

Test Report No.: SHAEC23004527901 **Date**: Apr 25, 2023 Page 1 of 13

Client Name: SK HYNIX SYSTEM IC (WUXI) CO., LTD

Client Address: 702 ZHIDE RD, XINWU DISTRICT, WUXI, JIANGSU CHINA

Sample Name: 200mm wafer

The above sample(s) and information were provided by the client.

SGS Job No.: SP23-009589 Sample Receiving Date: Apr 17, 2023

Testing Period: Apr 17, 2023 ~ Apr 25, 2023

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

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

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Chlorinated Phenols	See Results
Element(s)	See Results
Halogen	See Results
Polyvinyl chloride (PVC)	See Results
voc	See Results
Bisphenol A	See Results

Signed for and on behalf of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Sue Sheng

Approved Signatory





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Test Report No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 2 of 13

Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	SHA23-0045279-0001.C001	Colorful solid sheet

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017,

IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES, AAS, UV-

Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A1
Cadmium(Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybromobiphenyl (PBBs)	1000	mg/kg	-	ND
Monobromobiphenyl (MonoBB)	-	mg/kg	5	ND
Dibromobiphenyl (DiBB)	-	mg/kg	5	ND
Tribromobiphenyl (TriBB)	-	mg/kg	5	ND
Tetrabromobiphenyl (TetraBB)	-	mg/kg	5	ND
Pentabromobiphenyl (PentaBB)	-	mg/kg	5	ND
Hexabromobiphenyl (HexaBB)	-	mg/kg	5	ND
Heptabromobiphenyl (HeptaBB)	-	mg/kg	5	ND
Octabromobiphenyl (OctaBB)	-	mg/kg	5	ND
Nonabromobiphenyl (NonaBB)	-	mg/kg	5	ND
Decabromobiphenyl (DecaBB)	-	mg/kg	5	ND
Polybromodiphenyl ether(PBDEs)	1000	mg/kg	-	ND
Monobromodiphenylether (MonoBDE)	-	mg/kg	5	ND
Dibromodiphenylether (DiBDE)	-	mg/kg	5	ND
Tribromodiphenylether (TriBDE)	-	mg/kg	5	ND
Tetrabromodiphenylether (TetraBDE)	-	mg/kg	5	ND
Pentabromodiphenylether (PentaBDE)	-	mg/kg	5	ND
Hexabromodiphenylether (HexaBDE)	-	mg/kg	5	ND
Heptabromodiphenylether (HeptaBDE)	-	mg/kg	5	ND
Octabromodiphenylether (OctaBDE)	-	mg/kg	5	ND
Nonabromodiphenylether (NonaBDE)	-	mg/kg	5	ND
Decabromodiphenylether (DecaBDE)	-	mg/kg	5	ND
Dibutyl Phthalate(DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate(BBP)	1000	mg/kg	50	ND



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Test Report No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 3 of 13

Test Item(s)	Limit	Unit(s)	MDL	A1
Bis-(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalate(DIBP)	1000	mg/kg	50	ND

Notes:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series.
- (3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

Chlorinated Phenols

With reference to FD CEN/TR 14823:2006, analysis was performed by GC-ECD or GC-MS. Test Method:

Test Item(s)	Unit(s)	MDL	A1
Pentachlorophenol(PCP)	mg/kg	0.1	ND
2,3,4,5-Tetrachlorophenol(2,3,4,5-TeCP)	mg/kg	0.05	ND
2,3,5,6-Tetrachlorophenol(2,3,5,6-TeCP)	mg/kg	0.05	ND
2,3,4,6-Tetrachlorophenol(2,3,4,6-TeCP)	mg/kg	0.05	ND
2,4,6-Trichlorophenol(2,4,6-TriCP)	mg/kg	0.05	ND
2,3,6-Trichlorophenol(2,3,6-TriCP)	mg/kg	0.05	ND
2,3,5-Trichlorophenol(2,3,5-TriCP)	mg/kg	0.05	ND
2,4,5-Trichlorophenol(2,4,5-TriCP)	mg/kg	0.05	ND
2,3,4-Trichlorophenol(2,3,4-TriCP)	mg/kg	0.05	ND
3,4,5-Trichlorophenol(3,4,5-TriCP)	mg/kg	0.05	ND

Element(s)

Test Method: With reference to US EPA 3052:1996, analysis was performed by ICP-OES.

Test Item(s)	Unit(s)	MDL	A1
Arsenic(As)	mg/kg	10	ND
Silver(Ag)	mg/kg	10	ND
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	10	ND

Halogen

Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	CAS No.	Unit(s)	MDL	A1
Fluorine(F)	7782-41-4	mg/kg	20	ND
Chlorine(CI)	7647-14-5	mg/kg	50	ND
Bromine(Br)	7726-95-6	mg/kg	50	ND
lodine(I)	12190-71-5	mg/kg	50	ND

Polyvinyl chloride (PVC)

Test Method: With reference to SGS in house method, analysis was performed by FTIR/HATR.



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Test Report Page 4 of 13 No.: SHAEC23004527901 **Date:** Apr 25, 2023

Test Item(s)	CAS No.	A1
Polyvinyl chloride (PVC)	9002-86-2	Negative

Notes:

(1) Negative=The sample does not contain Polyvinylchloride (PVC),Positive=The sample contains Polyvinylchloride (PVC)

<u>voc</u>

Test Method: with reference to EPA 5021A:2014, analysis was performed by HS-GC-MS.

