



Test Report

Report No: KEYS241011053001RH-03

Date: Oct. 16, 2024

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Applicant : Sharkoon Technologies GmbH
Address : Grüninger Weg 48, 35415 Pohlheim, Germany
Manufacturer : Sharkoon Technologies GmbH
Address : Grüninger Weg 48, 35415 Pohlheim, Germany

The following sample(s) was /were submitted and identified on behalf of the clients as:

Sample Name : Switching Power Supply
Trade Name : Sharkoon
Sample Model : REBEL P10 550、REBEL P10 650、REBEL P10 750、REBEL P10 850
Sample Received Date : Oct. 11, 2024
Testing Period : Oct. 11, 2024 To Oct. 16, 2024
Test Requested : Selected test (s) in the selected parts as requested by client with the RoHS 2 Directive 2011/65/EU Annex II (EU) 2015/863 as last amended by Directive (EU) 2017/2102.
Test Method : 1. As specified by client, to screen Lead(Pb), Cadmium(Cd), Mercury(Hg), Chromium(Cr) and Bromine(Br) in the submitted sample(s) by XRF.
2. As specified by client, when screening results exceed the XRF screening limit in IEC 62321-3-1: 2013, further use of wet chemical methods are required to test Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), Polybrominated Biphenyls(PBBs), Polybrominated Diphenyl Ethers(PBDEs), Bis(2-ethylhexyl) phthalate (DEHP) ,Butyl benzyl phthalate (BBP), Dibutylphthalate (DBP) ,and Diisobutyl phthalate (DIBP)in the submitted sample(s).
Test Result : Please refer to next page(s).
Conclusion : **PASS** (Based on test results)

Signed for and on behalf of

Tony Qian/Approved Signatory



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Summary of Test Results:

Test Request	Conclusion
RoHS Directive 2011/65/EU and its subsequent amendments Directive (EU) 2015/863	
(1) To determine Lead (Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), Polybrominated Biphenyls (PBBs) and Polybrominated DiphenylEthers (PBDEs) content by screening test and chemical test	PASS
(2) To determine Phthalates (DBP, BBP, DEHP, DIBP) content by chemical test	PASS



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1. XRF Test Result:

No.	XRF Result(mg/kg)					Chemical Test (mg/kg)	Conclusion
	Pb	Cd	Hg	Cr	Br		
1	BL	BL	BL	BL	BL	--	Pass
2	BL	BL	BL	BL	BL	--	Pass
3	BL	BL	BL	BL	--		Pass
4	BL	BL	BL	BL	--	--	Pass
5	BL	BL	BL	BL	BL	--	Pass
6	BL	BL	BL	BL	BL	--	Pass
7	BL	BL	BL	BL	BL	--	Pass
8	BL	BL	BL	BL	BL	--	Pass
9	BL	BL	BL	BL	BL	--	Pass
10	BL	BL	BL	BL	BL	--	Pass
11	BL	BL	BL	BL	--	--	Pass
12	BL	BL	BL	BL	--	--	Pass
13	BL	BL	BL	BL	--	--	Pass
14	BL	BL	BL	BL	BL	--	Pass
15	BL	BL	BL	BL	BL	--	Pass
16	BL	BL	BL	BL	BL	--	Pass
17	BL	BL	BL	BL	BL	--	Pass
18	BL	BL	BL	BL	--	--	Pass
19	BL	BL	BL	BL	BL	--	Pass
20	BL	BL	BL	BL	--	--	Pass
21	BL	BL	BL	BL	--	--	Pass
22	BL	BL	BL	BL	BL	--	Pass
23	BL	BL	BL	BL	BL	--	Pass
24	BL	BL	BL	BL	--	--	Pass
25	BL	BL	BL	BL	--	--	Pass

