

Test Report

No.: ETR23503775

Date: 29-May-2023

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The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By :
 Sample Name : SWITCHING TRANSISTOR
 Style/Item No. :
 Order No. : 120525-2

=====

Sample Receiving Date : 22-May-2023
 Testing Period : 22-May-2023 to 29-May-2023

Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
 (2) As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine in the submitted sample.

Test Results : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.


 Troy Chang / Department Manager
 Signed for and on behalf of
 SGS TAIWAN LTD.
 Chemical Laboratory - Taipei



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Test Part Description

No.1 : WAFER

Test Result(s)

| Test Item(s) | Method | Unit | MDL | Result | Limit |
|----------------------------|--|-------|-----|--------|-------|
| | | | | No.1 | |
| Cadmium (Cd) | With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES. | mg/kg | 2 | n.d. | 100 |
| Lead (Pb) | With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES. | mg/kg | 2 | n.d. | 1000 |
| Mercury (Hg) | With reference to IEC 62321-4: 2013+AMD1: 2017, analysis was performed by ICP-OES. | mg/kg | 2 | n.d. | 1000 |
| Hexavalent Chromium Cr(VI) | With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS. | mg/kg | 8 | n.d. | 1000 |
| Monobromobiphenyl | With reference to IEC 62321-6: 2015, analysis was performed by GC/MS. | mg/kg | 5 | n.d. | - |
| