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

SGS File No. : AYGA23-04809

Product Name : FAB-3 PSD WAFER PRODUCT (N-Epi w Low resistivity N-sub)

Item No./Part No. : N/A

**Received Date** : 2023. 11. 09

Test Period : 2023. 11. 09 to 2023. 12. 01

Test Comments : By the applicant's specific request, the sampling and testing was performed only for the part

indicated in the photo without disassembly.

**Test Results**: For further details, please refer to following page(s)

Technical Manager / SGS Korea Co., Ltd

Billy Oh

Tonny Park

Issued Date: 2023. 12. 01



**Sample No.** : AYGA23-04809.001

Sample Description : FAB-3 PSD WAFER PRODUCT (N-Epi w Low resistivity N-sub)

Item No./Part No. : N/A
Materials : N/A

### **Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 : 2013, by ICP-OES	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5 : 2013, by ICP-OES	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 : 2013+AMD1:2017CSV, by ICP-OES	2	N.D.
Hexavalent Chromium (Cr VI)*	mg/kg	With reference to IEC 62321-7-2 : 2017, by UV-Vis and/or with reference to IEC 62321-5 : 2013, by ICP-OES	8	N.D.

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### **Total Metals**

Test Items	Unit	Test Method	MDL	Results
Antimony (Sb)	mg/kg	With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES	5	N.D.

### Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.



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Item No./Part No. : N/A
Materials : N/A

### Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6 : 2015, by GC-MS	5	N.D.

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### **Phthalates**

Test Items	Unit	Test Method	MDL	Results
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
[di(C7-C11 alkyl)phthalate] linear and branched (DHNUP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
[di(C6-C8 alkyl)phthalate] branched (DIHP)	mg/kg	With reference to IEC 62321-8: 2017, by GC-MS	50	N.D.
Bis(2-methoxyethyl) phthalate (BMP, BMEP, DMEP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Hexahydromethylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride, Hexahydro-4-methylphathalic anhydride	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-iso-pentyl phthalate(DIPP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
n-Pentyl-isopentyl phthalate (iPnPP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-pentyl phthalate(DPP, DnPP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
1.2 Benzenedicarboxylic acid, dihexyl ester, branched and linear	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-hexyl phthalate (DNHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
1,2-benzenedicarboxylic acid, di-C6-10 alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-cyclohexyl phthalate (DCHP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isononyl phthalate (D <b>I</b> NP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-ethyl phthalate(DEP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Di-methyl phthalate (DMP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.



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Item No./Part No. : N/A
Materials : N/A

#### **Phthalates**

Test Items	Unit	Test Method	MDL	Results
Di-pentyl phthalate, linear and branched (TDPP)	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.
Dipropyl Heptyl Phthalate	mg/kg	With reference to IEC 62321-8 : 2017, by GC-MS	50	N.D.

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### **Chlorinated Paraffin**

Test Items	Unit	Test Method	MDL	Results
Alkanes, C10~13, Short Chain Chlorinated Paraffins(SCCP)	mg/kg	With reference to ISO 18219, by CI-GC-MS	50	N.D.
Alkanes, C14~17, Medium Chain Chlorinated Paraffins (MCCP)	mg/kg	With reference to ISO 18219, by CI-GC-MS	50	N.D.

### PCBs & PCTs

Test Items	Unit	Test Method	MDL	Results
Polychlorinated Biphenyls (PCBs)	mg/kg	With reference to US EPA 8082,(US EPA 3550C), by GC/MS	3	N.D.

## Halogen Content

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to BS EN 14582 : 2016, by IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to BS EN 14582 : 2016, by IC	30	N.D.
Fluorine(F)	mg/kg	With reference to BS EN 14582 : 2016, by IC	30	N.D.
lodine(I)	mg/kg	With reference to BS EN 14582 : 2016, by IC	50	N.D.

### Organotin Compounds

Test Items	Unit	Test Method	MDL	Results
Dibutyltin (DBT)	mg/kg	with reference to ISO 17353, by GC/MS	1	N.D.
Tributyltin (TBT)	mg/kg	with reference to ISO 17353, by GC/MS	1	N.D.
Dioctyltin(DOT)	mg/kg	with reference to ISO 17353, by GC/MS	1	N.D.
Triphenyltin (TPhT)	mg/kg	with reference to ISO 17353, by GC/MS	1	N.D.

### PFAS (Per-and polyfluoroalkyl substances)

Test Items	Unit	Test Method	MDL	Results
Perfluorootanoic acid (PFOA)	μg/kg	with reference to CEN/TS 15968 :2010, HPLC/MS/MS	10	N.D.



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Item No./Part No. : N/A
Materials : N/A

### PFAS (Per-and polyfluoroalkyl substances)

Test Items	Unit	Test Method	MDL	Results
Perfluorooctanesulfonic Acid (PFOS)	μg/kg	with reference to CEN/TS 15968 :2010, HPLC/MS/MS	10	N.D.

