



Report No.: MTL24031500318R01

RoHS TEST REPORT

Prepared for :

SHENZHEN KELIWEI ELECTRONIC COM.,LTD.

**Room L, 12th Floor, Building A, Huaqiang Plaza, Futian District, Shenzhen
City, Guangdong Province**

Product: SOT-23 SEMICONDUCTOR DEVICE

Brand Name: KMW

**Model Name: SOT-23,SOT-323,SOT-523,SOT-723,SOT-
-23-3,SOD-123,SOD-323,SOD-523,SOP-
8,SOT-89,TO-252,SOT-223,DFN3*3-8,DF
N5*6,TO-92**

Date of Test: Mar. 15, 2024 to Mar. 22, 2024

Date of Report: Mar. 22, 2024

Report Number: MTL24031500318R01

Prepared By :

Shenzhen MTL Testing Technology Co., Ltd.



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release		

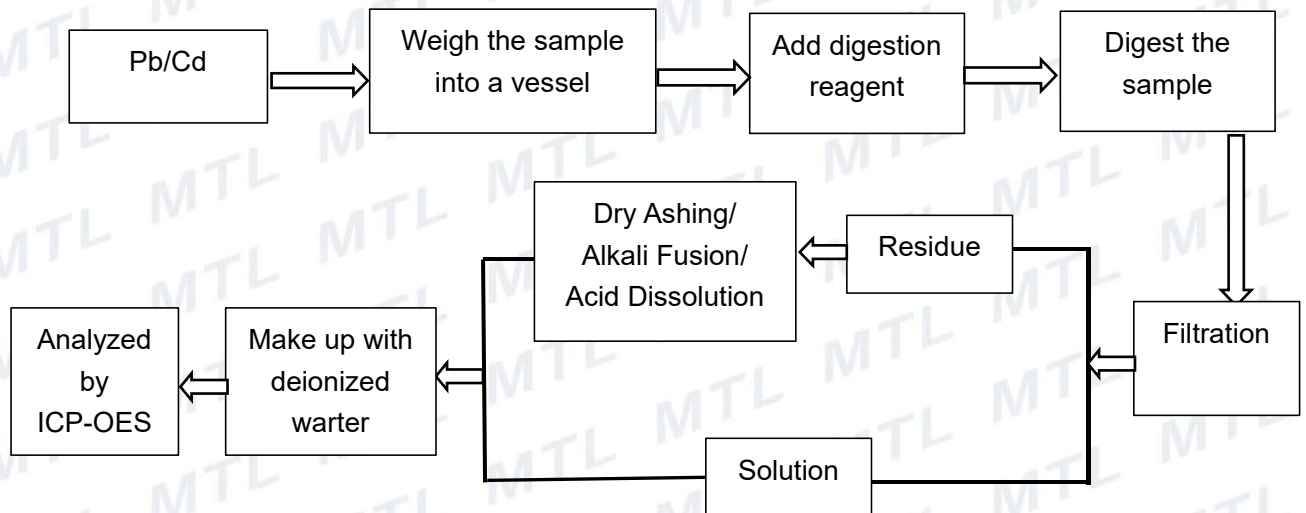


1. Test Method(s):

Testing item	Testing Method	Equipment
Screening analysis by XRF		
Lead(Pb) Cadmium(Cd) Mercury(Hg) Chromium(Cr) Bromine(Br)	IEC 62321-3-1-2013	ED-XRF
Chemical testing		
Lead(Pb)	IEC 62321-5-2013	ICP-OES
Cadmium(Cd)	IEC 62321-5-2013	ICP-OES
Mercury(Hg)	IEC 62321-4:2013+A1:2017	ICP-OES
Chromium(Cr VI) for plastic	IEC 62321-7-2:2017	UV-Vis
Chromium(Cr VI) for coating on metals	IEC 62321-7-1:2015	UV-Vis
PBBs/ PBDEs	IEC 62321-6:2015	GC-MS
DEHP/DBP/BBP/ DIBP	IEC 62321-8:2017	GC-MS

