.3	18.8	40.0	21.2	100.0	87.0
3	50.613	H	28.1	-12.4	15.7	40.0	24.3	305.0	49.0
4	54.856	V	30.7	-12.8	17.9	40.0	22.1	100.0	311.0
5	143.248	V	28.0	-10.6	17.4	43.5	26.1	100.0	13.0
6	144.824	H	24.1	-10.5	13.6	43.5	29.9	305.0	49.0

[Audio in Mode]



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	35.699	H	27.2	-13.2	14.0	40.0	26.0	205.0	236.0
2	51.704	V	34.9	-12.5	22.4	40.0	17.6	400.0	53.0
3	143.975	V	34.2	-10.6	23.6	43.5	19.9	100.0	0.0
4	218.786	V	39.8	-12.4	27.4	46.0	18.6	100.0	0.0
5	219.999	V	40.9	-12.3	28.6	46.0	17.4	100.0	0.0
6	952.591	V	22.0	8.3	30.3	46.0	15.7	304.0	0.0

3.3 Radiated Electric Field Emissions (Above 1 GHz)

Test Date

Not applicable

Test Location

3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Cal Date	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2016-10-31	2017-10-31	☐
Double Ridged Guide Antenna	3117	ETS-Lindgren	00154525	2015-09-02	2017-09-02	☐
Preamplifier	8449B	Agilent Technologies	3008A02011	2016-12-01	2017-12-01	☐

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Setting

IF Band Width: 1 MHz

Climate Condition

Temperature:

Relative Humidity:

Atmospheric Pressure:

Test Result

The requirements are: ☐ MET ☐ NOT MET

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss- Amp Gain

Test Data

Because the maximum clock frequency is less than 108 MHz, this test is not applicable.

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APPENDIX A - Test Setup Photos and Configuration

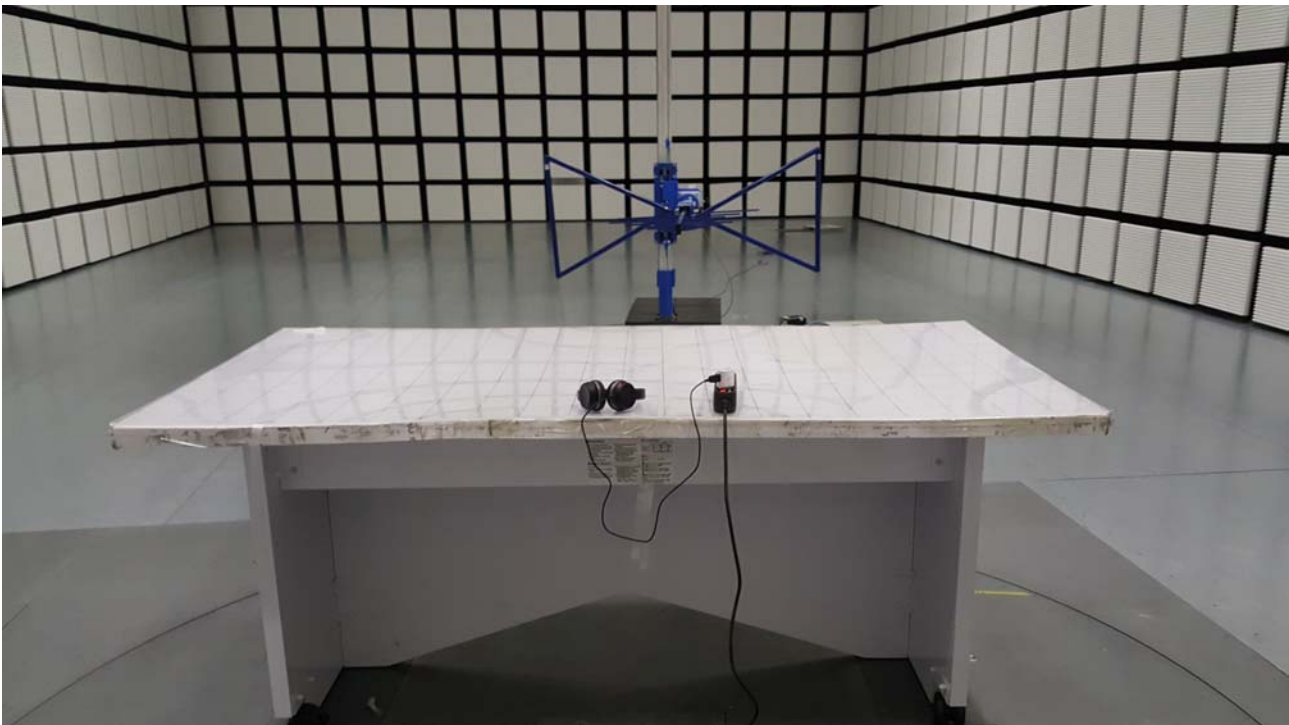
Conducted Voltage Emissions of Mains Ports