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No.	XRF Result(mg/kg)					Chemical Test (mg/kg)	Conclusion
	Pb	Cd	Hg	Cr	Br		
26	BL	BL	BL	BL	--	--	Pass
27	BL	BL	BL	BL	--	--	Pass
28	BL	BL	BL	BL	--	--	Pass
29	BL	BL	BL	BL	BL	--	Pass
30	BL	BL	BL	BL	BL	--	Pass
31	BL	BL	BL	BL	--	--	Pass
32	BL	BL	BL	BL	--	--	Pass
33	BL	BL	BL	BL	--	--	Pass
34	BL	BL	BL	BL	--	--	Pass
35	BL	BL	BL	BL	--	--	Pass
36	BL	BL	BL	BL	--	--	Pass
37	BL	BL	BL	BL	BL	--	Pass
38	BL	BL	BL	BL	--	--	Pass
39	BL	BL	BL	BL	--	--	Pass
40	BL	BL	BL	BL	--	--	Pass
41	BL	BL	BL	BL	BL	--	Pass
42	BL	BL	BL	BL	--	--	Pass
43	BL	BL	BL	BL	BL	--	Pass
44	BL	BL	BL	BL	BL	--	Pass
45	BL	BL	BL	BL	BL	--	Pass
46	BL	BL	BL	BL	--	--	Pass
47	BL	BL	BL	BL	BL	--	Pass
48	BL	BL	BL	BL	--	--	Pass
49	BL	BL	BL	BL	--	--	Pass
50	BL	BL	BL	BL	BL	--	Pass
51	BL	BL	BL	BL	BL	--	Pass
52	BL	BL	BL	BL	BL	--	Pass

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No.	XRF Result(mg/kg)					Chemical Test (mg/kg)	Conclusion
	Pb	Cd	Hg	Cr	Br		
53	BL	BL	BL	BL	BL	--	Pass
54	BL	BL	BL	BL	--	--	Pass
55	BL	BL	BL	BL	--	--	Pass
56	BL	BL	BL	BL	BL	--	Pass
57	BL	BL	BL	BL	--	--	Pass
58	BL	BL	BL	BL	BL	--	Pass
59	BL	BL	BL	BL	--	--	Pass
60	BL	BL	BL	BL	--	--	Pass
61	BL	BL	BL	BL	--	--	Pass
62	BL	BL	BL	BL	--	--	Pass
63	BL	BL	BL	BL	--	--	Pass
64	BL	BL	BL	BL	BL	--	Pass
65	BL	BL	BL	BL	BL	--	Pass
66	BL	BL	BL	BL	--	--	Pass
67	BL	BL	BL	BL	--	--	Pass
68	BL	BL	BL	BL	--	--	Pass
69	BL	BL	BL	BL	--	--	Pass
70	BL	BL	BL	BL	--	--	Pass
71	BL	BL	BL	BL	--	--	Pass
72	BL	BL	BL	BL	BL	--	Pass
73	BL	BL	BL	BL	--	--	Pass
74	BL	BL	BL	BL	--	--	Pass

Remark:

1. It is the result on total Br while test item on restricted substances in PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr(VI).
2. Screening test by XRF spectroscopy
XRF screening limits in mg/kg for regulated elements according to IEC 62321-3-1: 2013Annex A.

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Element	Polymer Material	Metallic Material	Composite Material
Pb	$BL \leq 700 - 3\sigma \leq X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma \leq X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma \leq X < 1500 + 3\sigma \leq OL$
Cd	$BL \leq 70 - 3\sigma \leq X < 130 + 3\sigma \leq OL$	$BL \leq 70 - 3\sigma \leq X < 130 + 3\sigma \leq OL$	$LOD < X < 150 + 3\sigma \leq OL$
Hg	$BL \leq 700 - 3\sigma \leq X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma \leq X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma \leq X < 1500 + 3\sigma \leq OL$
Cr	$BL \leq 700 - 3\sigma < X$	$BL \leq 700 - 3\sigma < X$	$BL \leq 500 - 3\sigma < X$
Br	$BL \leq 300 - 3\sigma < X$	--	$BL \leq 250 - 3\sigma < X$

XRF Detection Limits in mg/kg for Regulated Elements in Various Material

Element	Polymer Material	Metallic Material	Composite Material
Pb	10	50	50
Cd	10	50	50
Hg	10	50	50
Cr	10	50	50
Br	10	50	50

- Note:**
1. BL = Under the XRF screening limit
 2. OL = Future chemical test will be conducted while result is above the screening limit
 3. X = The symbol "X" marks the region where further investigation is necessary
 4. 3σ = The reproducibility of analytical instruments
 5. LOD = Detection limit

