

**Teledyne DALSA Semiconductor**  
**18 Blvd. De l'aéroport**  
**Bromont (Québec) J2L 1S7**  
**Canada**

"This report supersedes all previous documents bearing the test report number 4766020-CH01."

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

**Circuit Board on Silicon Wafers**  
**Countries of Sale: Various**

Sample Received Date:

**4/30/2021**

Testing Period:

**5/3/2021 – 6/1/2021**

Revision Date : 6/17/2021

Revision Summary : Halogen test results updated.

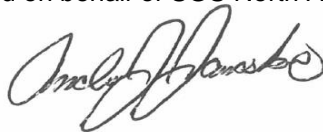
Test Requested : Please refer to the result summary.

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

Result Summary :

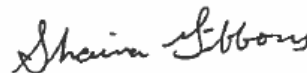
| Test Requested   | Conclusion       |
|--|------------------|
| <b>1. RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU</b> | PASS             |
| <b>2. Antimony Content</b>   | See Test Results |
| <b>3. Beryllium Content</b>  | See Test Results |
| <b>4. Halogen Content</b>  | See Test Results |

Signed for and on behalf of SGS North America, Inc.



Andrew Janosko  
 Senior Manager, Chemistry Laboratory

Prepared By:



Shaina Gibbons  
 Technical Report Writer, Chemistry Laboratory

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**1. RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU**

| Test Item(s):                       | Unit  | Test Method  | Results | MDL | Limit |
|-------------------------------------|-------|--|---------|-----|-------|
|                                     |       |  | 1       |     |       |
| Cadmium (Cd)                        | mg/kg | With reference to IEC 62321-5:2013 (Determination of Cd and Pb by ICP-OES and /or ICP-MS)  | ND      | 2   | 100   |
| Lead (Pb)                           | mg/kg |  | ND      | 2   | 1000  |
| Mercury (Hg)                        | mg/kg | With reference to IEC 62321-4:2013+A1:2017 (Determination of Hg by ICP-OES and/ or ICP-MS) | ND      | 2   | 1000  |
| Hexavalent Chromium (CrVI)          | mg/kg | With reference to IEC 62321-7-2:2017 (Determination of CrVI by UV-Vis)                     | ND*     | 8   | 1000  |
| <b>Sum of PBBs</b>                  | mg/kg | With reference to IEC 62321-6:2015 (Determination of PBB and PBDE by GC-MS)                | ND      | -   | 1000  |
| Monobromobiphenyl                   | mg/kg |  | ND      | 5   | -     |
| Dibromobiphenyl                     | mg/kg |  | ND      | 5   | -     |
| Tribromobiphenyl                    | mg/kg |  | ND      | 5   | -     |
| Tetrabromobiphenyl                  | mg/kg |  | ND      | 5   | -     |
| Pentabromobiphenyl                  | mg/kg |  | ND      | 5   | -     |
| Hexabromobiphenyl                   | mg/kg |  | ND      | 5   | -     |
| Heptabromobiphenyl                  | mg/kg |  | ND      | 5   | -     |
| Octabromobiphenyl                   | mg/kg |  | ND      | 5   | -     |
| Nonabromobiphenyl                   | mg/kg |  | ND      | 5   | -     |
| Decabromobiphenyl                   | mg/kg |  | ND      | 5   | -     |
| <b>Sum of PBDEs</b>                 | mg/kg |  | ND      | -   | 1000  |
| Monobromodiphenyl ether             | mg/kg |  | ND      | 5   | -     |
| Dibromodiphenyl ether               | mg/kg |  | ND      | 5   | -     |
| Tribromodiphenyl ether              | mg/kg | ND   | 5       | -   |       |
| Tetrabromodiphenyl ether            | mg/kg | ND   | 5       | -   |       |
| Pentabromodiphenyl ether            | mg/kg | ND   | 5       | -   |       |
| Hexabromodiphenyl ether             | mg/kg | ND   | 5       | -   |       |
| Heptabromodiphenyl ether            | mg/kg | ND   | 5       | -   |       |
| Octabromodiphenyl ether             | mg/kg | ND   | 5       | -   |       |
| Nonabromodiphenyl ether             | mg/kg | ND   | 5       | -   |       |
| Decabromodiphenyl ether             | mg/kg | ND   | 5       | -   |       |
| Bis (2-ethylhexyl) Phthalate (DEHP) | mg/kg | IEC 62321-8:2017 (Determination of DEHP, BBP, DBP and DIBP by GC-MS)                       | ND      | 50  | 1000  |
| Butyl Benzyl Phthalate (BBP)        | mg/kg |  | ND      | 50  | 1000  |
| Dibutyl Phthalate (DBP)             | mg/kg |  | ND      | 50  | 1000  |
| Diisobutyl Phthalate (DIBP)         | mg/kg |  | ND      | 50  | 1000  |
| <b>Conclusion</b>                   | /     | /  | PASS    | /   | /     |

