

Report No. AL2112819801EN Approved date: Dec. 13, 2021

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**Applicant** TONGFU MICROELECTRONICS CO.,LTD.

Address №288,CHONGCHUAN ROAD,CHONGCHUAN ECONOMIC DEVELOPMENT

AREA, NANTONG, JIANGSU, P.R. CHINA.

The following submitted sample(s) was/were identified by/on behalf of the applicant as

Sample Name LQFP48

**Test Part** 1. Silvery metal 2. Black body

\_\_\_\_\_\_

Date Received Dec. 2, 2021

**Test Period** Dec. 2, 2021 to Dec. 10, 2021

Test Request 1.Silvery metal:

To determiner the contents of Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent

Chromium (Cr(VI)), Perfluorooctane Sulfonates (PFOS), Perfluorooctanoic

Acid(PFOA), Beryllium oxide, Beryllium copper, Antimony (Sb) in the received sample(s).

2.Black body:

To determine the contents of Pb,Cd,Hg,Hexavalent Chromium (Cr(VI)),PBBs,PBDEs,Sb, F,Cl,Br,I,PCBs,PCNs,PCTs,SCCP,TBT,TPT,DBT, DOT,Asbestos,Specific azo compounds,

Formaldehyde,PVC and PVC compound,Beryllium oxide,Beryllium copper,

DEHP,DBP,BBP,DINP,DIDP,DNOP,DNHP,DIHP,DHNUP,DMEP,HFC,PFC,UV320 (Specific benzotriazole),PFOS,PFOA, Cobalt dichloride, Ozonosp here destroy substance, DMF, Tris (2-chloroethyl) phosphate (T CEP), Hexabromocyclododecane (HBCDD), Diarsenic

trioxide, D iarsenic pentaoxide, Boric acid, specific sodium borates, Diisobu tyl

phthalate (DIBP), 4-(1,1,3,3-tetramethylbutyl)phenol, Bis(2-met hoxyethyl)ether-d14,

DMAC, EGDME in the received sample(s).

For more information about the test, please refer to the following pages.

Compiled

Ву

ying c

Checked

Zhu Zheng feng

Approved
By

Jiang He

Signed for and on behalf of

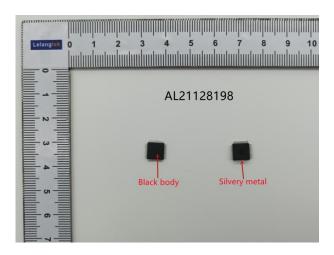
Shanghai Lelangtek Testing Technology Co., Ltd.(2<sup>nd</sup> Floor, Building 4, No.158, Jinfeng Road, Pudong District, Shanghai)



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### Sample Photo(s)



Lelangtek authenticated the photo on original report only



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### **Test Result**

Took Itom	Result(mg/kg)		MDL
Test Item	Silvery metal	Black body	(mg/kg)
Lead (Pb)	ND	ND	2
Cadmium (Cd)	ND	ND	2
Mercury (Hg)	ND	ND	2
Have related Change in the (Ca(VIII)	/	ND	8
Hexavalent Chromium (Cr(VI))	Negative#	/	See note 5
Polybrominated Biphenyls (PBBs)			
Monobromobiphenyls	/	ND	5
Dibromobiphenyls	/	ND	5
Tribromobiphenyls	/	ND	5
Tetrabromobiphenyls	/	ND	5
Pentabromobiphenyls	/	ND	5
Hexabromobiphenyls	/	ND	5
Heptabromobiphenyls	/	ND	5
Octabromobiphenyls	/	ND	5
Nonabromobiphenyls	/	ND	5
Decabromobiphenyls	/	ND	5
Polybrominated Biphenyls (PBBs) total	/	ND	
Polybrominated Diphenyl Ethers (PBDEs)			
Monobromodiphenyl ethers	/	ND	5
Dibromodiphenyl ethers	/	ND	5
Tribromodiphenyl ethers	/	ND	5
Tetrabromodiphenyl ethers	/	ND	5
Pentabromodiphenyl ethers	/	ND	5
Hexabromodiphenyl ethers	/	ND	5
Heptabromodiphenyl ethers	/	ND	5
Octabromodiphenyl ethers	/	ND	5
Nonabromodiphenyl ethers	/	ND	5
Decabromodiphenyl ethers	/	ND	5
Polybrominated Diphenyl ethers (PBDEs) total	/	ND	

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Test Item	Result	Result(mg/kg)	
	Silvery metal	Black body	(mg/kg)
PCBs		ND	10
PCNs		ND	10
PCTs		ND	10
SCCP		ND	10
ТВТ	/	ND	10
ТРТ		ND	10
DBT		ND	10
DOT		ND	10

	Result(	Result(mg/kg)	
Test Item	Silvery metal	Black body	(%)
Asbestos			
Anthrophyllite		ND	1
Crocodolite		ND	1
Amosite	,	ND	1
Tremolite	/	ND	1
Chrysotile		ND	1
Actinolite		ND	1

Total Maria	Result	(mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Azo compounds			
4-Aminodiphenyl		ND	5
Benzidine		ND	5
4-Chloro-o-toluidine		ND	5
2-Naphthylamine		ND	5
O-Aminoazotoluene	/	ND	5
P-Chloroaniline		ND	5
2,4-Diaminoanisole		ND	5
4,4'-Diaminodiphenylmethane		ND	5

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Test Item	Result(	mg/kg)	MDL
	Silvery metal	Black body	(mg/kg)
Azo compounds			
3,3'-Dichlorobenzidine		ND	5
3,3'-Dimethoxybenzidine		ND	5
3,3'-Dimethylbenzidine		ND	5
3,3'-Dimethyl-4,4'-diaminodi phenylmetha		ND	5
P-Cresidine(2-methoxy-5-m ethylaniline)		ND	5
4,4'-Methylene-bis-(2-chloc oaniline)		ND	5
4,4'-Oxydianiline		ND	5
4,4'-Thiodianiline		ND	5
O-Toluidine		ND	5
2,4-Toluylenediamine		ND	5
2,4,5-Trimethylaniline		ND	5
O-Anisidine		ND	5
5-Nitro-o-toluidine		ND	5
4-Aminoazobenzene		ND	5
2,4-Dimethylaniline		ND	5
2,6-Dimethylaniline		ND	5

Total Maria	Result	(mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Formaldehyde		ND	5
PVC and PVC compound	/	Not contain	/
Beryllium oxide	ND	ND	2
Beryllium copper	ND	ND	2
Fluorine(F)		ND	50
Chlorine(CI)		ND	50
Bromine(Br)	/	ND	50
lodine(I)		ND	50
Antimony (Sb)	ND	ND	2

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T	Result(	mg/kg)	MDL
Test Item	Silvery metal		(mg/kg)
Phthalates(PAEs)			
Di(2-ethylhexyl) phthalate (DEHP)		ND	50
Dibutyl phthalate(DBP)		ND	50
Butyl benzyl phthalate (BBP)		ND	50
Di-isononyl phthalate(DINP)		ND	50
Di-iso-decyl phthalate(DIDP)		ND	50
Di-n-octyl phthalate(DNOP)		ND	50
Di-n-hexyl phthalate (DNHP)		ND	50
Di-isobutyl Phthalate(DIBP)	/	ND	50
Diphenyliodonium hexafluorophosphate (DIHP)		ND	50
1,2-Benzenedicarboxylic acid,di-C7-11- branched and linear alkyl esters(DHNUP)		ND	50
1,2-Benzenedicarboxylic acid,butyl methyl ester(DMEP)		ND	50

Total No. 10	Result(	mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
HFC			
HFC-23		ND	1
HFC-32		ND	1
HFC-41		ND	1
HFC-43-10mee		ND	1
HFC-125	/	ND	1
HFC-134		ND	1
HFC-134a		ND	1
HFC-143		ND	1
HFC-143a		ND	1

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	Result(	mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
HFC-152a		ND	1
HFC-227ea		ND	1
HFC-236fa		ND	1
HFC-236ea		ND	1
HFC-245ea		ND	1
HFC-245fa		ND	1
HFC-365mfc		ND	1
PFC		ND	1
F14		ND	1
Fluorocarbon 116		ND	1
Freon 218		ND	1
Decafluorobutane		ND	1
Freon C318		ND	1
Perfluor-1-butane		ND	1
Perfluorisobutane		ND	1
1,4-Dihydroctafluorobutane		ND	1
Nonafluor-2-(trifluorpmethyl)butane		ND	1
Perfluoro-n-pentane		ND	1
2-Perfluoromethylpentane		ND	1
Perfluorohexane		ND	1
UV320(Specific benzotriazole)		ND	1
Cobalt dichloride		ND	2
Ozonosphere destroy substance			
CFCs		ND	10
Carbon Tetrachloride		ND	10
1,1,1-Trichloroethane		ND	10
Halons	/	ND	10
HCFCs		ND	10
Bromomethane		ND	10
HBFCs		ND	10