2. Wet Chemical Test

Test Item(s)	Test Method/ Test Equipment	Unit	Limit	MDL
Cadmium(Cd)	IEC 62321-5:2013, ICP-OES	mg/kg	100	2
Lead(Pb)	IEC 62321-5:2013, ICP-OES	mg/kg	1000	2
Mercury(Hg)	IEC 62321-4:2013+AMD1:2017, ICP-OES	mg/kg	1000	2
Hexavalent Chromium(CrVI) (Metal)	IEC 62321-7-1:2015, UV-Vis	µg/cm ²	0.13	0.1
Hexavalent Chromium(CrVI) (Nonmetal)	IEC 62321-7-2:2017, UV-Vis	mg/kg	1000	8
PBBs (Next form)	IEC 62321-6:2015, GC-MS	mg/kg	1000	5
PBDEs (Next form)	IEC 62321-6:2015, GC-MS	mg/kg	1000	5
Dibutyl Phthalate(DBP)	IEC 62321-8:2017, GC-MS	mg/kg	1000	30
Butyl benzyl phthalate (BBP)	IEC 62321-8:2017, GC-MS	mg/kg	1000	30
Di-(2-ethylhexyl) Phthalate(DEHP)	IEC 62321-8:2017, GC-MS	mg/kg	1000	30
Diisobutyl phthalate (DIBP)	IEC 62321-8:2017, GC-MS	mg/kg	1000	30

PBBs		PBDEs	
Monobromobiphenyl	Hexabromobiphenyl	Monobromodiphenyl ether	Hexabromodiphenyl ether
Dibromobiphenyl	Heptabromobiphenyl	Dibromodiphenyl ether	Heptabromodiphenyl ether
Tribromobiphenyl	Octabromobiphenyl	Tribromodiphenyl ether	Octabromodiphenyl ether
Tetrabromobiphenyl	Nonabromobiphenyl	Tetrabromodiphenyl ether	Nonabromodiphenyl ether
Pentabromobiphenyl	Decabromobiphenyl	Pentabromodiphenyl ether	Decabromodiphenyl ether

- Note:**
1. mg/kg= ppm=0.0001%
 2. N.D.= Not Detected(<MDL)
 3. MDL = Method Detection Limit
 4. -- = No Testing
 5. When Cr (VI) in a sample is detected below the 0.10 $\mu\text{g}/\text{cm}^2$ LOQ (limit of quantification), the sample is considered to be negative for Cr (VI). Since Cr (VI) may not be uniformly distributed in the coating even within the same sample batch, a "grey zone" between 0.10 $\mu\text{g}/\text{cm}^2$ and 0.13 $\mu\text{g}/\text{cm}^2$ has been established as "inconclusive" to reduce inconsistent results due to unavoidable coating variations. In this case, additional testing may be necessary to confirm the presence of Cr (VI). When Cr (VI) is detected above 0.13 $\mu\text{g}/\text{cm}^2$, the sample is considered to be positive for the presence of Cr (VI) in the coating layer. Unavoidable coating variations may influence the determination. Information on storage conditions and production date of the tested sample is unavailable and thus Cr (VI) results represent status of the sample at the time of testing.

A large, semi-transparent watermark of the KEYS logo is centered on the page. It consists of the word "KEYS" in a large, bold, sans-serif font, with a blue circular graphic element behind it that matches the logo in the top left corner.



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3. Phthalate Test Result:

Test No.	Test Item(s)				Conclusion
	Dibutyl Phthalate (DBP)	Butyl benzyl phthalate (BBP)	Di-(2-ethylhexyl) Phthalate (DEHP)	Diisobutyl phthalate (DIBP)	
1	N.D.	N.D.	N.D.	N.D.	Pass
2	N.D.	N.D.	N.D.	N.D.	Pass
5	N.D.	N.D.	N.D.	N.D.	Pass
6	N.D.	N.D.	N.D.	N.D.	Pass
7	N.D.	N.D.	N.D.	N.D.	Pass
8	N.D.	N.D.	N.D.	N.D.	Pass
9	N.D.	N.D.	N.D.	N.D.	Pass
10	N.D.	N.D.	N.D.	N.D.	Pass
14	N.D.	N.D.	N.D.	N.D.	Pass
15	N.D.	N.D.	N.D.	N.D.	Pass
16	N.D.	N.D.	N.D.	N.D.	Pass
17	N.D.	N.D.	N.D.	N.D.	Pass
19	N.D.	N.D.	N.D.	N.D.	Pass
22	N.D.	N.D.	N.D.	N.D.	Pass
23	N.D.	N.D.	N.D.	N.D.	Pass
29	N.D.	N.D.	N.D.	N.D.	Pass
30	N.D.	N.D.	N.D.	N.D.	Pass
37	N.D.	N.D.	N.D.	N.D.	Pass
41	N.D.	N.D.	N.D.	N.D.	Pass
43	N.D.	N.D.	N.D.	N.D.	Pass
44	N.D.	N.D.	N.D.	N.D.	Pass
45	N.D.	N.D.	N.D.	N.D.	Pass
47	N.D.	N.D.	N.D.	N.D.	Pass
50	N.D.	N.D.	N.D.	N.D.	Pass
51	N.D.	N.D.	N.D.	N.D.	Pass

