



中国认可  
国际互认  
检测  
TESTING  
CNAS L6478



# TEST REPORT

**Report No.** ..... : WTF21F05047667C

**Applicant** ..... : Mid Ocean Brands B.V.

**Address** ..... : 7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon,  
Hong Kong

**Manufacturer** ..... : 109979

**Sample Name** ..... : TWS earbuds in aluminium box

**Model No.** ..... : MO6249

**Sample Receiving Date** .... : 2021-05-18

**Testing Period** ..... : 2021-05-18 to 2021-06-02

**Date of Issue** ..... : 2021-06-02

**Test Result** ..... : Please refer to next page (s)

## Remarks:

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## Prepared By:

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- Test Requested**..... : In accordance with the RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863.
- Test Method**..... :
  - 1) With Reference to IEC 62321-2:2013, disassembly, disjunction and mechanical sample preparation
  - 2) With Reference to IEC 62321-3-1:2013, screening - Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry
  - 3) With reference to IEC 62321-4:2013+AMD1:2017 CSV, determination of Mercury by ICP-OES
  - 4) With reference to IEC 62321-5:2013, determination of Lead and Cadmium by ICP-OES
  - 5) With reference to IEC 62321-7-2: 2017 and IEC 62321-7-1: 2015, determination of Hexavalent Chromium by UV-Vis
  - 6) With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS
  - 7) With reference to IEC 62321-8:2017, determination of Phthalates content by GC-MS.
- Test Conclusion**..... : **Pass** (Based on the performed tests on the submitted samples, the results comply with the RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863)

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**Test Results:****1. Lead, Mercury, Cadmium, Hexavalent Chromium, PBBs and PBDEs**

Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
1	Silvery metal shell with black plating	BL	BL	BL	BL	BL	NA
2	Black soft plastic handle	BL	BL	BL	BL	BL	NA
3	Silvery metal rivet	BL	BL	BL	BL	BL	NA
4	Silvery metal spring	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
5	Silvery metal ring	BL	BL	BL	BL	BL	NA
6	Silvery magnetic sheet	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
7	Silvery metal shaft	BL	BL	BL	BL	BL	NA
8	Silvery metal screw with black plating	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
9	Silvery metal screw	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
10	Black sponge adhesive tape	BL	BL	BL	BL	BL	NA
11	Black soft plastic sheet	BL	BL	BL	BL	BL	NA
12	Yellow plastic adhesive tape	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
13	Black plastic shell	BL	BL	BL	BL	BL	NA
14	Black fibrous net	BL	BL	BL	BL	BL	NA
15	Black plastic jacket of plug	BL	BL	BL	BL	BL	NA
16	White plastic core of plug	BL	BL	BL	BL	BL	NA
17	Silvery metal shell of plug	BL	BL	BL	BL	BL	NA
18	Silvery metal pin of plug	BL	BL	BL	BL	BL	NA
19	Solder	BL	BL	BL	BL	BL	NA



Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
20	Black glue of plug	BL	BL	BL	BL	BL	NA
21	Black plastic wire covering	BL	BL	BL	BL	BL	NA
22	Coppery metal wire	BL	BL	BL	BL	BL	NA
23	Black plastic wire jacket	BL	BL	BL	BL	BL	NA
24	Red plastic wire covering	BL	BL	BL	BL	BL	NA
25	Silvery metal shell of plug	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
26	Silvery metal pin of plug	BL	BL	BL	BL	BL	NA
27	Solder of plug	BL	BL	BL	BL	BL	NA
28	Black plastic core of plug	BL	BL	BL	BL	BL	NA
29	Black plastic jacket of plug	BL	BL	BL	BL	BL	NA
30	Semi-transparent adhesive tape	BL	BL	BL	BL	BL	NA
31	Red metal wire	BL	BL	BL	BL	BL	NA
32	Golden metal wire	BL	BL	BL	BL	BL	NA
33	Chip audion	BL	BL	BL	BL	BL	NA
34	Golden metal sheet	BL	BL	BL	BL	BL	NA
35	Green metal wire	BL	BL	BL	BL	BL	NA
36	Blue metal wire	BL	BL	BL	BL	BL	NA
37	White fibrous wire	BL	BL	BL	BL	BL	NA
38	Solder	BL	BL	BL	BL	BL	NA
39	Chip crystal oscillator	BL	BL	BL	BL	BL	NA



Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
40	Green PCB	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
41	Chip resistor	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
42	Chip capacitor	BL	BL	BL	BL	BL	NA
43	Chip IC	BL	BL	BL	BL	BL	NA
44	Chip LED	BL	BL	BL	BL	BL	NA
45	Chip capacitor	BL	BL	BL	BL	BL	NA
46	Chip capacitor	BL	BL	BL	BL	BL	NA
47	Solder	BL	BL	BL	BL	BL	NA
48	Silvery metal sheet	BL	BL	BL	BL	BL	NA
49	White fibrous adhesive tape	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
50	Solder	BL	BL	BL	BL	BL	NA
51	Green PCB	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
52	Silvery metal shell of loudspeaker	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
53	Silvery magnetic core of loudspeaker	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
54	Transparent plastic film of loudspeaker	BL	BL	BL	BL	BL	NA
55	Coppery metal winding of loudspeaker	BL	BL	BL	BL	BL	NA
56	Yellow plastic adhesive film of button	BL	BL	BL	BL	BL	NA
57	Silvery metal sheet of button	BL	BL	BL	BL	BL	NA
58	Black plastic base of button	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
59	Black plastic key of button	BL	BL	BL	BL	BL	NA



Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
60	Silvery metal shell of button	BL	BL	BL	BL	BL	NA
61	Silvery metal ring of MIC	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
62	Chip audion of MIC	BL	BL	BL	BL	BL	NA
63	Chip capacitor of MIC	BL	BL	BL	BL	BL	NA
64	Chip resistor of MIC	BL	BL	BL	BL	BL	NA
65	Silvery metal shell of MIC	BL	BL	BL	BL	BL	NA
66	Silvery metal sheet of MIC	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
67	Silvery plastic film of MIC	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : ND
68	Silvery metal ring of MIC	BL	BL	BL	BL	BL	NA
69	Yellow plastic washer of MIC	BL	BL	BL	BL	BL	NA
70	Black plastic ring of MIC	BL	BL	BL	BL	BL	NA
71	Chip LED	BL	BL	BL	BL	BL	NA
72	Red plastic wire covering	BL	BL	BL	BL	BL	NA
73	Silvery metal wire	BL	BL	BL	BL	BL	NA
74	Solder	BL	BL	BL	BL	BL	NA
75	Black plastic wire covering	BL	BL	BL	BL	BL	NA
76	Solder	BL	BL	BL	BL	BL	NA
77	Chip capacitor	BL	BL	BL	BL	BL	NA
78	Green PCB	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
79	Chip inductor	BL	BL	BL	BL	BL	NA



Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
80	Chip IC	BL	BL	BL	BL	BL	NA
81	Golden metal sleeve	IN	OL	BL	BL	BL	Cd : 16 #Pb : $2.50 \times 10^4$
82	Golden metal cap	BL	BL	BL	BL	BL	NA
83	Silvery metal spring	BL	BL	BL	IN	BL	Cr <sup>6+</sup> : Negative
84	Chip IC	BL	BL	BL	BL	BL	NA
85	Silvery metal shell of socket	BL	BL	BL	BL	BL	NA
86	Silvery metal pin of socket	BL	BL	BL	BL	BL	NA
87	Black plastic core of socket	BL	BL	BL	BL	BL	NA