[Charging Mode]



Radiated Electric Field Emissions (Below 1 GHz)

[Charging Mode]



[Audio in Mode]



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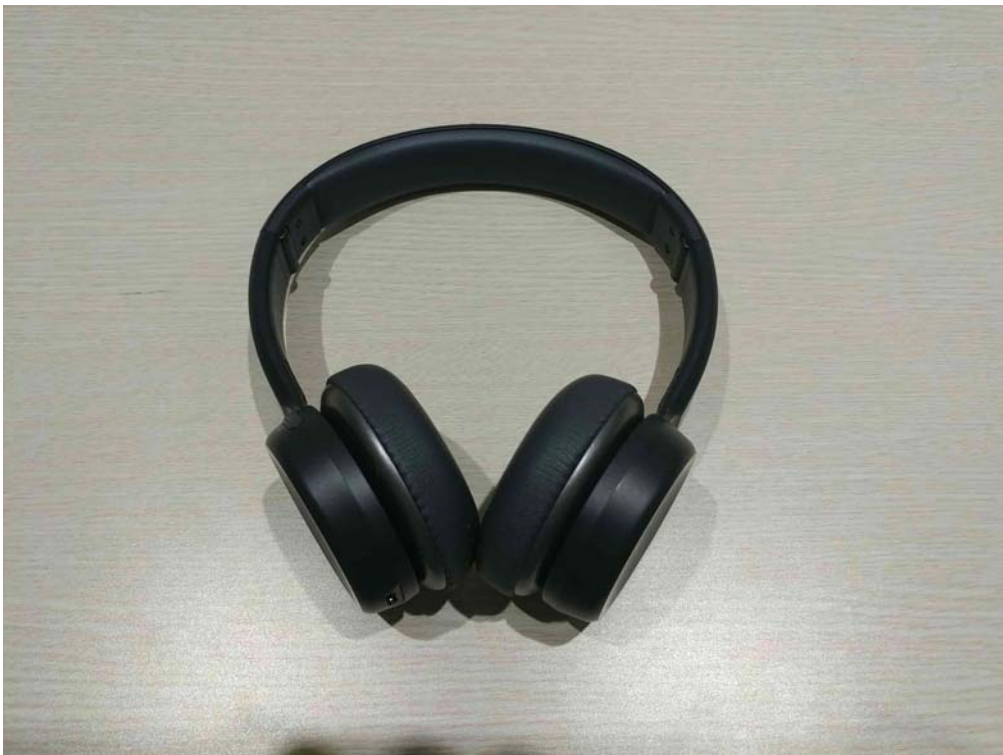
Radiated Electric Field Emissions (Above 1 GHz)

Not Applicable

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APPENDIX B – EUT Photographs