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Test No.	Test Item(s)				Conclusion
	Dibutyl Phthalate (DBP)	Butyl benzyl phthalate (BBP)	Di-(2-ethylhexyl) Phthalate (DEHP)	Diisobutyl phthalate (DIBP)	
52	N.D.	N.D.	N.D.	N.D.	Pass
53	N.D.	N.D.	N.D.	N.D.	Pass
56	N.D.	N.D.	N.D.	N.D.	Pass
58	N.D.	N.D.	N.D.	N.D.	Pass
64	N.D.	N.D.	N.D.	N.D.	Pass
65	N.D.	N.D.	N.D.	N.D.	Pass
72	N.D.	N.D.	N.D.	N.D.	Pass

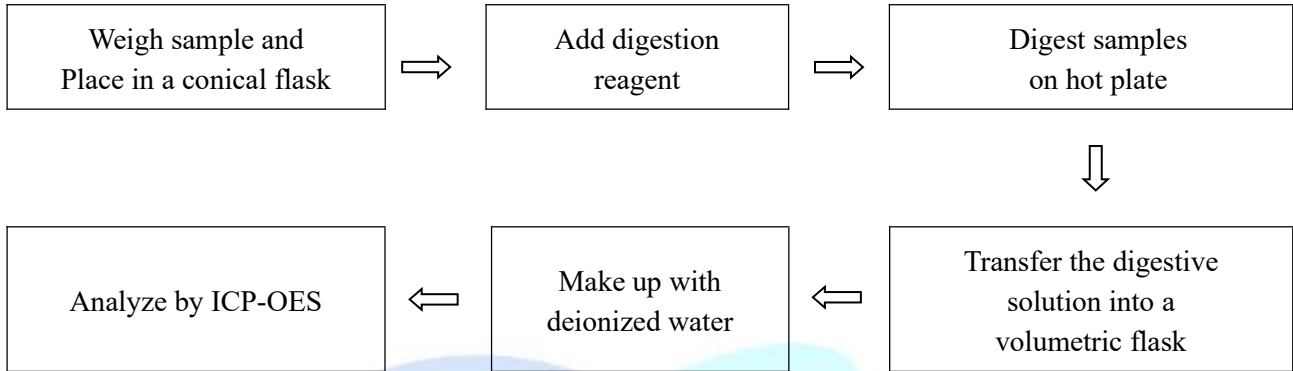
Note: 1. mg/kg= ppm=0.0001%

2. N.D.= Not Detected(<MDL)

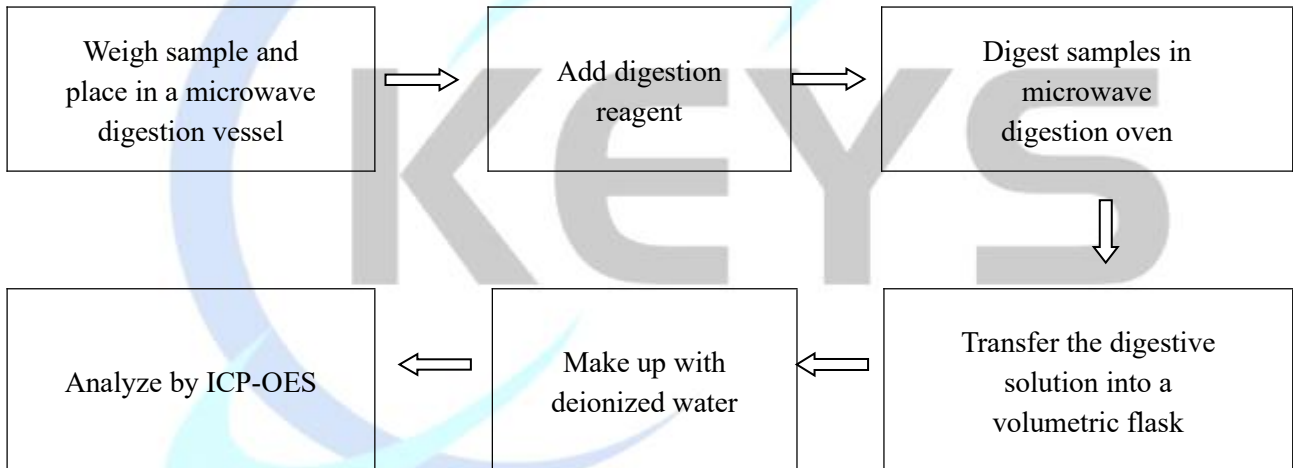


Test Process:

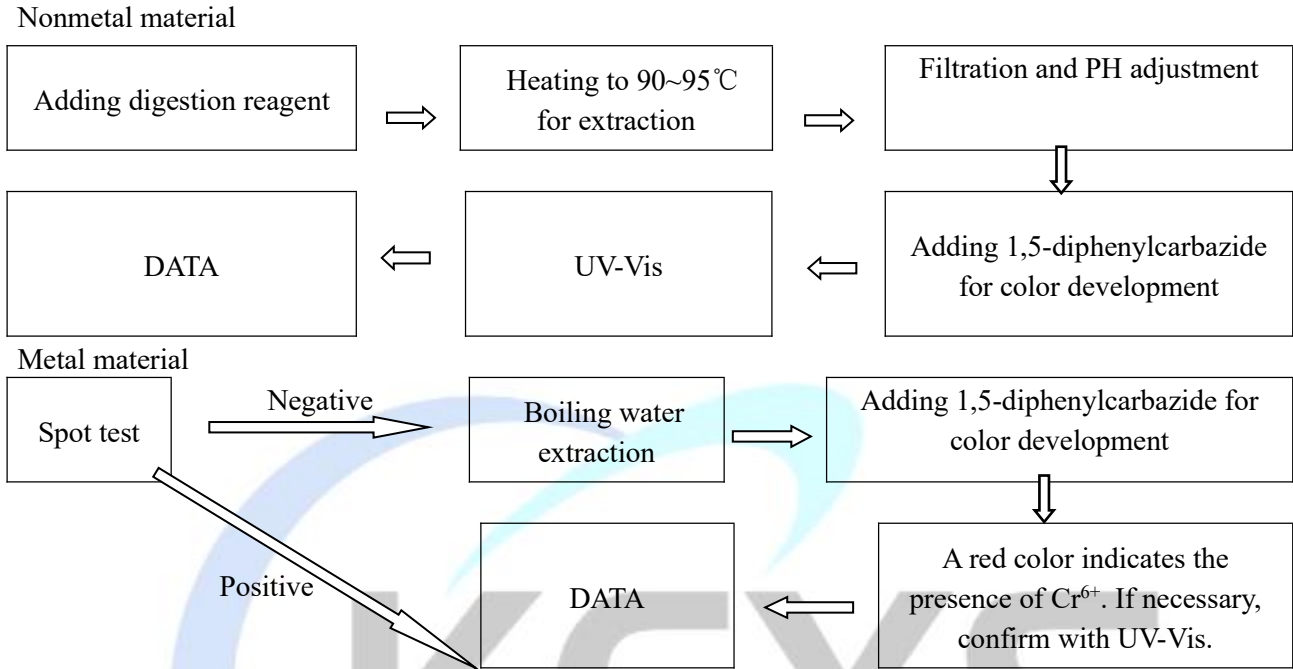
1. Test for Cd/Pb Content



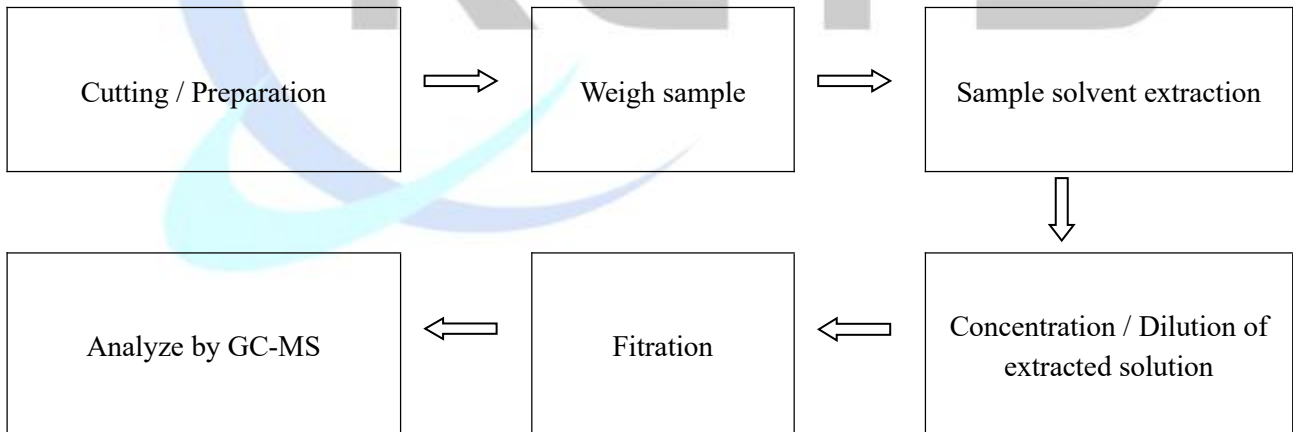
2. Test for Hg Content



3. Test for Chromium (VI) Content



4. Test for DBP, BBP, DEHP, DIBP, PBB, PBDE Content





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Sample Description:

No.	Name
1	Transparent Plastic
2	Black Coating
3	Metal Case
4	Ferrous Metal Case
5	Transparent Plastic
6	Black Plastic
7	Black Outer Leather
8	Black Wire Skin
9	Black Plastic
10	Black Wire Skin
11	Wire Core
12	Enamelled Wire
13	Magnet
14	Black Plastic
15	Red Wire Skin
16	Yellow-Green Wire Skin
17	Black Wire Skin
18	Wire Core
19	Black Plastic
20	Blue Safety Capacitor
21	Silver Metal
22	Black Plastic
23	PCB
24	Magnetic Ring Inductance
25	Silver Metal
26	Electrolytic Capacitance

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No.	Name
27	High-Frequency Transformer
28	High-Voltage Electrolytic Capacitor
29	Blue Wire Skin
30	Brown Wire Skin
31	Wire Core
32	Resistance
33	Capacitance
34	Triode
35	Diode
36	Soldering Tin
37	PCB
38	Electrolytic Capacitance
39	Soldering Tin
40	Ferrous Metal Case
41	Transparent Plastic
42	Ferrous Metal Case
43	Transparent Plastic
44	Black Plastic
45	Black Wire Skin
46	Wire Core
47	Black Plastic
48	Enamelled Wire
49	Magnet
50	Green Wire Skin
51	Red Wire Skin
52	Black Outer Leather
53	Black Plastic
54	Blue Safety Capacitor