**Remark:**

- (1) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-VIS (for Cr<sup>6+</sup>) and GC-MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1: 2013 (unit: mg/kg)

Element	Polymer	Metal	Composite Materials
Cd	$BL \leq (70-3\sigma) < IN < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < IN < (130+3\sigma) \leq OL$	$LOD < IN < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < IN < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < IN < (1500+3\sigma) \leq OL$
Cr	$BL \leq (700-3\sigma) < IN$	$BL \leq (700-3\sigma) < IN$	$BL \leq (500-3\sigma) < IN$
Br	$BL \leq (300-3\sigma) < IN$	--	$BL \leq (250-3\sigma) < IN$

BL= Below Limit      OL= Over Limit      LOD = Limit of Detection      -- = Not Regulated

- (2) "IN" expresses the inconclusive region, and further chemical testing to confirm whether it complies with the requirement of RoHS Directive.
- (3) The XRF screening test for RoHS elements – the reading may be different to the actual content in the sample be of non-uniformity composition.
- (4) mg / kg =milligram per kilogram=ppm,  $\mu\text{g}/\text{cm}^2$  = Micrograms per square centimetre.
- (5) ND = Not Detected or lower than limit of quantitation.
- (6) NA = Not Applicable, as the XRF screening test result was below the limit or as the XRF screening directly determine that test result was over the limit, it was not need to conduct the wet chemical testing.



## (7) LOQ = Limit of quantitation.

Test Items	Pb	Cd	Hg	Cr <sup>6+</sup>		PBB	PBDE
Units	mg/kg	mg/kg	mg/kg	mg/kg	µg/cm <sup>2</sup>	mg/kg	mg/kg
LOQ	2	2	2	8	0.1	5	5

The LOQ for single compound of PBBs and PBDEs is 5mg/kg, LOQ of Cr<sup>6+</sup> for polymer and composite sample is 8mg/kg and LOQ of Cr<sup>6+</sup> for metal sample is 0.1µg/cm<sup>2</sup>.

## (8) RoHS Requirement

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

(9) According to IEC 62321-7-1:2015, determined of Cr<sup>6+</sup> on metal sample by boiling water extraction test method, and result is shown as Positive/Negative.

Boiling water extraction:

Negative = Absence of Cr<sup>6+</sup> coating, the detected concentration in boiling water extraction solution is less than 0.10ug/cm<sup>2</sup>.

Positive = Presence of Cr<sup>6+</sup> coating, the detected concentration in boiling water extraction solution is greater than 0.13ug/cm<sup>2</sup>.

Information on storage conditions and production date of the tested sample is unavailable and thus Cr<sup>6+</sup> results represent status of the sample at the time of testing.

## (10) Abbreviation:

“Pb” denotes Lead, “Cd” denotes Cadmium, “Hg” denotes Mercury, “Cr” denotes Chromium, “Cr (VI)” denotes Hexavalent Chromium, “Br” denotes Bromine, “PBBs” denotes Total Polybrominated Biphenyls, “PBDEs” denotes Total Polybrominated Diphenyl Ethers.

(11)<sup>#</sup> = According to the declaration from client, the source of lead in test sample is from copper alloy while lead as copper alloy containing up to 4% lead by weight is exempted by Directive 2011/65/EU ANNEX III.





## 2. Phthalates:

Serial No.	Part No.	Result (mg/kg)			
		DBP	BBP	DEHP	DIBP
T01	2	<50	<50	<50	<50
T02	6+33+37+40+41 <sup>△</sup>	<50	<50	<50	<50
T03	10	<50	<50	<50	<50
T04	11	<50	<50	<50	<50
T05	12	<50	<50	71	<50
T06	13+16+28 <sup>△</sup>	<50	<50	<50	<50
T07	14+59+67 <sup>△</sup>	<50	<50	<50	<50
T08	15	<50	<50	<50	<50
T09	20	<50	<50	<50	<50
T10	21	159	<50	<50	<50
T11	23	274	<50	156	<50
T12	24	61	<50	<50	<50
T13	29	<50	<50	<50	<50
T14	30	<50	<50	168	<50
T15	39+84 <sup>△</sup>	<50	<50	<50	<50
T16	42+43+44+45+46 <sup>△</sup>	<50	<50	<50	<50
T17	49	185	<50	144	<50
T18	51+53+62+63+64 <sup>△</sup>	<50	<50	<50	<50
T19	54	<50	<50	<50	<50
T20	56	<50	<50	204	<50
T21	58	<50	<50	<50	<50
T22	69	<50	<50	<50	<50
T23	70	<50	<50	<50	<50
T24	72	<50	<50	<50	<50
T25	75	<50	<50	<50	<50
T26	71+77+78+79+80 <sup>△</sup>	<50	<50	<50	<50
T27	87	<50	<50	<50	<50

### Note:

- (1) "<" = less than
- (2) mg/kg = milligram per kilogram= ppm
- (3) Abbreviation:  
 "DBP" denotes Dibutyl phthalate, "BBP" denotes Benzyl butyl phthalate (BBP), "DEHP" denotes Bis(2-ethylhexyl)-phthalate, "DIBP" denotes Diisobutyl phthalate, "PHT" denotes Phthalates.

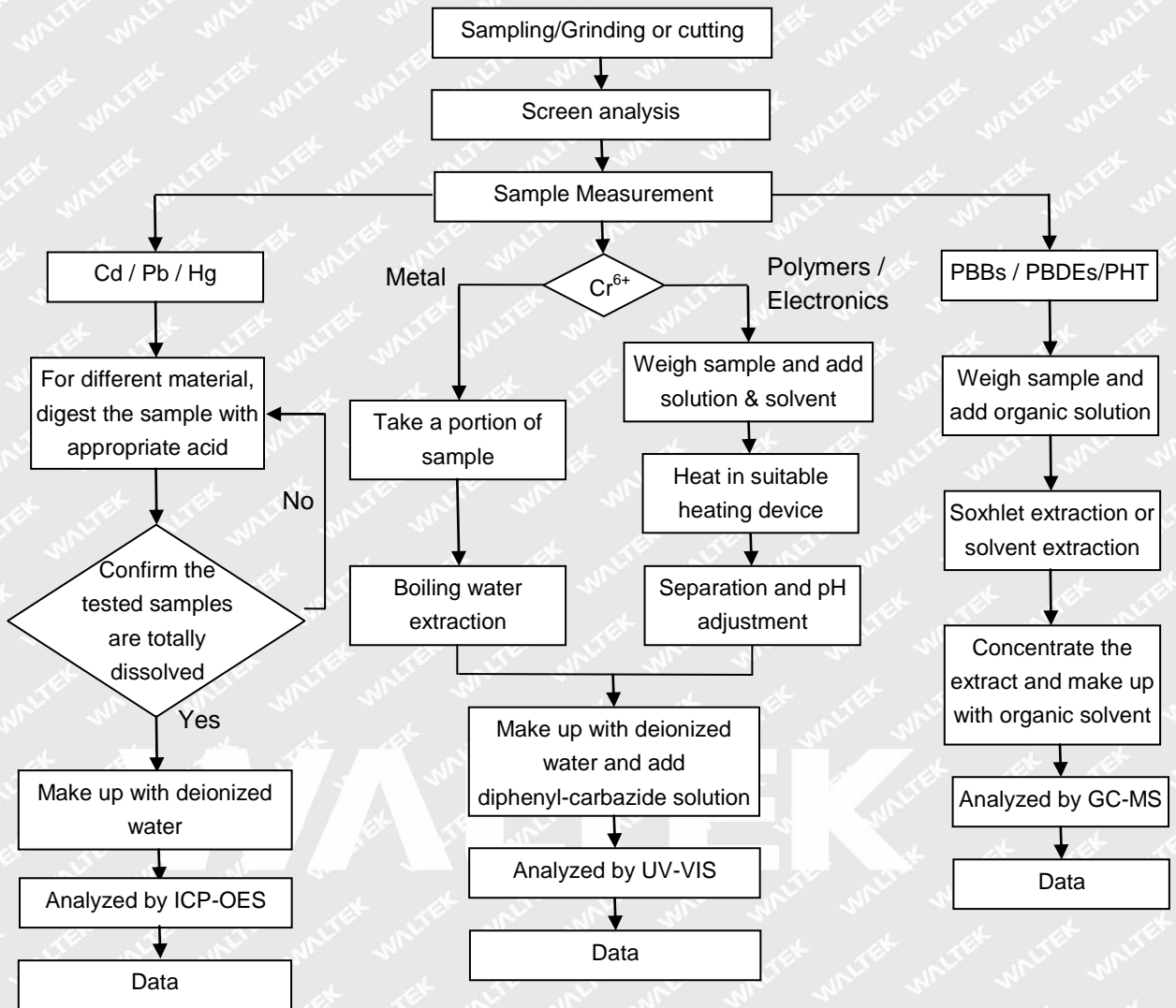
- (4) RoHS requirement

Restricted Substances	Limits
Dibutyl phthalate (DBP)	0.1% (1000 mg/kg)
Benzyl butyl phthalate (BBP)	0.1% (1000 mg/kg)
Di(2-ethylhexyl) phthalate (DEHP)	0.1% (1000 mg/kg)
Di-iso-butyl phthalate (DIBP)	0.1% (1000 mg/kg)

- (5) "△" = As client's requirement, the testing was conducted based on mixed components. Results are calculated by the minimum weight of mixed components.