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### Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD)	mg/kg	With reference to USEPA 3540 C, by LC/MS	5	N.D.
Tetrabromobisphenol A	mg/kg	With reference to US EPA 3540C, by GC-MS	10	N.D.

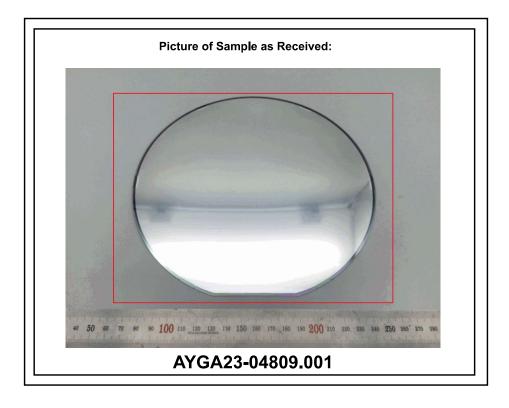
NOTE: (1) N.D. = Not detected. (<MDL)

- (2) mg/kg = ppm, ug/kg = ppb, mg/L = ppm
- (3) MDL = Method Detection Limit
- (4) = No regulation
- (5) \*\* = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable
- (7) \* = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
  - b. If the content of Total Chromium (Cr) is greater than the MDL of Hexavalent Chromium (Cr(VI)), it is the result of hexavalent Chromium by UV-VIS.
- (8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report is not related to Korea Laboratory Accreditation Scheme.



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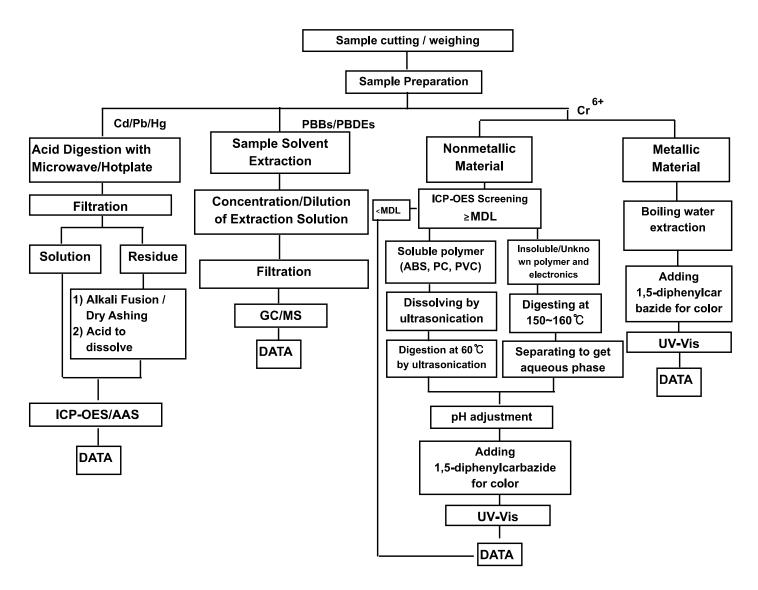




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## Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr6+ /PBBs&PBDEs Testing

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The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg Section Chief : Tonny Park

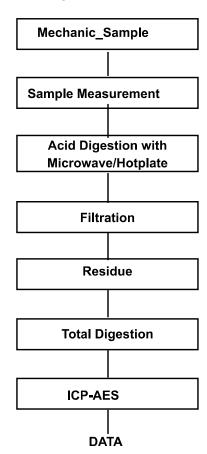


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## Flow Chart for Inorganic Elements Testing

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## **Inorganic Elements**



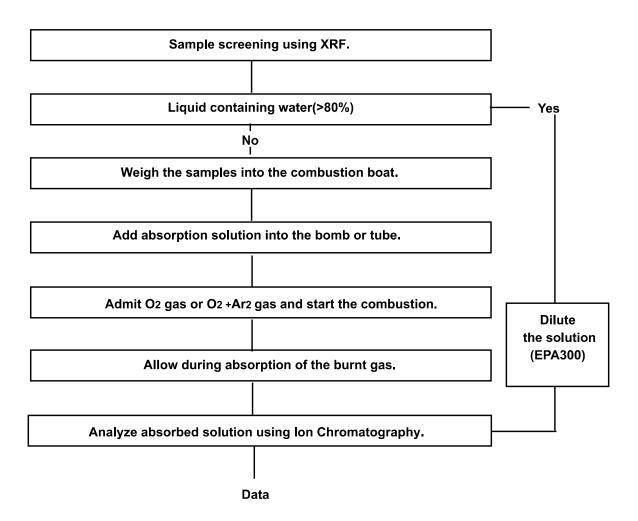
Major Inorganic Antimony(Sb) , Beryllium(Be) , Phosphorus(P) ,

Heavy Metals Arsenic(As) etc.