**Sample Description:**

- Silicon Wafer

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## Note :

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) \* = Total Chromium analysis by ICP-MS and/or ICP-OES was not detected in submitted sample. Therefore, Hexavalent Chromium determination using UV-Visible Spectroscopy was not performed.
- (f) IEC 62321 series is equivalent to EN 62321 series  
[http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:1258637,25](http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25)

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## 2. Antimony Content

Test Method: With reference to EPA Method 3050B followed by analysis using ICP-OES and/or ICP-MS.

| Test Item     | Results (mg/kg) | Reporting Limit (mg/kg) |
|---------------|-----------------|-------------------------|
|               | 1               |                         |
| Antimony (Sb) | 10.3            | 2                       |

### Sample Description:

1. Silicon Wafer

Note:

1. mg/kg = milligram per kilogram
2. mg/kg = ppm
3. 1% = 10000 mg/kg (ppm)
4. ND = Not Detected, reported when the reading is less than the reporting limit value.

## 3. Beryllium Content

Test Method: With reference to EPA Method 3050B followed by analysis using ICP-OES and/or ICP-MS.

| Test Item      | Results (mg/kg) | Reporting Limit (mg/kg) |
|----------------|-----------------|-------------------------|
|                | 1               |                         |
| Beryllium (Be) | ND              | 2                       |

### Sample Description:

1. Silicon Wafer

Note:

1. mg/kg = milligram per kilogram
2. mg/kg = ppm
3. 1% = 10000 mg/kg (ppm)
4. ND = Not Detected, reported when the reading is less than the reporting limit value.

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**4. Halogen Content**

Test Method: With reference to BS EN 14582:2016, analysis was performed by Ion Chromatography.

| Test Item     | Results (mg/kg) |  | Reporting Limit (mg/kg) |
|---------------|-----------------|--|-------------------------|
|               | 1               |  |                         |
| Chlorine (Cl) | ND              |  | 50                      |
| Bromine (Br)  | ND              |  | 50                      |
| Fluorine (F)  | ND              |  | 50                      |
| Iodine (I)    | ND              |  | 50                      |