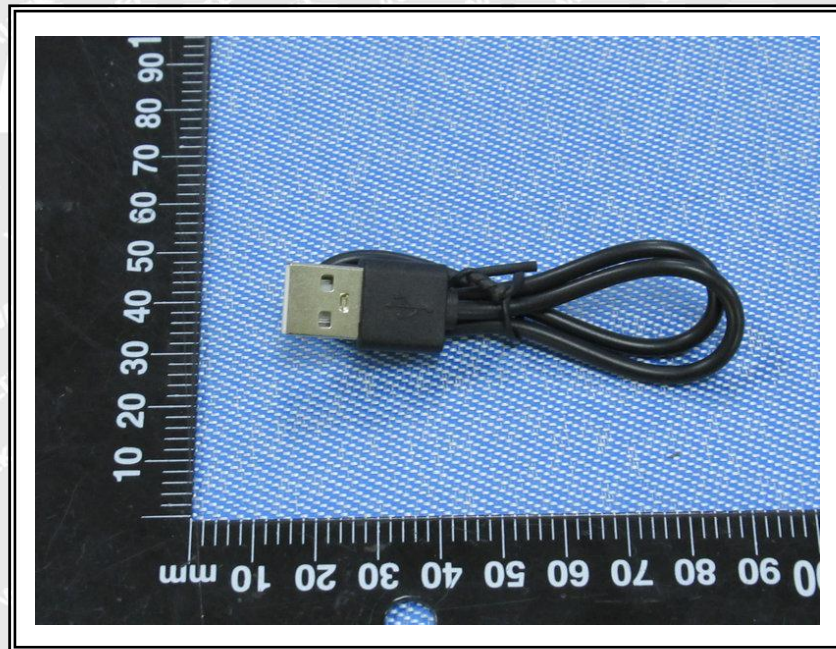


**Measurement Flowchart:**





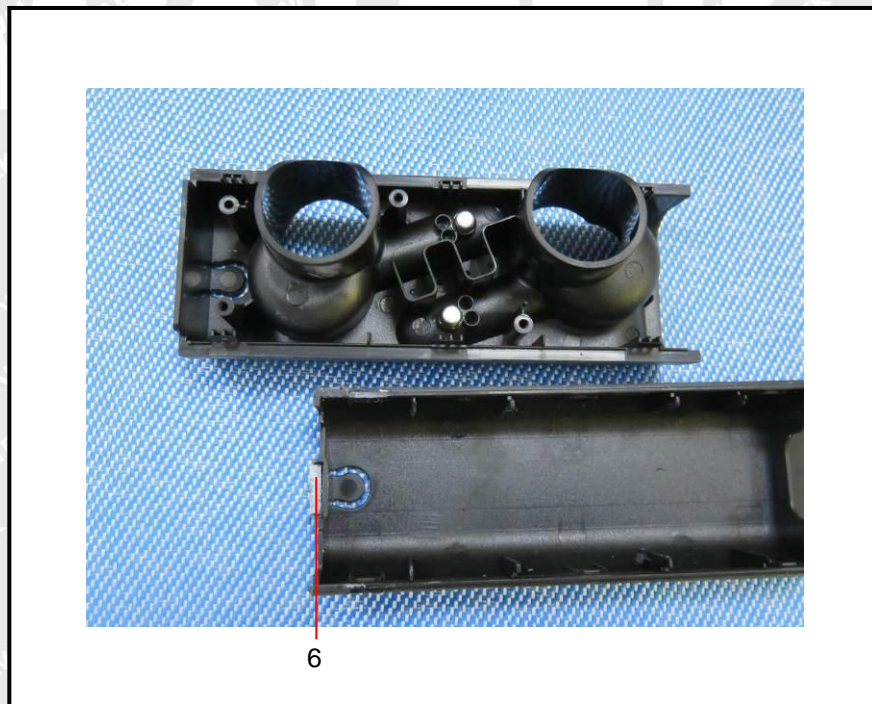
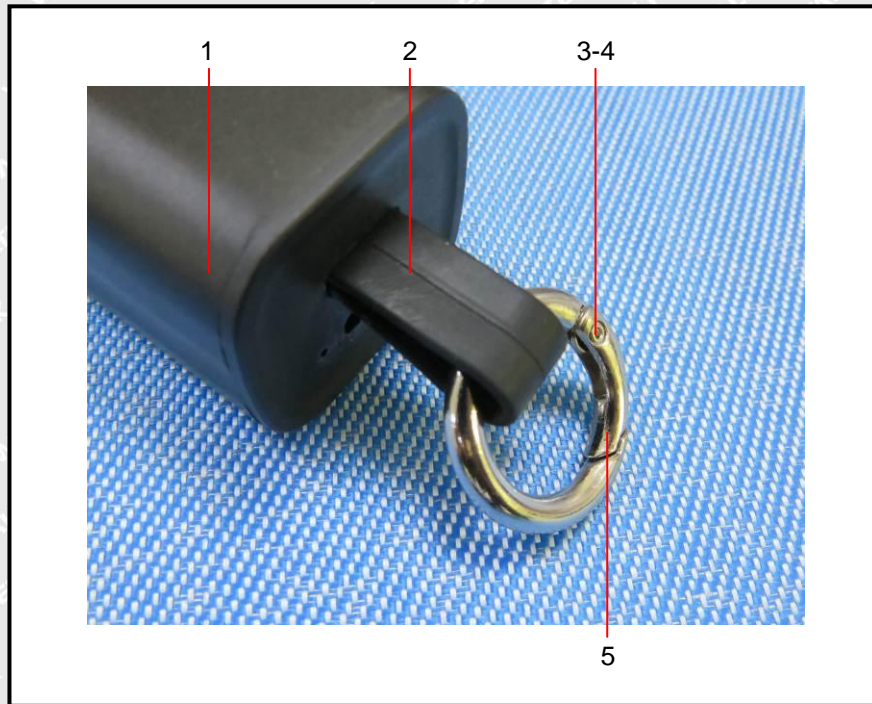
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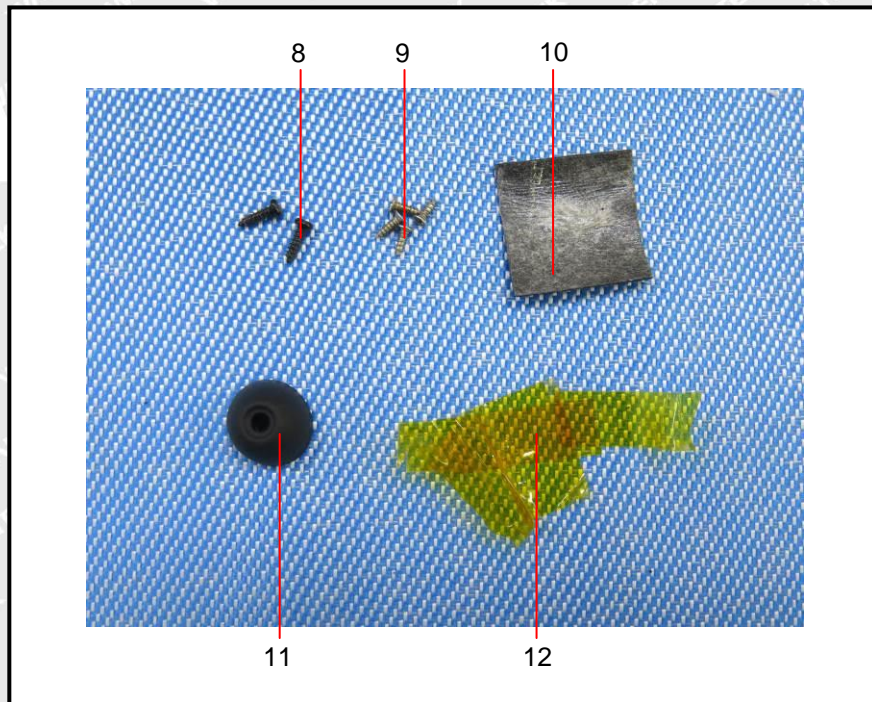
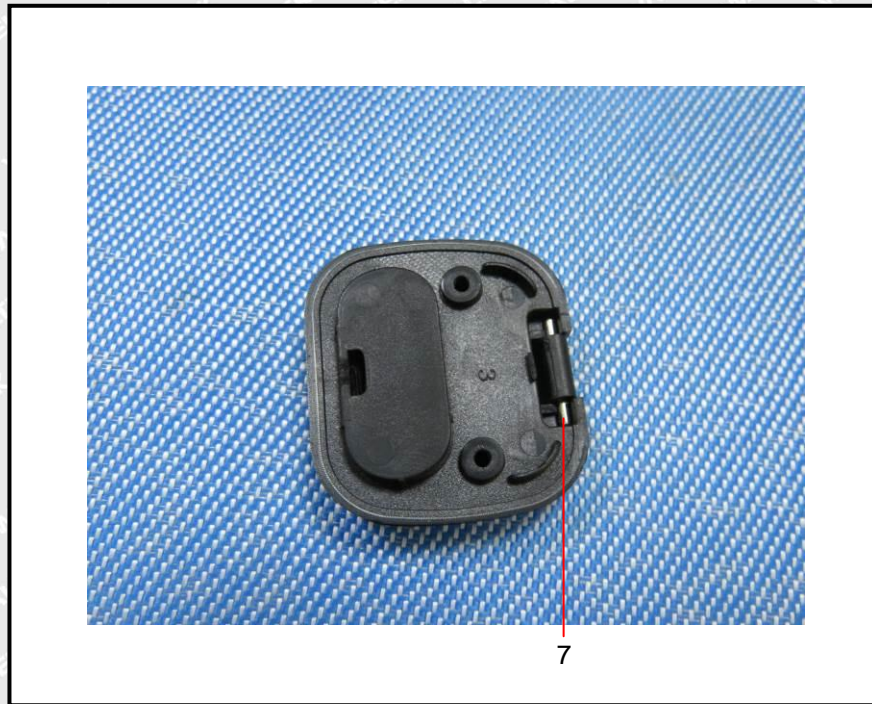