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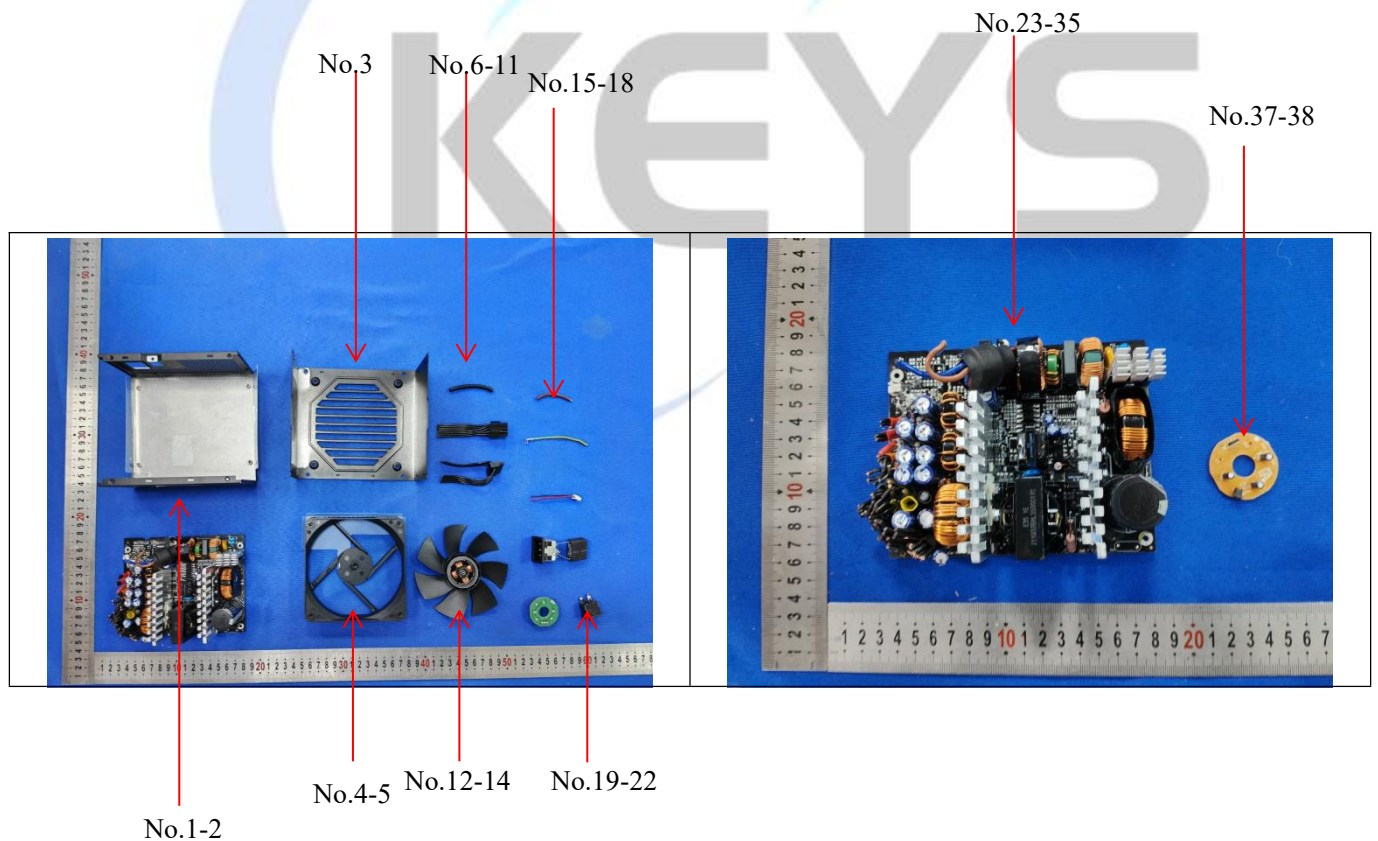
No.	Name
55	Silver Metal
56	Black Plastic
57	Silver Metal
58	PCB
59	Magnetic Ring Inductance
60	Silver Metal
61	Electrolytic Capacitance
62	High-Frequency Transformer
63	High-Voltage Electrolytic Capacitor