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T	Result	(mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Perfluorooctane sulphonate (PFOS)	ND	ND	0.01
Perfluorooctanoic Acid(PFOA)	ND	ND	0.01
DMF		ND	10
TCEP		ND	10
Hexabromocyclododecane (HBCDD)	1	ND	10
Diarsenic trioxide, Diarsenic pentaoxide		ND	2
Boric acid, specific sodium borates	/	ND	2
4-(1,1,3,3-tetramethylbutyl)phenol		ND	50
Bis(2-methoxyethyl)ether-d14		ND	50
DMAC		ND	50
EGDME		ND	50

#### Note:

- (1) The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.
- (2) ND=Not detected (Below the detection limit);
- (3) mg/kg = ppm=parts per million.
- (4) When Cr(VI) in a sample is detected below the  $0.10~\mu$  g/cm², the sample is negative for Cr(VI). When Cr(VI) is detected above  $0.13~\mu$  g/cm², the sample is positive for the presence of Cr(VI) in the coating layer. A"grey zone" between  $0.10~\mu$  g/cm² and  $0.13~\mu$  g/cm² 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).
- (5) # = Testing Cr<sup>6+</sup> by IEC 62321:2008 Annex B and the result is showed as Positive/Negative Negative = Absence of Cr<sup>6+</sup>, which means that the Cr<sup>6+</sup> concentration in extraction solution is less than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area Positive = Presence of Cr<sup>6+</sup>, which means that the Cr<sup>6+</sup> concentration in extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.



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### **Test Method**

Test Item	Test Method	Measured Equipment
Load (Dh.) Codesium (Cd.)	IEC 62321-3-1:2013 & IEC	VDE 8 ICD OFC
Lead (Pb), Cadmium (Cd)	62321-5:2013	XRF&ICP-OES
Maria (115)	IEC 62321-3-1:2013 & IEC	VDE 0.100, OF 0
Mercury (Hg)	62321-4:2018	XRF&ICP-OES
Hovevelent Chromium (Cr/VII)	IEC62321 Edition 1.0:2008	UV-Vis
Hexavalent Chromium (Cr(VI))	IEC 62321-7-2:2017	UV-Vis
Polybrominated biphenyls (PBBs)	IEC (2224 C-204E	GC-MS
Polybrominated diphenyl ethers (PBDEs)	IEC 62321-6:2015	GC-MS
PCBs	EPA 8082A	GC-MS
PCNs	EPA 8082A	GC-MS
PCTs	EPA 8082A	GC-MS
SCCP	EPA 3540C	GC-MS
ТВТ	DIN 38407-13	GC
TPT	DIN 38407-13	GC
DBT	DIN 38407-13	GC
DOT	DIN 38407-13	GC
Asbestos	Niosh Method 9000,issue 2	X-ray Diffraction
Azo compounds	35 LMBG	GC-MS
Formaldehyde	ISO/TS 17226:2003(E)	HPLC
DVC and DVC someound		Fourier ransform
PVC and PVC compound		Infrared Spectra
Beryllium oxide		ICP-OES
Beryllium copper		ICP-OES
Fluorine(F), Chlorine(Cl),	EN 44502-2046	10
Bromine(Br),Iodine(I)	EN 14582:2016	IC
Antimony (Sb)	GB/T 5121.12-2008	ICP-OES
Phthalates	IEC 62321-8: 2017	GC-MS
HFC	EPA8260B	GC-MS
UV320(Specific benzotriazole)		GC-MS
Cobalt dichloride		ICP-OES