EUT External Photographs



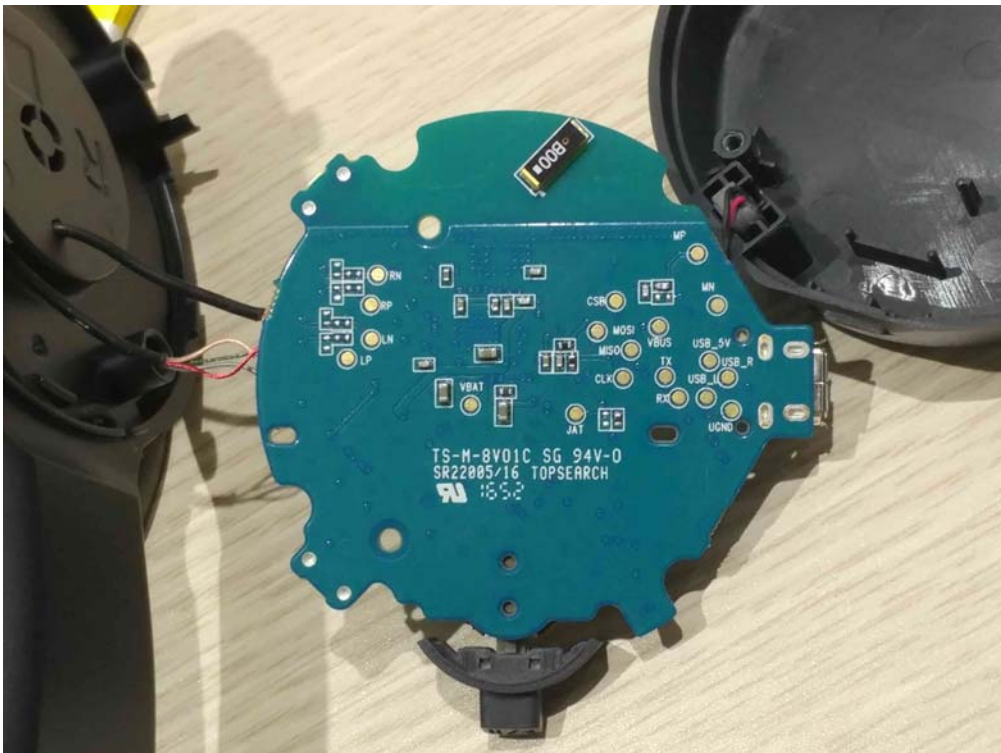


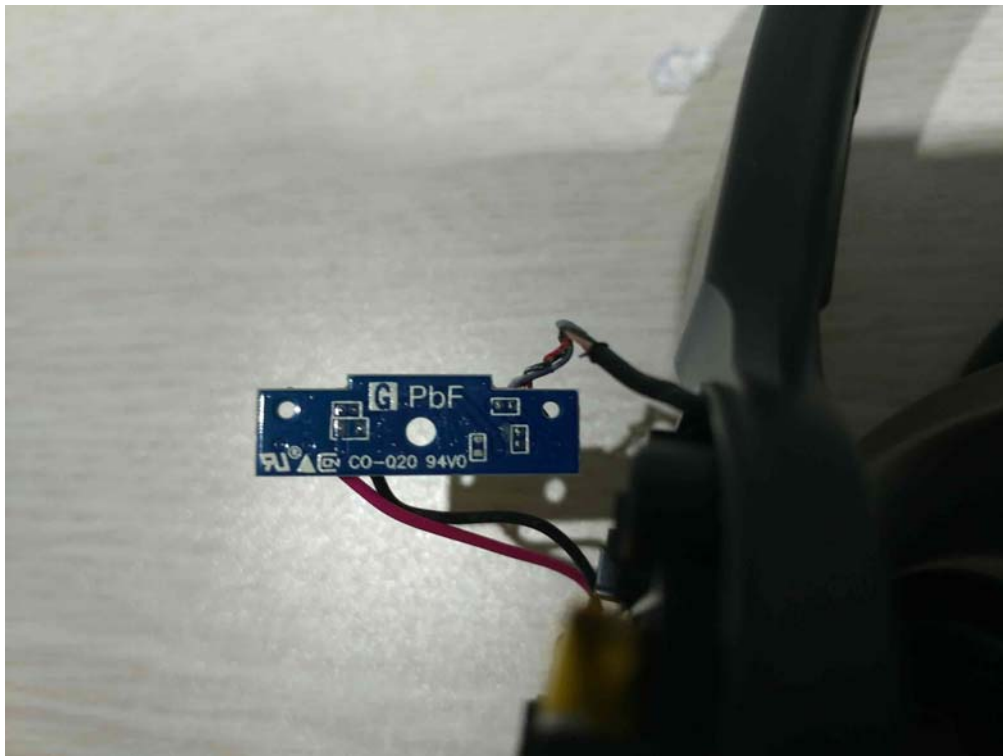


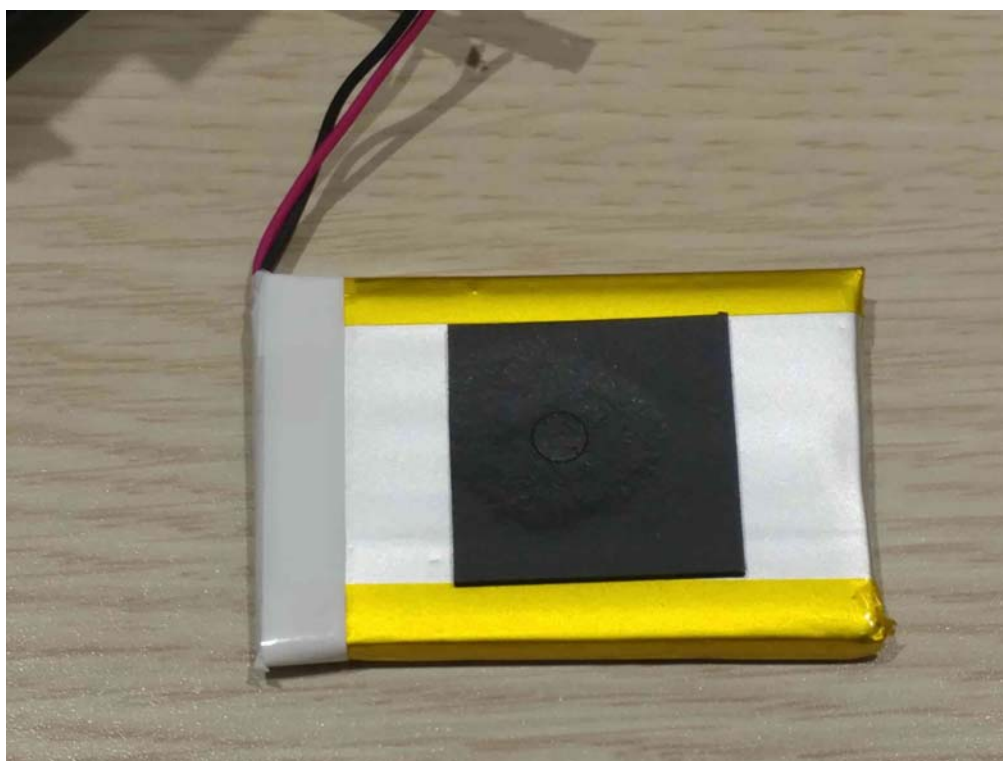