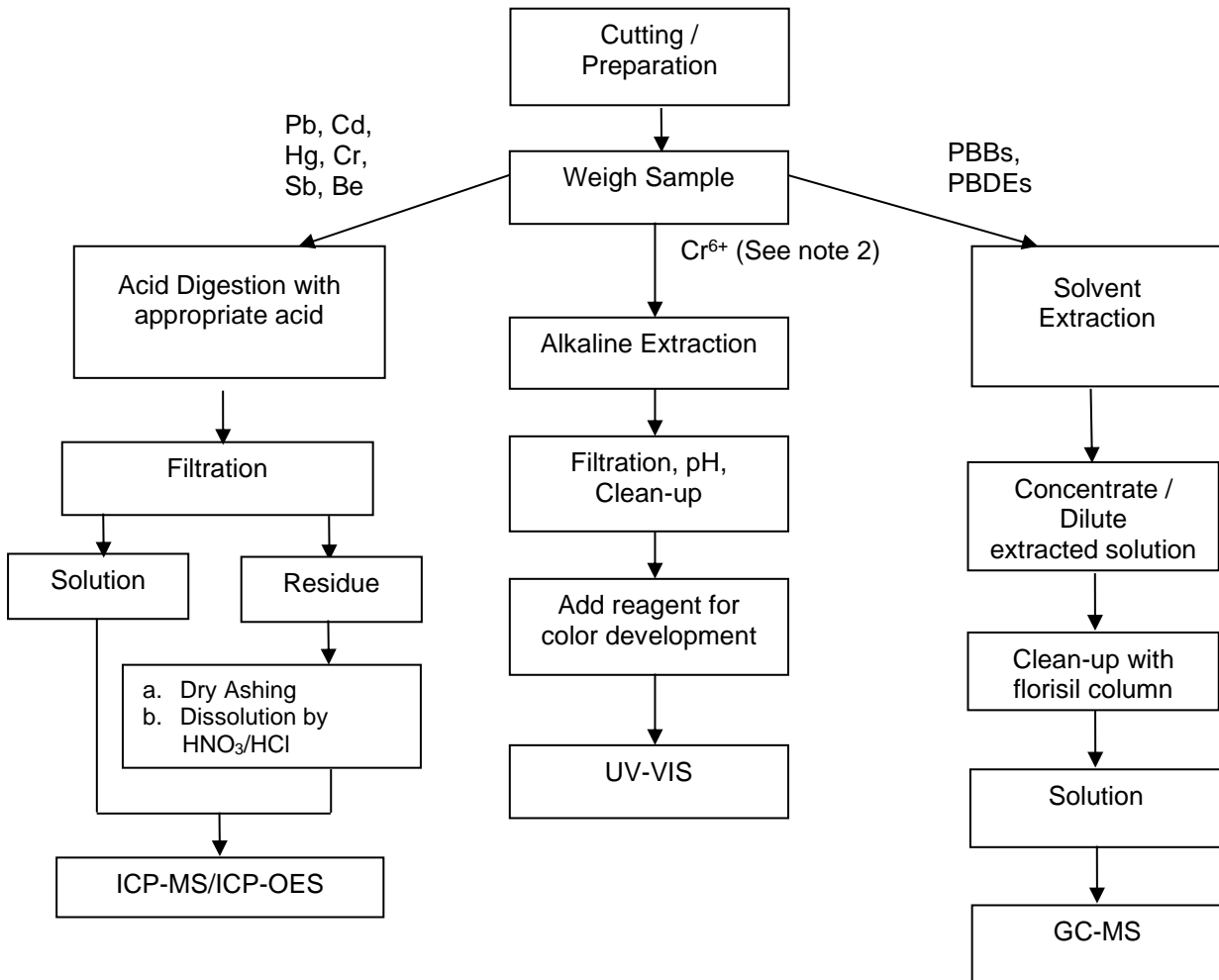
**Sample Description:**

1. Silicon Wafer

- Note:
1. mg/kg = milligram per kilogram
  2. mg/kg = ppm
  3. 1% = 10000 ppm (mg/kg)
  4. ND = Not Detected, reported when the reading is less than the reporting limit value.

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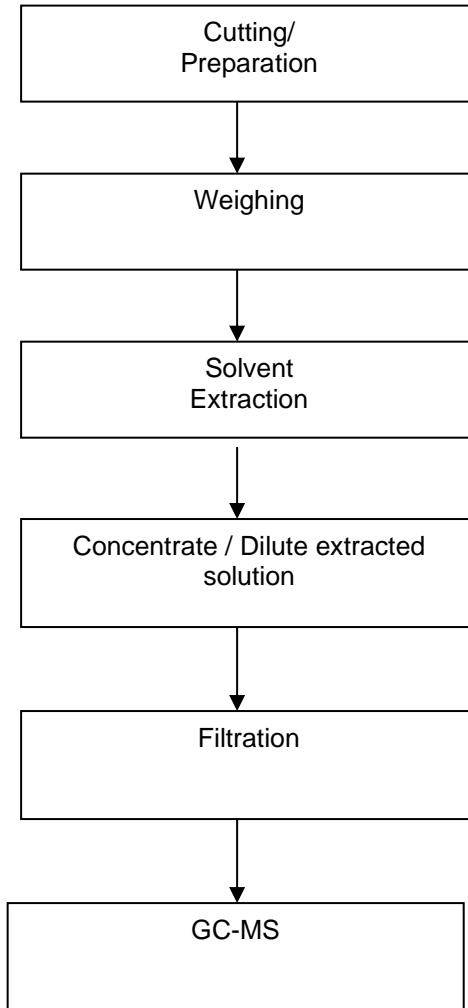
### Flowchart for ROHS Testing:



- Note : 1. The Sb, Cd, Pb, Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.  
 2. Cr<sup>6+</sup> is performed only when total Cr is detected