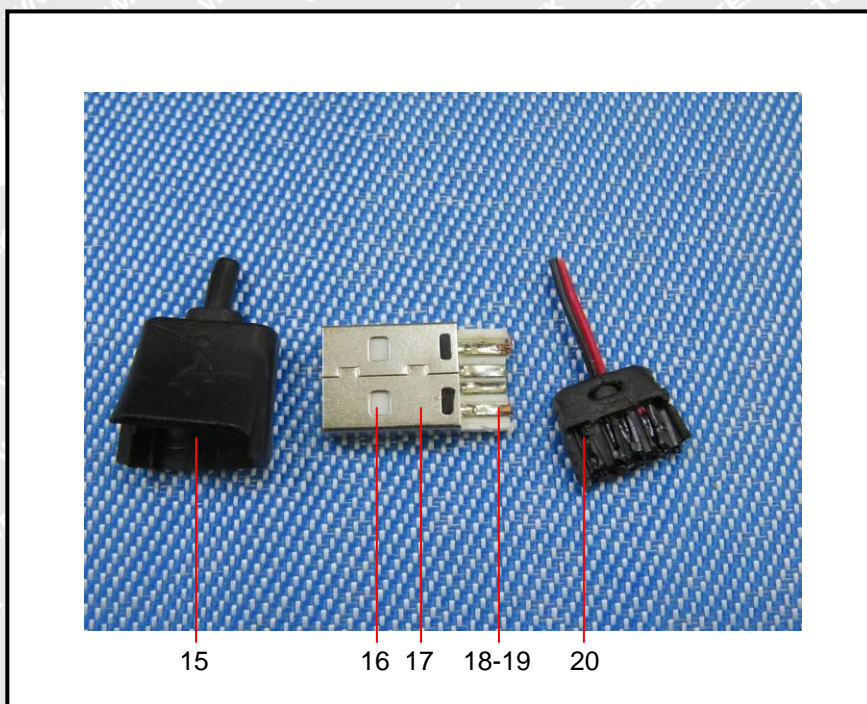
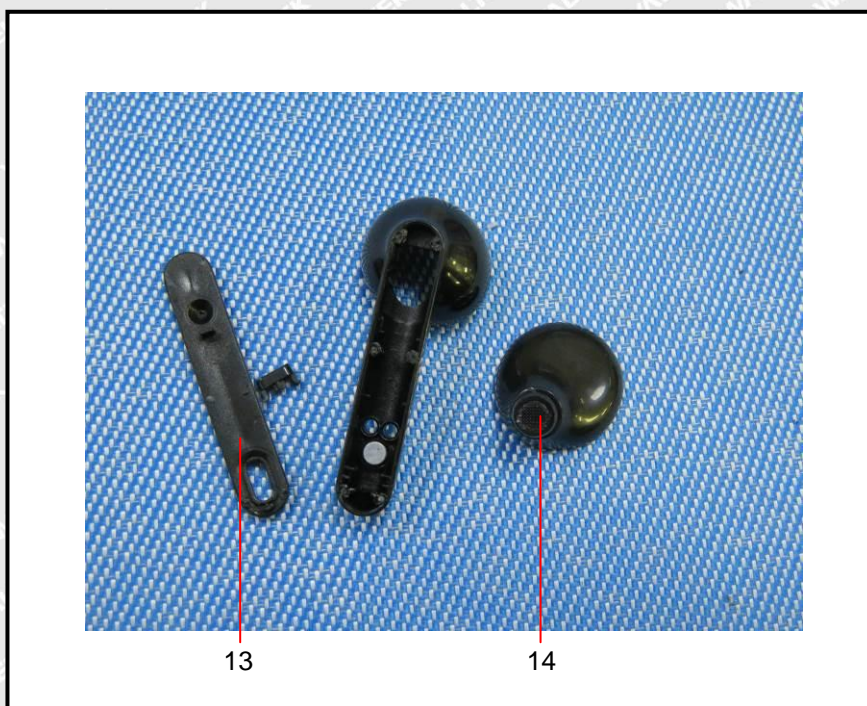


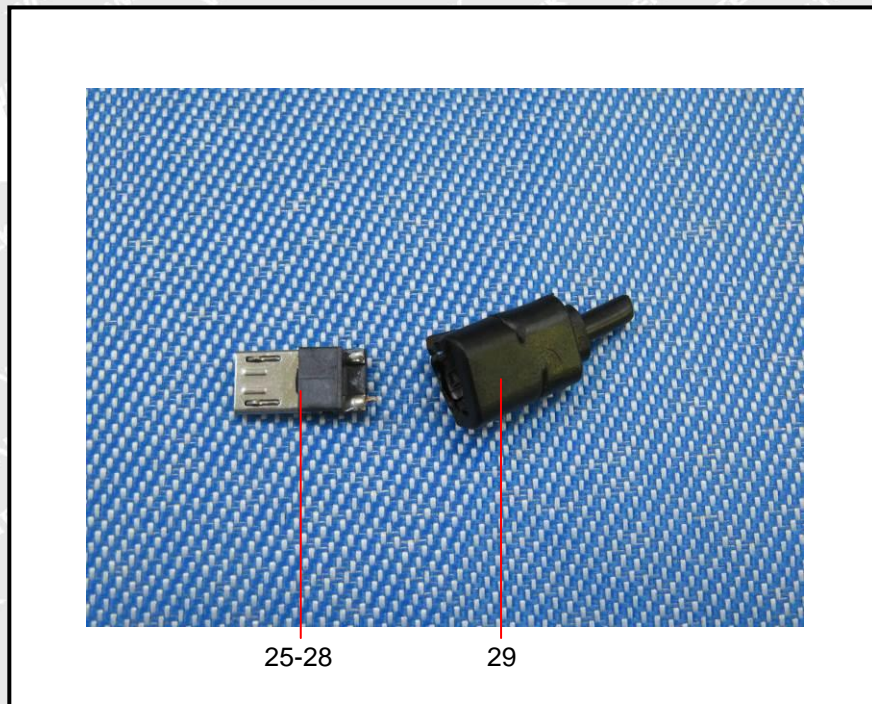
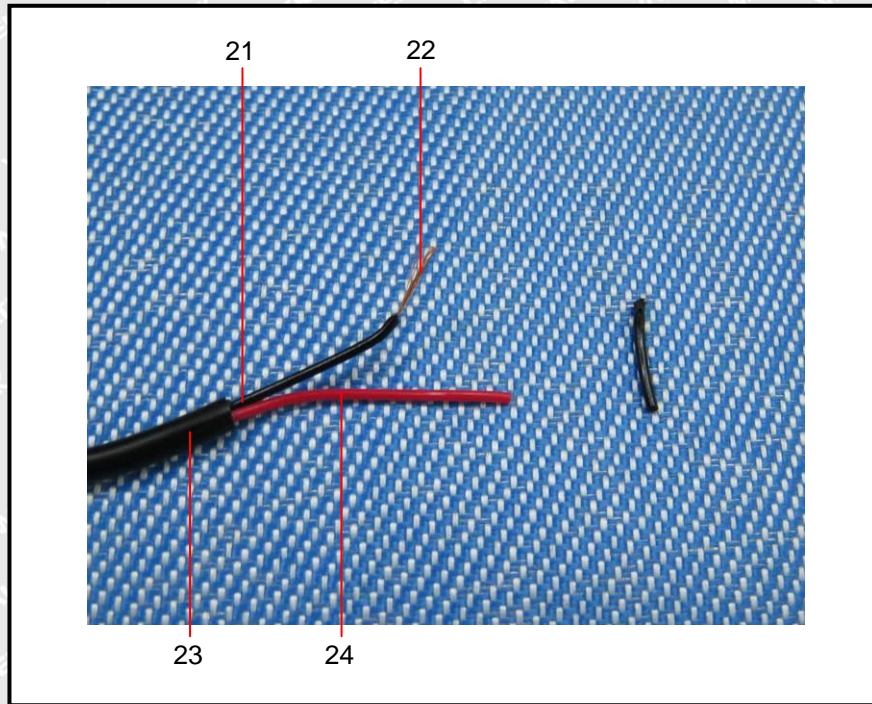