EUT Internal Photographs

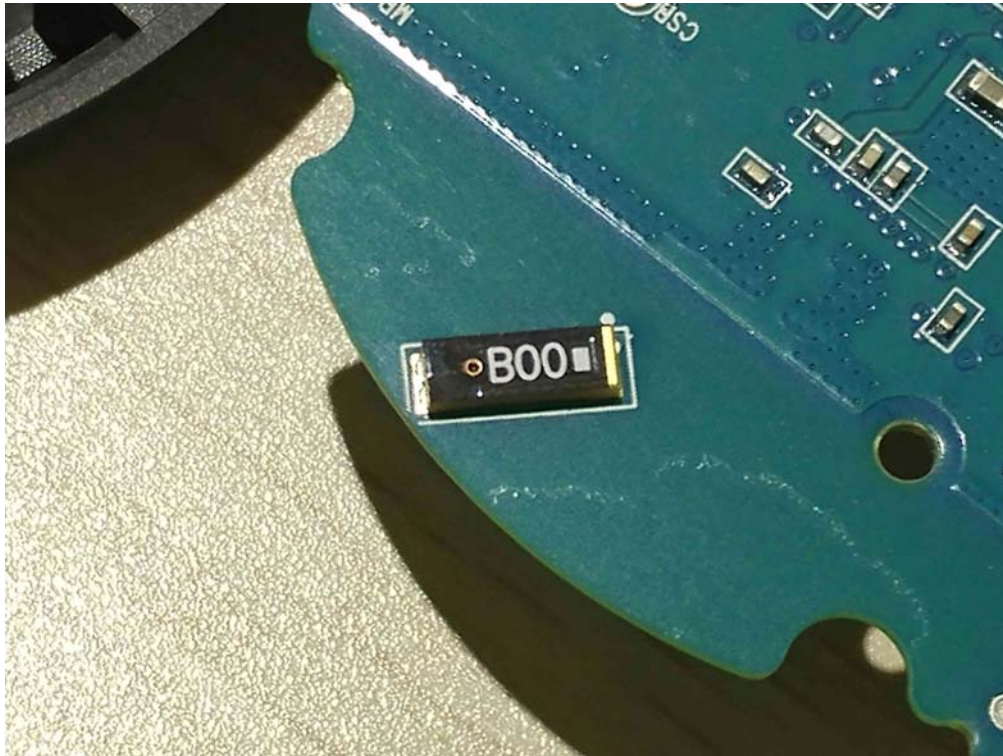


PCB









LABEL Location and LABEL



SET