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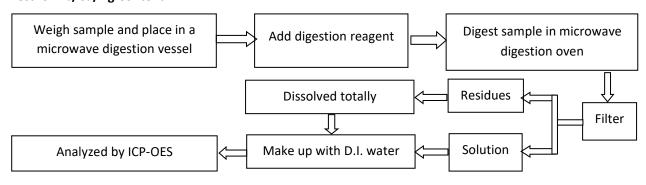
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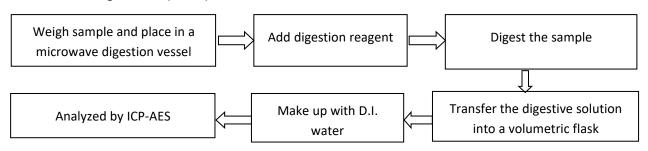
Test Item	Test Method	Measured Equipment
Ozonosphere destroy substance	EPA8260B	GC-MS
Perfluorooctane Sulfonates(PFOS)	CEN/TC 150C0:2010	LC NAC NAC
Perfluorooctanoic Acid(PFOA)	CEN/TS 15968:2010	LC-MS-MS
DMF		GC
TCEP	EPA 3540C	GC-MS
Hexabromocyclododecane (HBCDD)	EPA 3540C	GC-MS
Diarsenic trioxide, Diarsenic pentaoxide	EPA3052	ICP-OES
Boric acid, specific sodium borates	EPA3052	ICP-OES
4-(1,1,3,3-tetramethylbutyl)phenol	EPA 3540C	GC-MS
Bis(2-methoxyethyl)ether-d14	EPA 3540C	GC-MS
DMAC	EPA 3540C	GC-MS
EGDME	EPA 3540C	GC-MS

### **Test Flow Chart**

## Test for Pb/Cd/Hg Content



### Test for Pb/Cd/Hg Content (Metal)



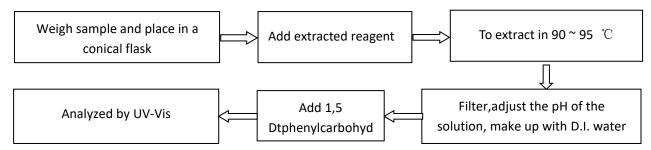
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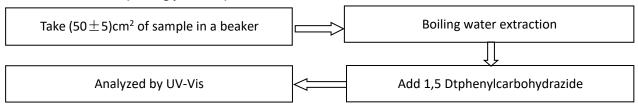
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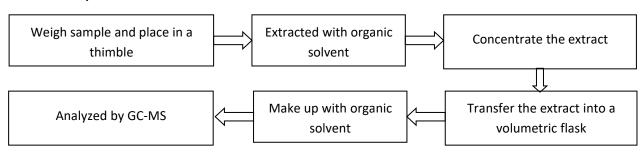
### Test for Cr6+ Content



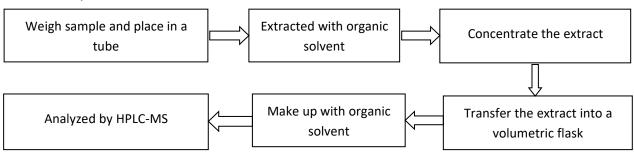
## Test for Cr6+ Content (Plating products)



## **Test for PBBs /PBDEs Content**



### **Test for PFOA, PFOS Content**



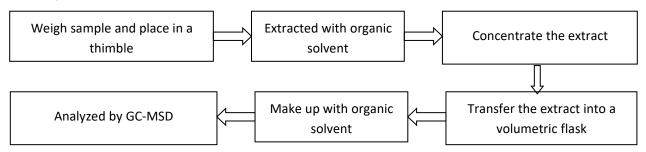
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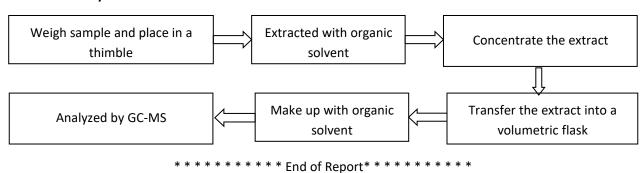
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### **Test for phthalates Content**



### **Test for Dimethyl fumarate Content**



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- (2) This report shall not be modified, increased, deleted, copied or intercepted, without the approval of Lelangtek.
- (3) The results shown in this report refer only to the lab received sample(s).
- (4) If you have any question or concern to this report, please contact us within 10 days, or it will not be accepted out of the time.