**Photograph(s) of parts tested:**

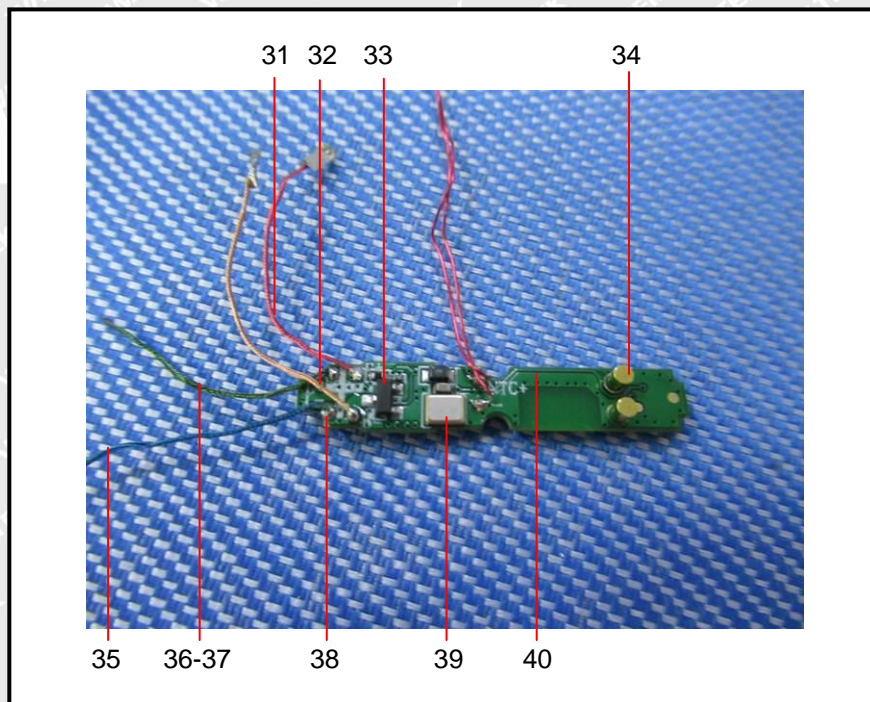
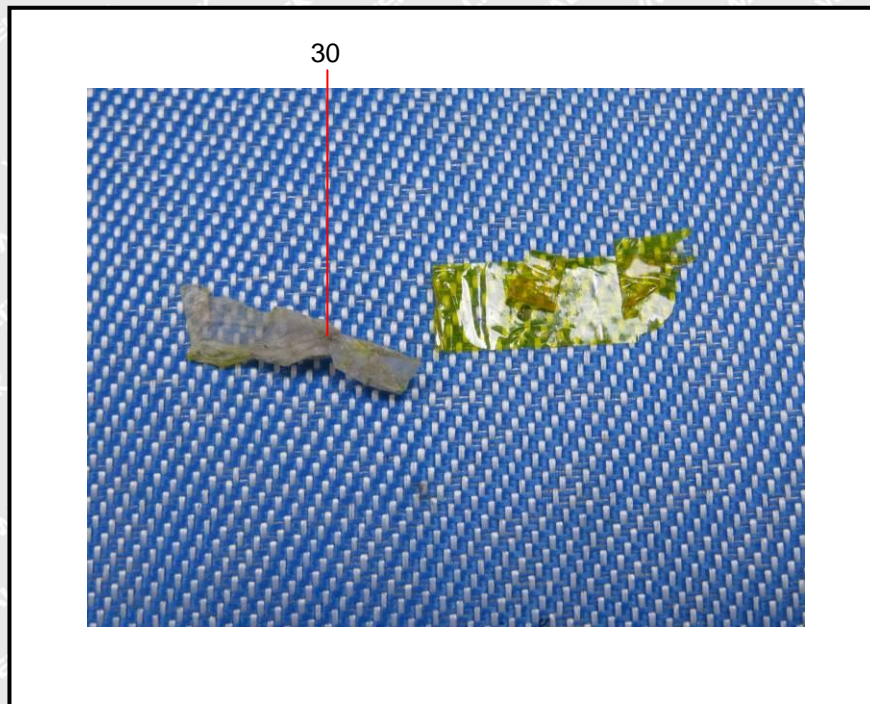


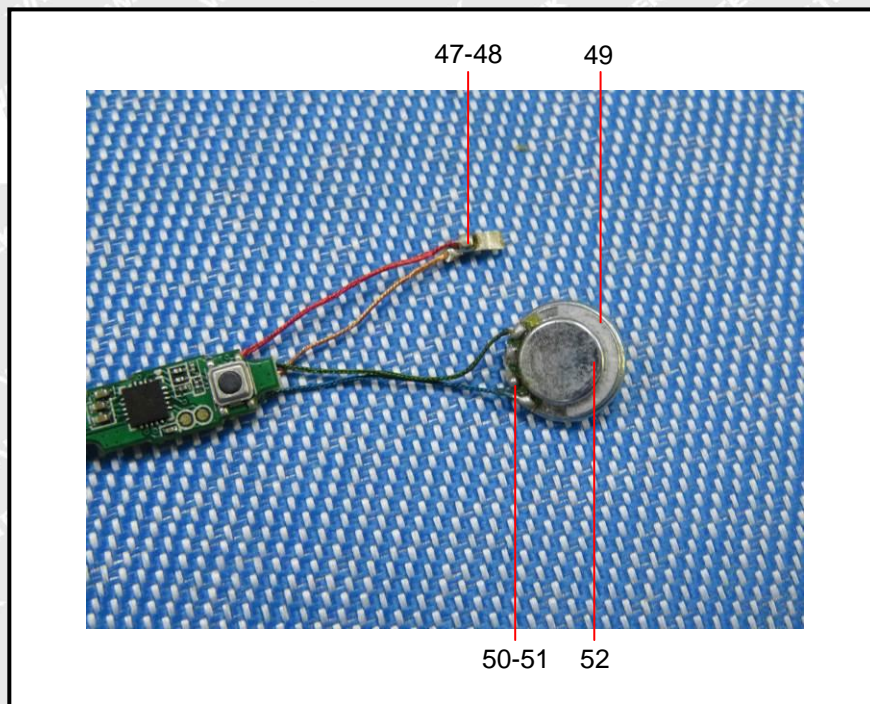
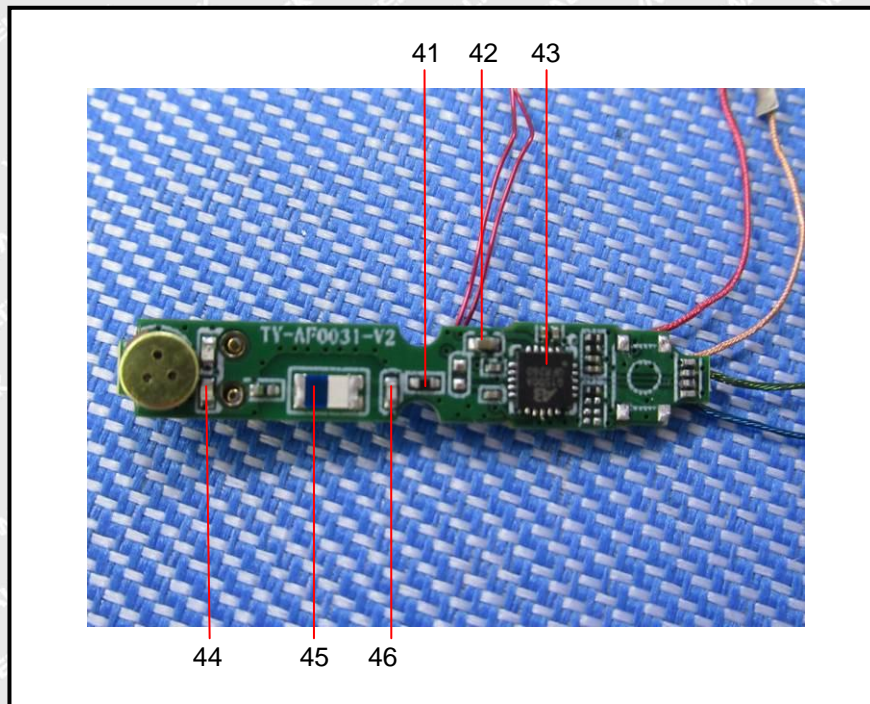