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### Flow Chart for Halogen Test



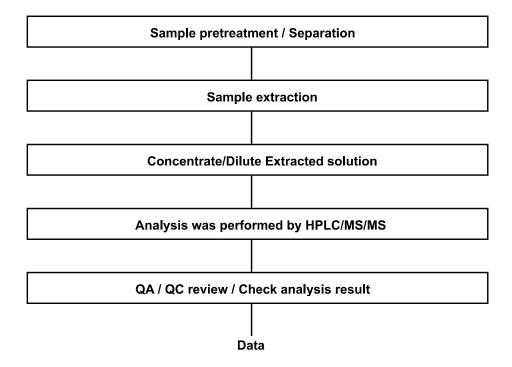
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### Flow Chart for PFOS/PFOA Test

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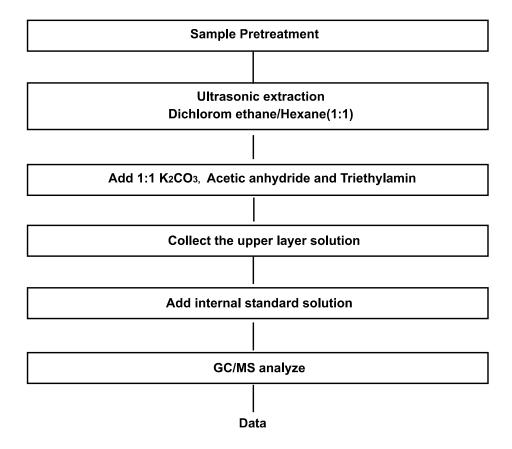




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### Flow Chart for TBBPA Test

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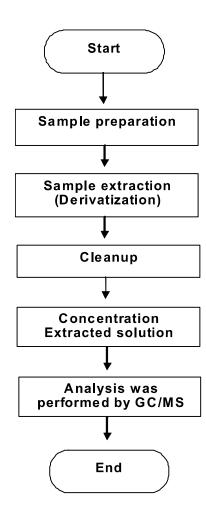




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## **Organotin Flow Chart**

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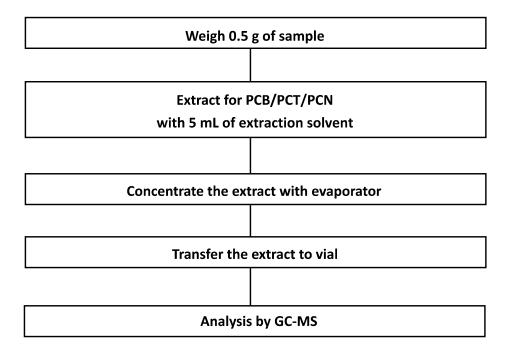




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## Flow Chart for (PCB/PCT/PCN)

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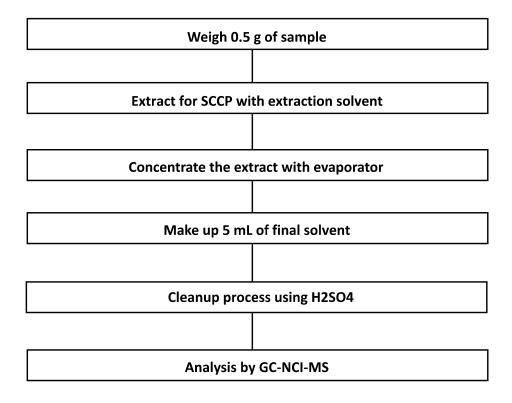




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### Flow Chart for SCCP

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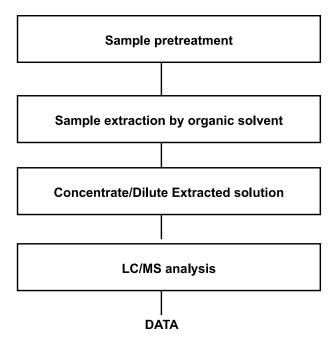




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## **Testing Flow Chart for HBCD**

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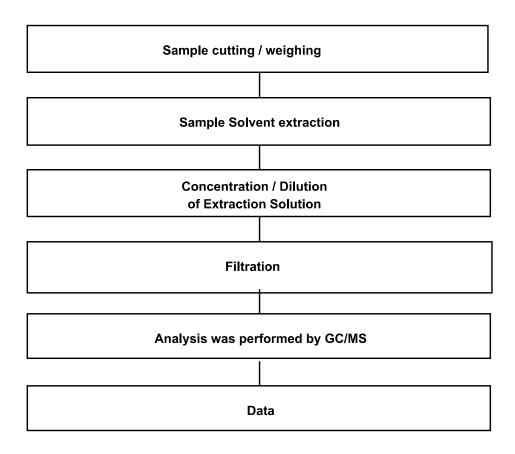




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## Flow Chart for PhthalateTest



\*\*\* End of Report \*\*\*