64	Blue Wire Skin
65	Brown Wire Skin
66	Wire Core
67	Resistance
68	Capacitance
69	Triode
70	Diode
71	Soldering Tin
72	PCB
73	Electrolytic Capacitance
74	Soldering Tin

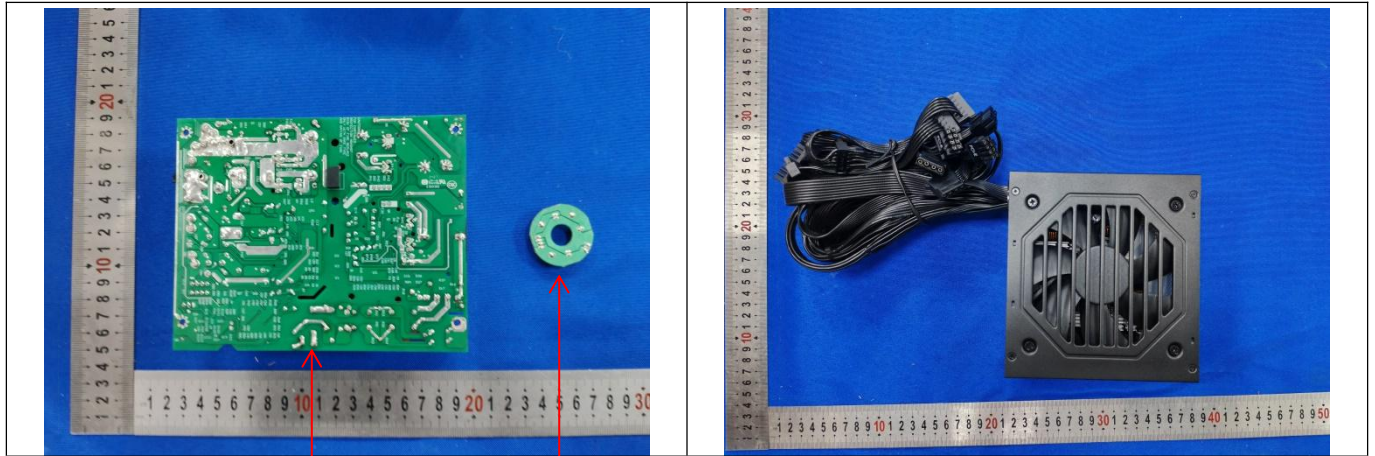
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Sample Photo:





No.36

No.39

No.40

No.41-42

No.45-46

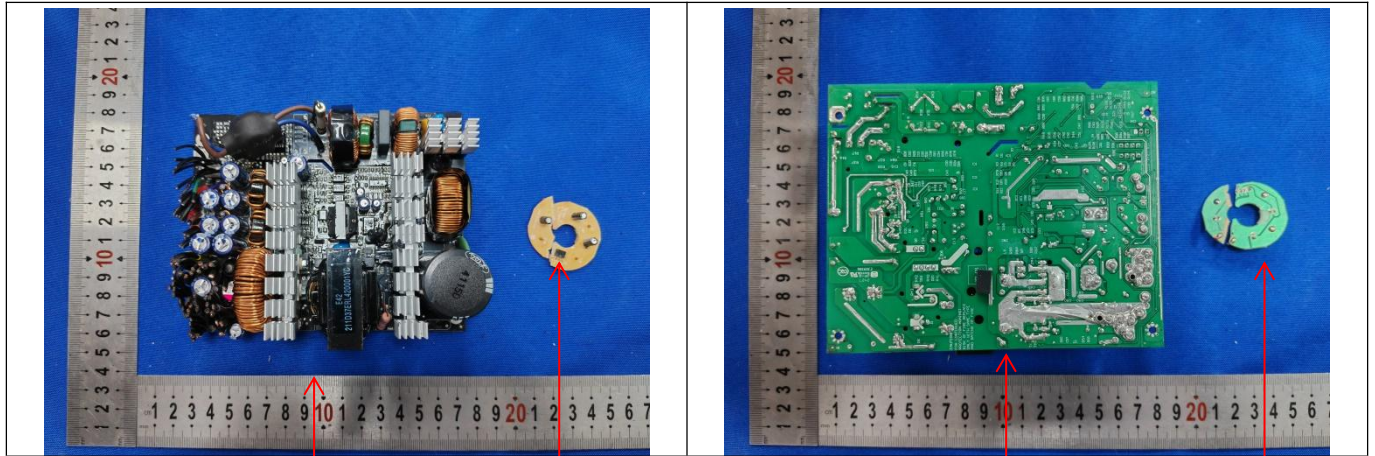
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No.43-44

No.47-49

No.54-57

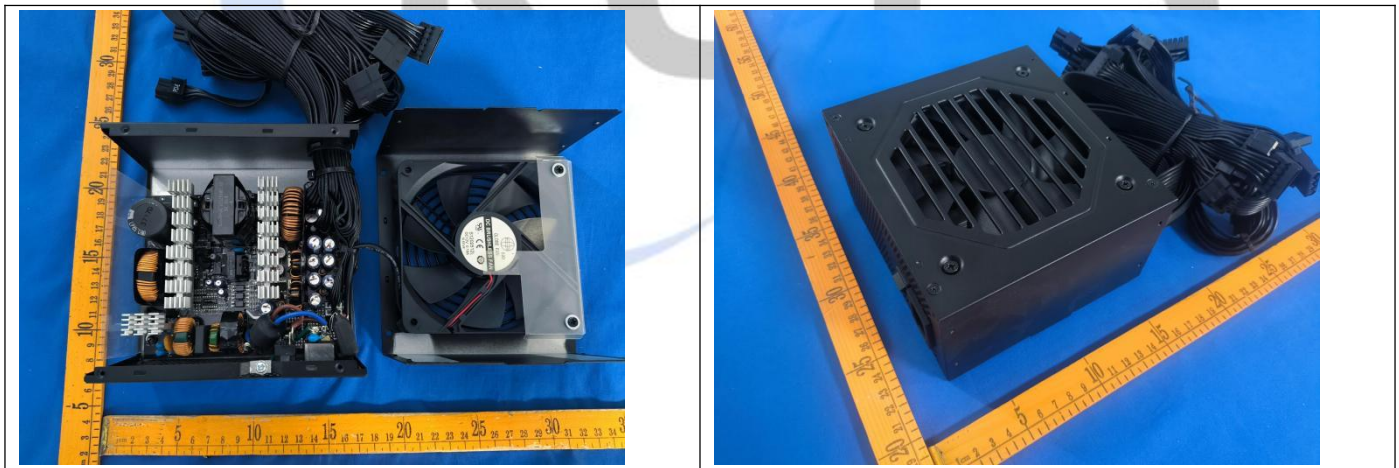


No.58-70

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No.74



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