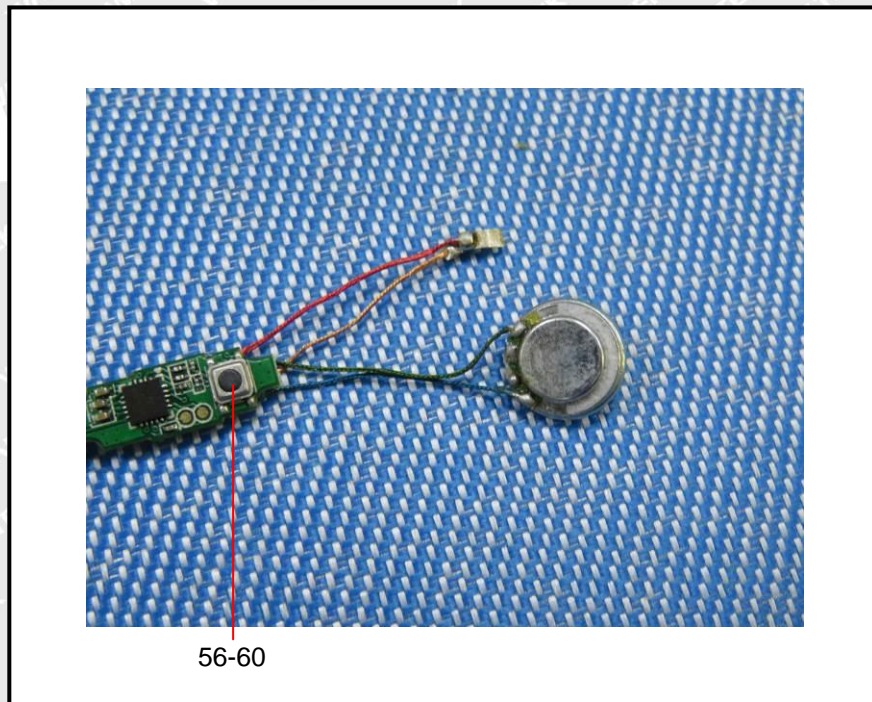
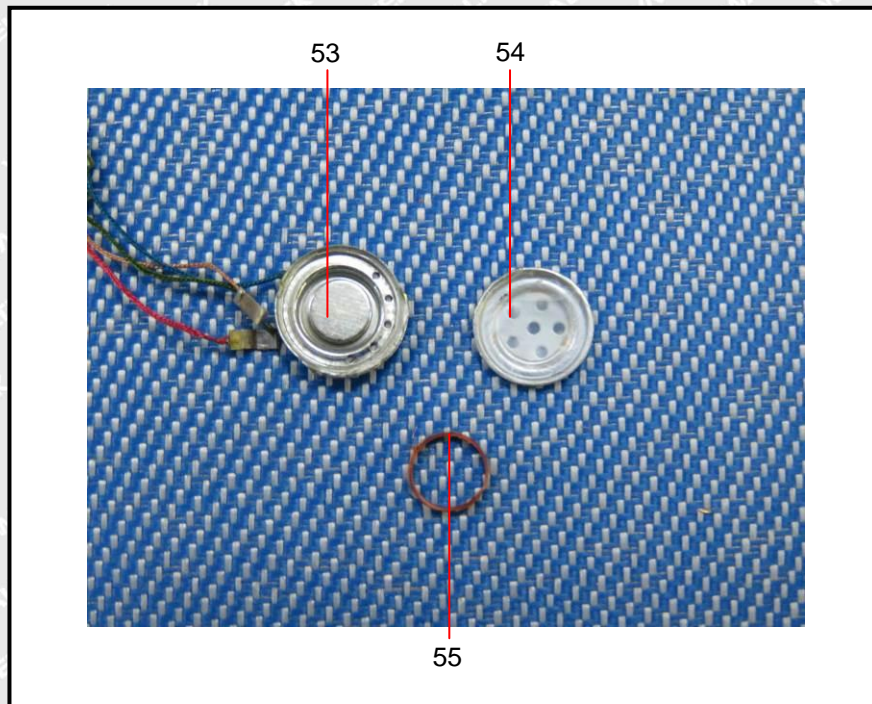


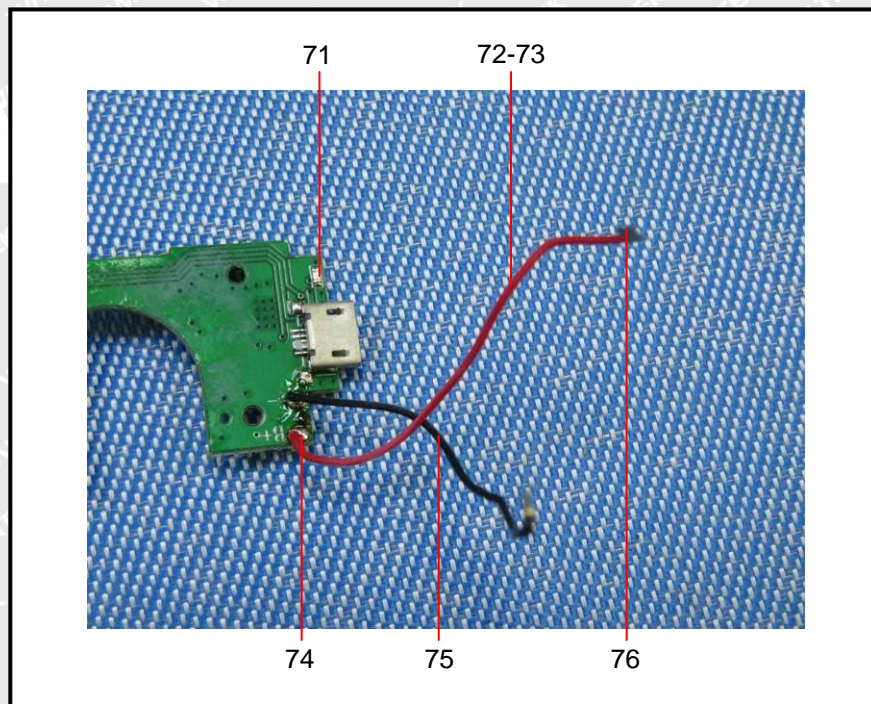
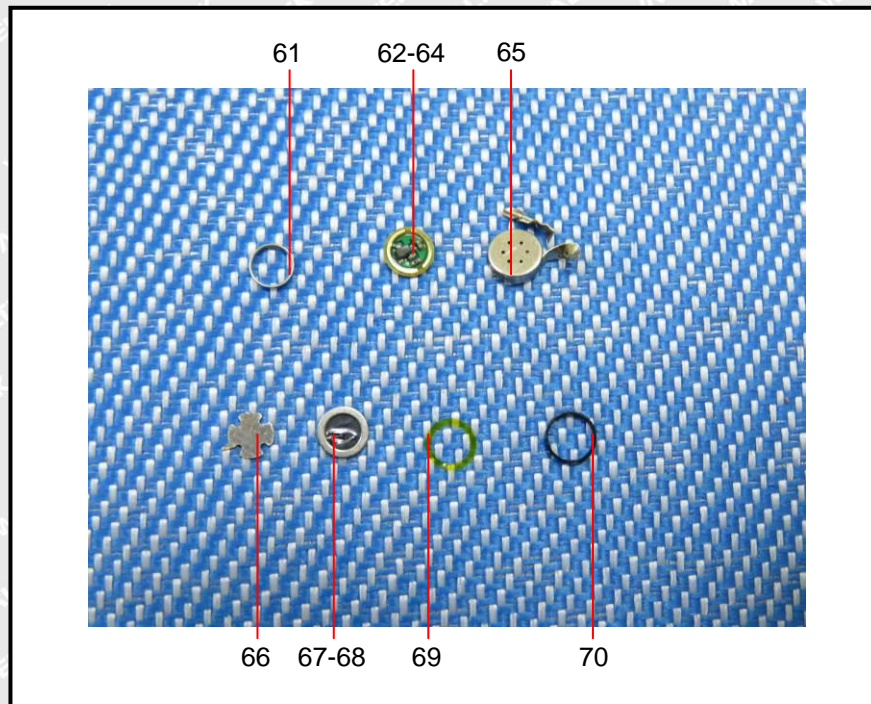