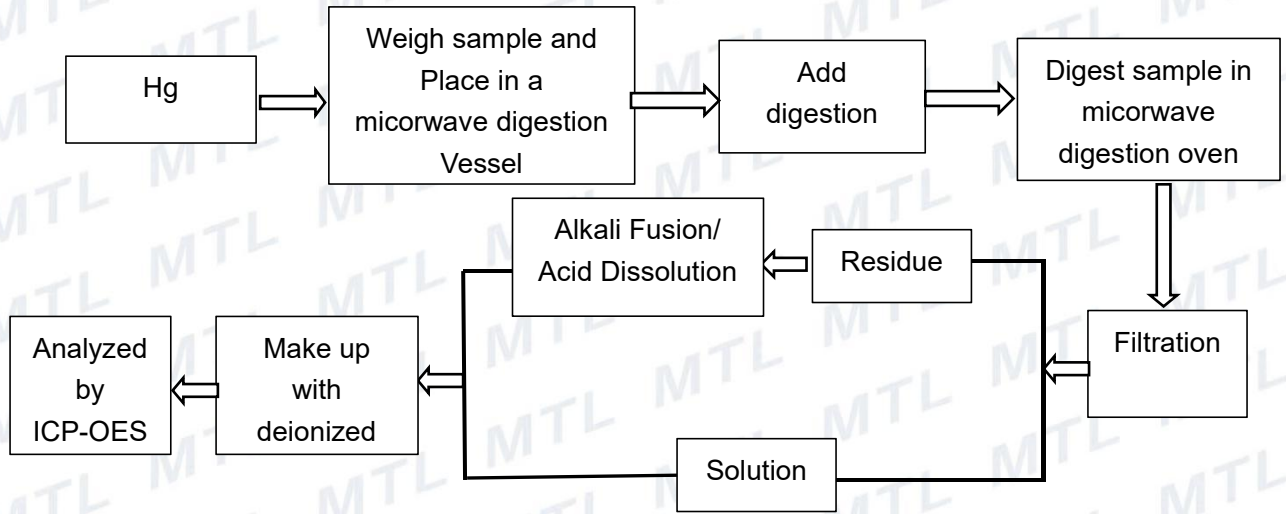
2. Test Flow:

1. Lead(Pb), Cadmium(Cd)

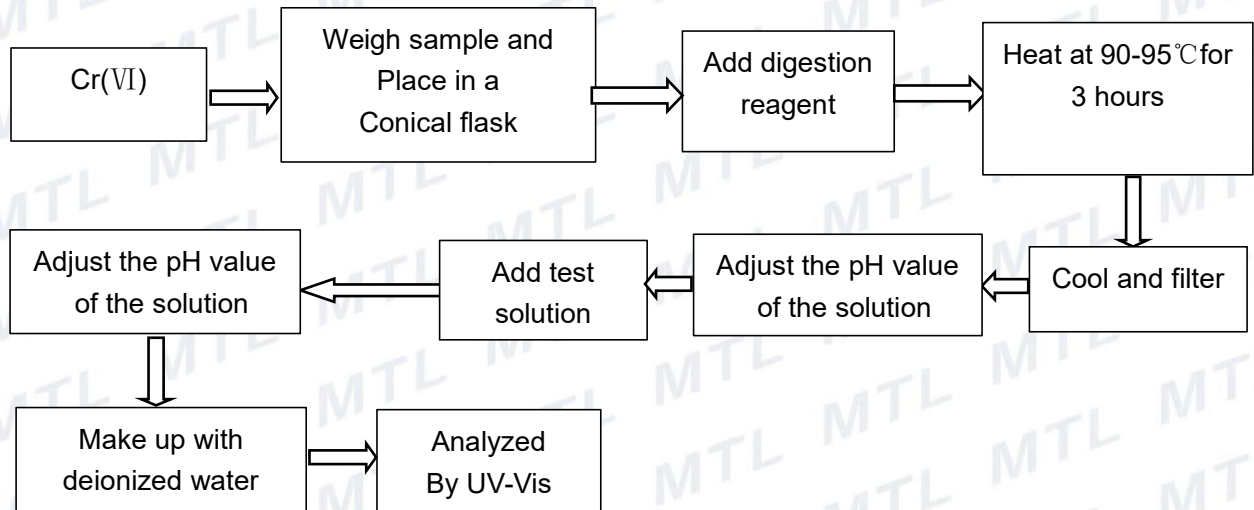




2. Mercury (Hg)

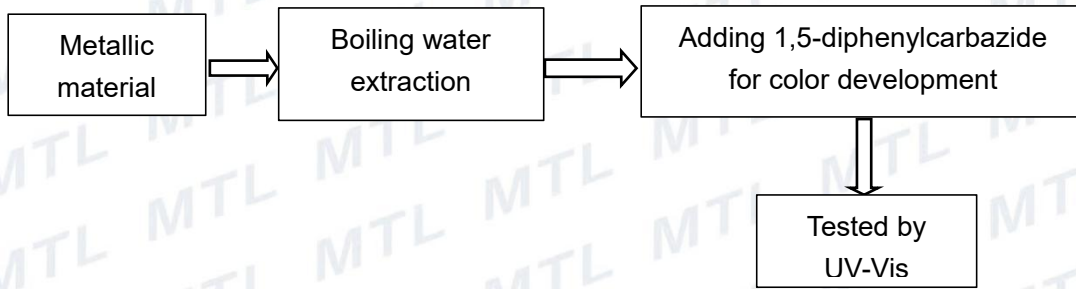


3. Hexavalent Chromium(Cr VI) (Alkaline extraction)

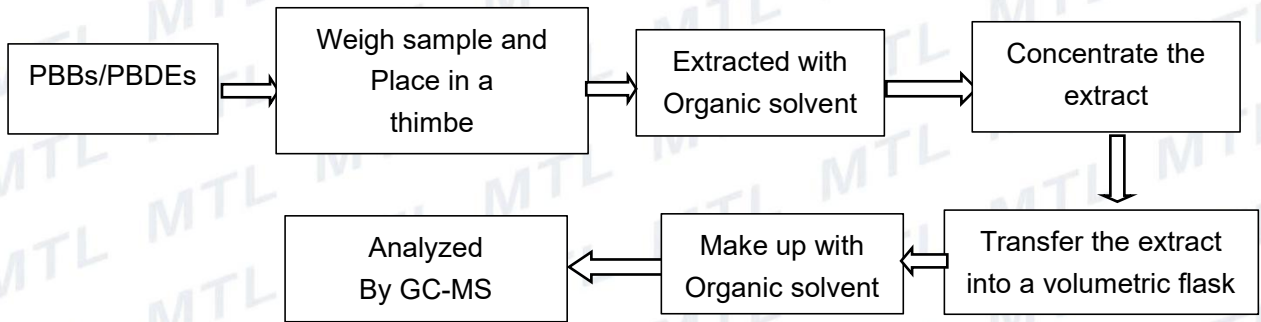




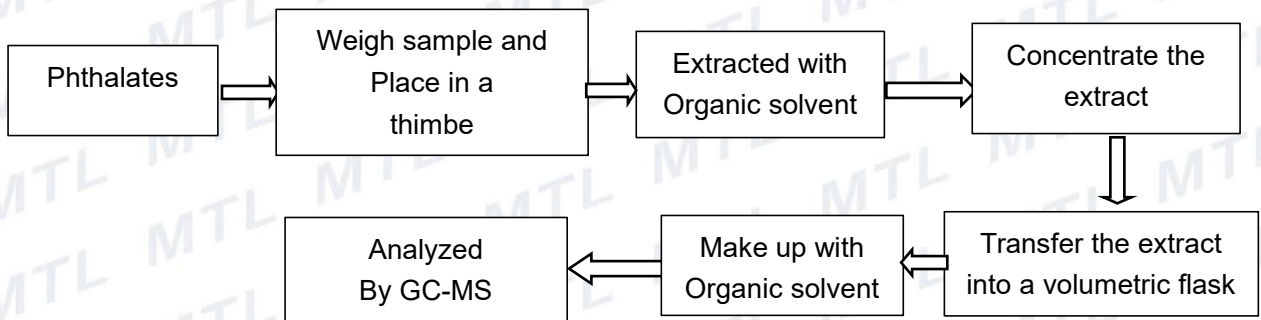
4. Hexavalent Chromium(Cr VI) (Boiling water extraction)



5. PBBs/ PBDEs



6. DEHP/ BBP/ DBP/ DIBP





3. Test Results:

Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
1	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
2	Silver metal	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	--	--	
		PBDEs		--	
		DEHP	--	--	
		DBP	--	--	
		BBP	--	--	
		DIBP	--	--	
3	Patch resistance	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
4	Black triode	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			
5	Black triode	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			
6	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
7	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
8	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
9	Silver metal	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	--	--	
		PBDEs		--	
		DEHP	--	--	
		DBP	--	--	
		BBP	--	--	
		DIBP	--	--	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
10	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
11	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
12	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
13	Silver metal	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	--	--	
		PBDEs	--	--	
		DEHP	--	--	
		DBP	--	--	
		BBP	--	--	
		DIBP	--	--	
14	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs	--	--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
15	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs	--	--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
16	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
17	Silver metal	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	--	--	
		PBDEs		--	
		DEHP	--	--	
		DBP	--	--	
		BBP	--	--	
		DIBP	--	--	
18	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
19	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			
20	Black triode	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			
21	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
DIBP	--	ND			



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
22	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
23	Black IC	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
24	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
25	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
26	Black IC	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
27	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	



Part No.	Sample Description	Test item	XRF Result	Chemical Test (mg/kg)	Conclusion
28	Transparent plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
29	Patch resistance	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	
30	Black plastic	Pb	BL	--	Pass
		Cd	BL	--	
		Hg	BL	--	
		Cr(Cr(VI))	BL	--	
		PBBs	BL	--	
		PBDEs		--	
		DEHP	--	ND	
		DBP	--	ND	
		BBP	--	ND	
		DIBP	--	ND	

Remark:

1) (a) It is the result on total Br while test item on restricted substances is PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr⁶⁺.