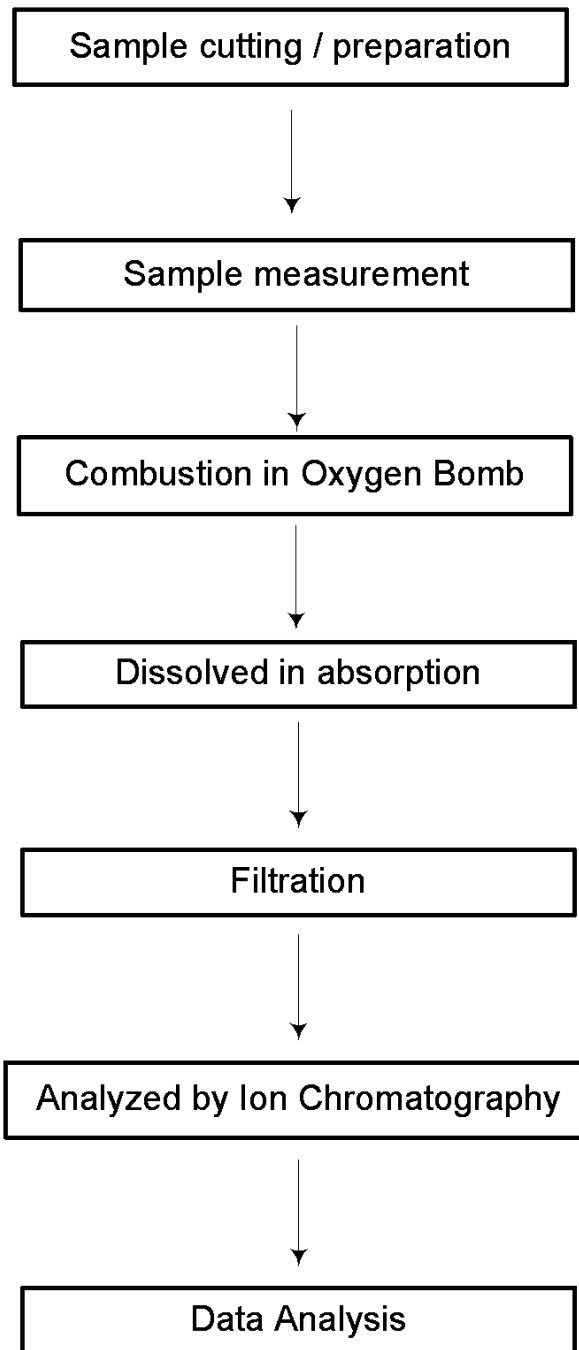
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Flowchart for Phthalates



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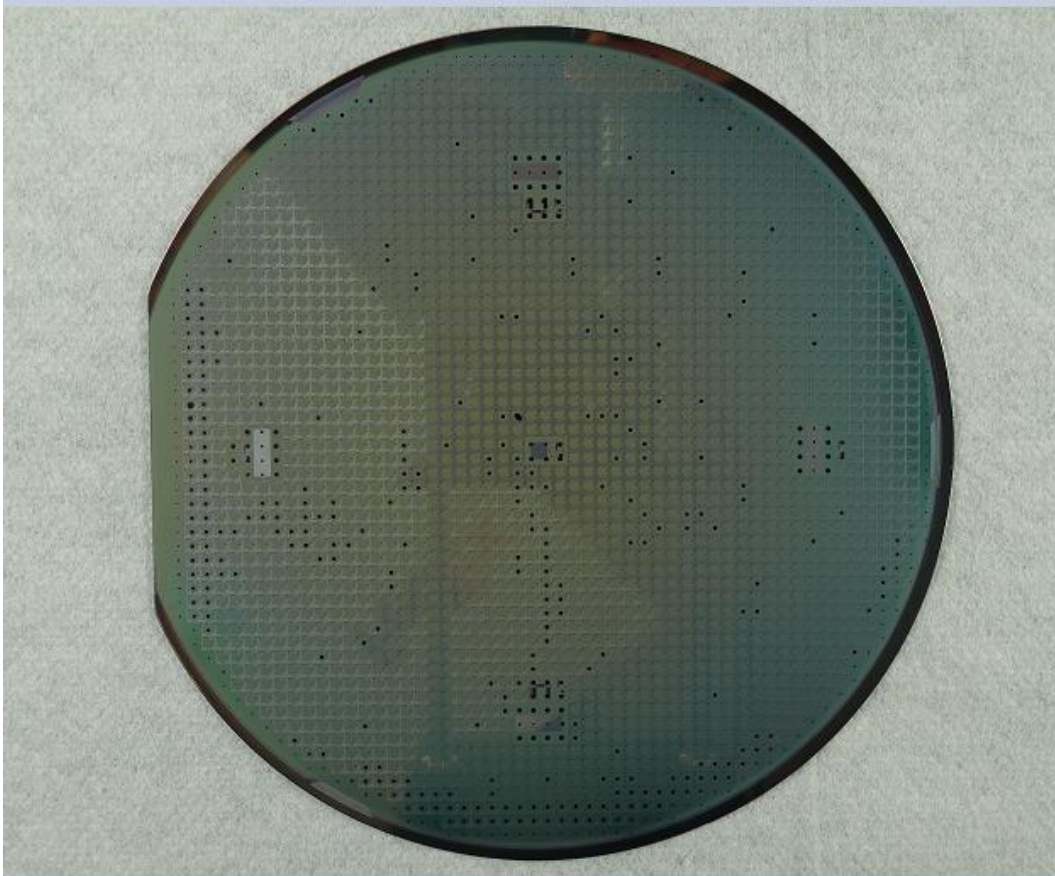
Halogen Testing Flow Chart



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Sample Photo(s):



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