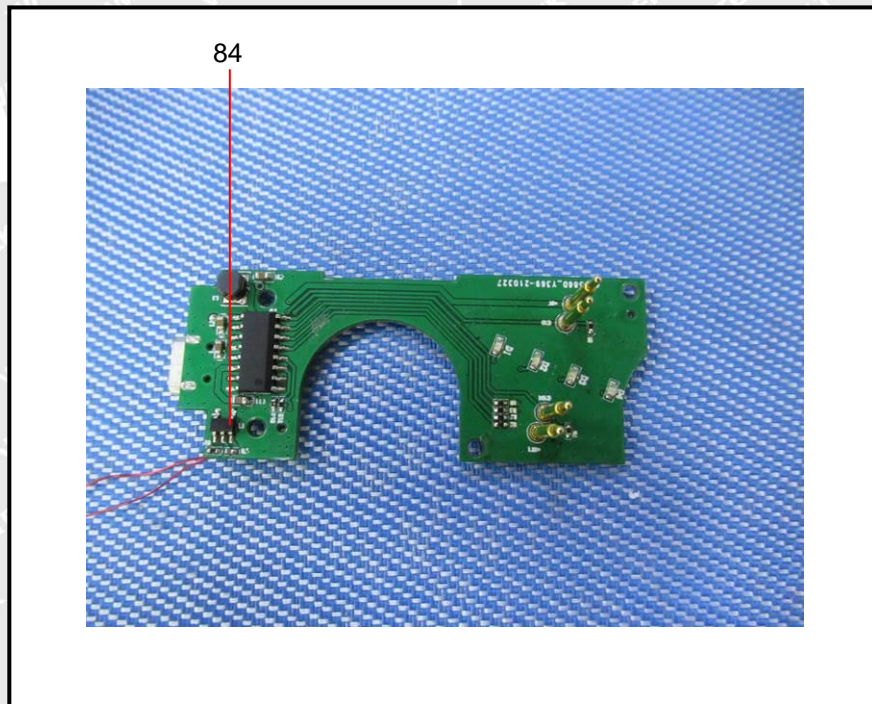
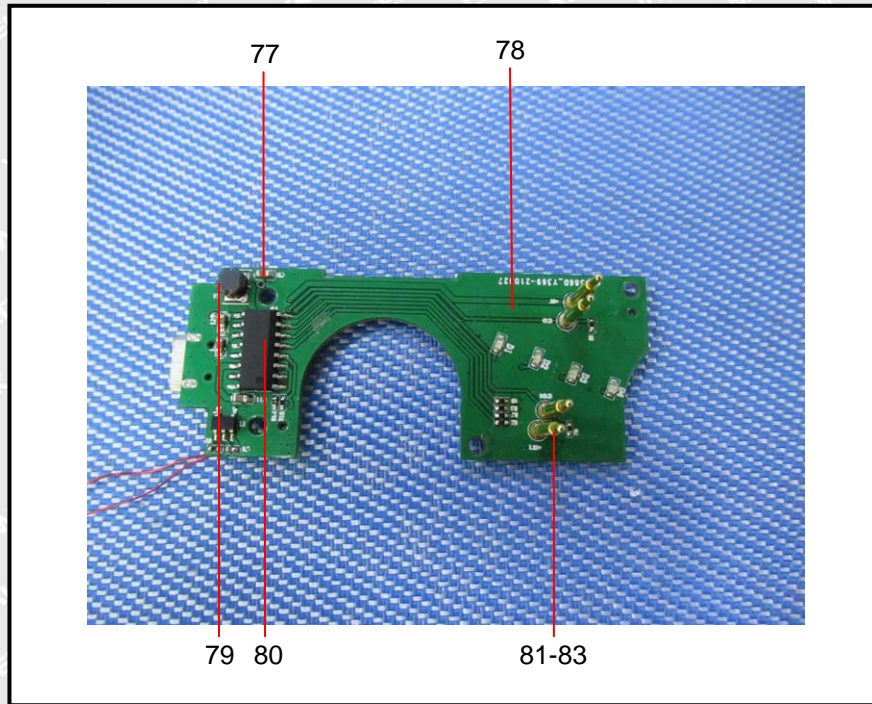


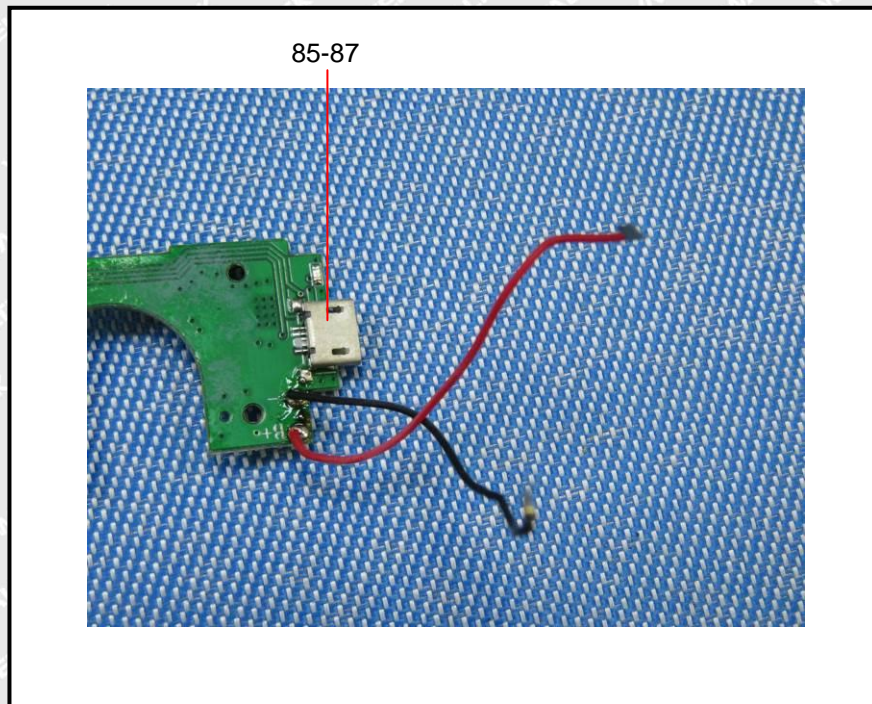












==== End of Report =====

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