Test Item(s)	Unit(s)	MDL	A1
Benzene	mg/kg	1	ND
1,4-Dichlorobenzene	mg/kg	1	ND
Toluene	mg/kg	1	ND
Ethylbenzene	mg/kg	1	ND
m-Xylene/p-Xylene	mg/kg	2	ND
o-Xylene	mg/kg	1	ND
Styrene	mg/kg	1	ND
n-butylacetate	mg/kg	1	ND

Bisphenol A

Test Method: With reference to US EPA 3550C:2007, analysis was performed by LC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A1
Bisphenol A(BPA)	80-05-7	ma/ka	1.0	ND

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019.



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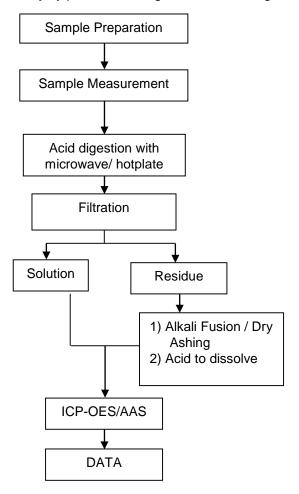
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ATTACHMENTS

No.: SHAEC23004527901 **Date:** Apr 25, 2023

Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.





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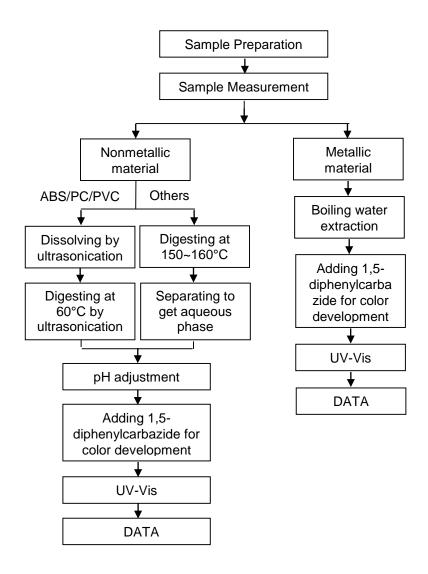
Page 5 of 13



No.: SHAEC23004527901 **Date:** Apr 25, 2023

pr 25, 2023 Page 6 of 13

Hexavalent Chromium (Cr(VI)) Testing Flow Chart





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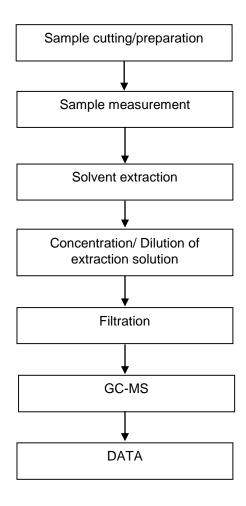
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No.: SHAEC23004527901 Page 7 of 13 **Date:** Apr 25, 2023

PBBs/PBDEs Testing Flow Chart





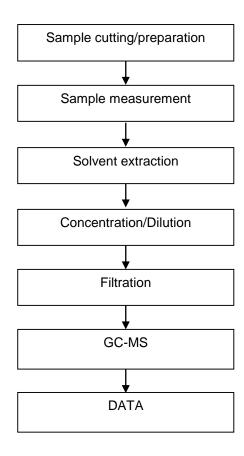
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Page 8 of 13 No.: SHAEC23004527901 **Date:** Apr 25, 2023

Phthalates Testing Flow Chart





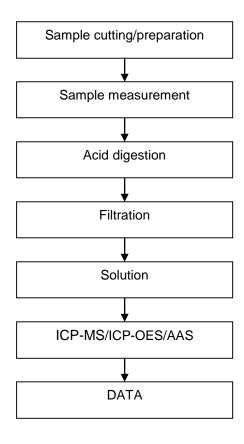
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No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 9 of 13

Elements Testing Flow Chart





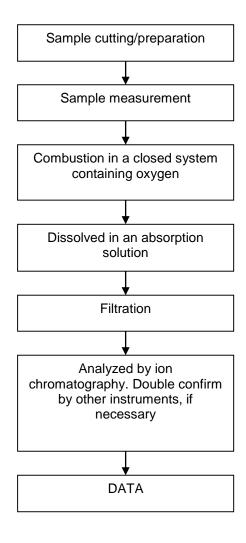
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No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 10 of 13

Halogen Testing Flow Chart





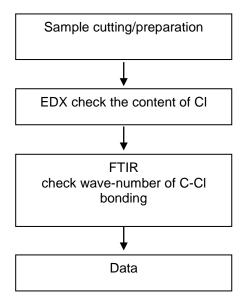
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No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 11 of 13

PVC Testing Flow Chart





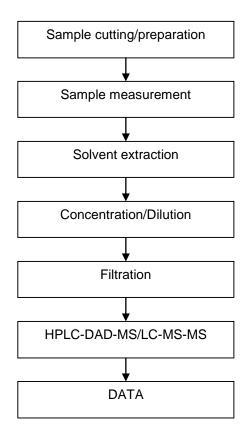
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No.: SHAEC23004527901 **Date:** Apr 25, 2023 Page 12 of 13

BPA Testing Flow Chart





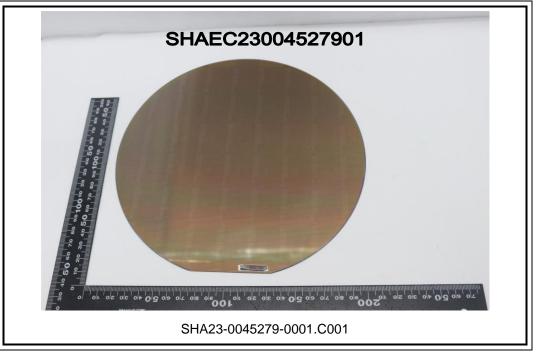
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Sample Photo:



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