(b) Results are obtained by XRF for primary screening, and further chemical testing by



ICP-OES (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC62321-3-1:2013 (unit: mg/kg).

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

(c) OL=Over Limit, BL=Below Limit, X=inconclusive, LOD=Limit of Detection, NA=not applicable, -- = No Testing

(d) The XRF screening test for RoHS elements-The reading may be different to the actual content in the sample be of non-uniformity composition

2) (a) mg/kg=ppm=0.0001%, N.D.=not detected (<MDL)

(b) Unit and Method Detection Limit(MDL) in wet chemical test

Test Items	Unit	MDL	Limit
Pb	mg/kg	2	1000
Cd	mg/kg	2	100
Hg	mg/kg	2	1000
DBP	mg/kg	30	1000
BBP	mg/kg	30	1000
DEHP	mg/kg	30	1000
DIBP	mg/kg	30	1000

The MDL for single compound of PBBs & PBDEs is 20mg/kg, MDL of Cr⁶⁺ for metal sample is 0.10µg/cm². and MDL of Cr⁶⁺ for polymer & composite sample is 8 mg/kg.

(c) Metal sample:

-The sample is positive for Cr⁶⁺ if the Cr⁶⁺ concentration is greater than 0.13 µg/cm².

The sample coating is considered to contain Cr⁶⁺.

-The sample is negative for Cr⁶⁺ if Cr⁶⁺ is ND (concentration less than 0.10 µg/cm²).

The coating is considered a non- Cr⁶⁺ based coating

-The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive, unavoidable coating variations may influence the determination

Information on storage conditions and production date of the tested sample is unavailable and thus Cr⁶⁺ results represent status of the sample at the time of testing.

3) As specified by client to test the specified materials only.

(4) *=According to the declaration from the client, Lead (Pb) in the sample are exempted by EU RoHS Directive 2011/65/EU based on ANNEX III 6(c): Copper alloy containing no more than 4% lead by weigh

(5) #=According to the declaration from the client, Lead (Pb) in the sample are exempted by EU RoHS Directive 2011/65/EU based on ANNEX III 7(c)-I, Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors

Photograph of Sample



FIGURE 1



FIGURE 2

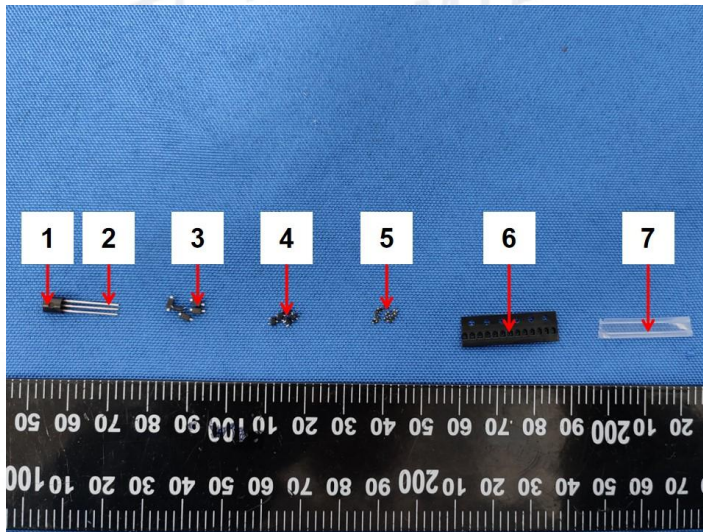


FIGURE 3

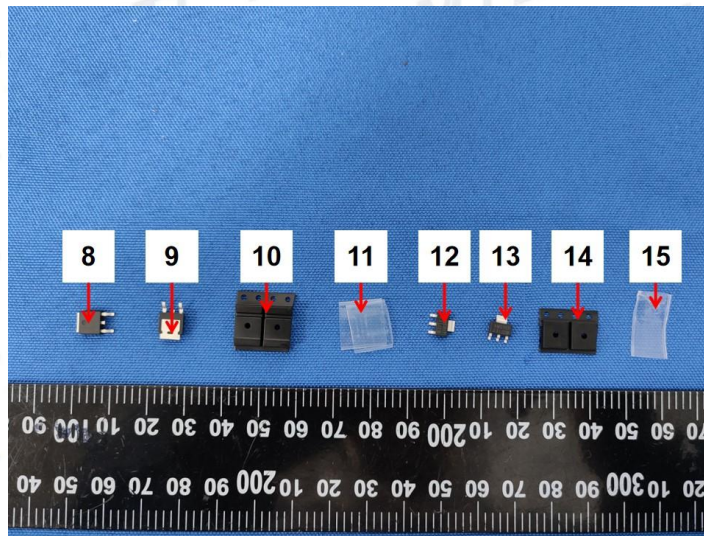


FIGURE 4

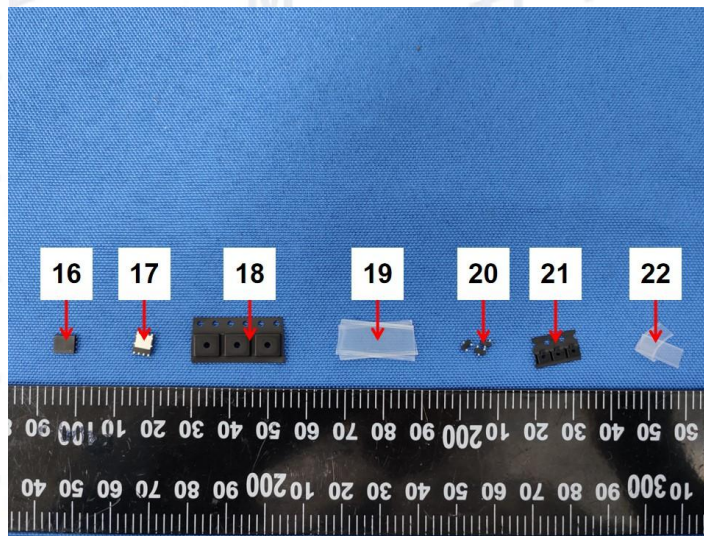


FIGURE 5

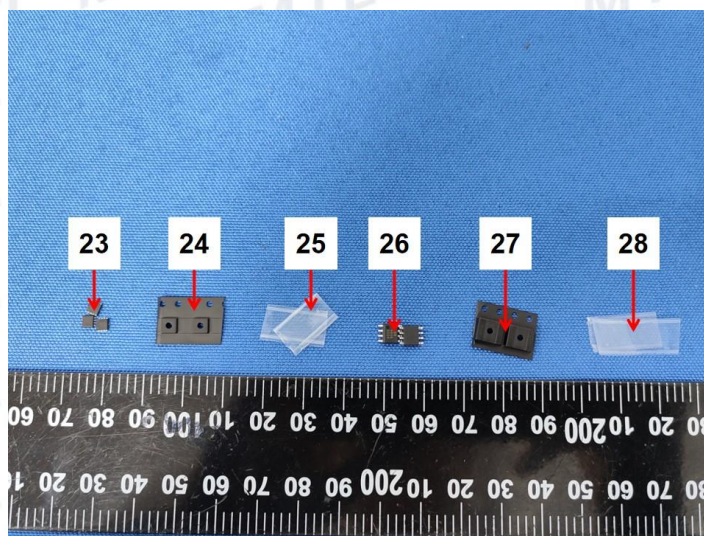


FIGURE 6

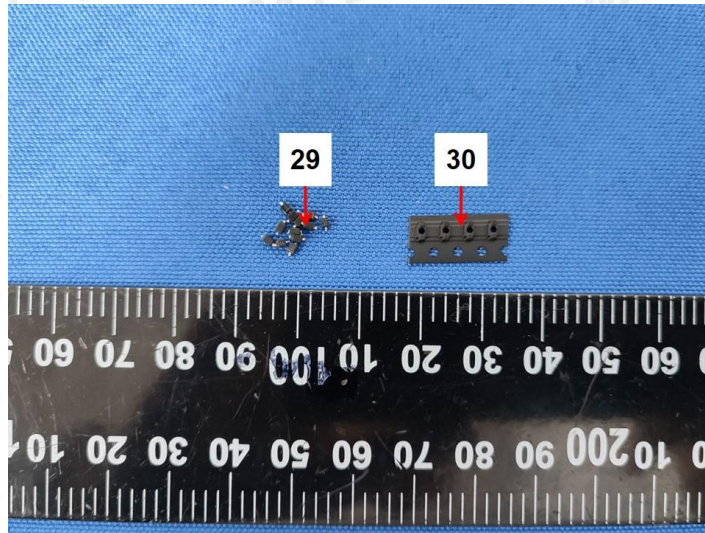


FIGURE 7

End of Report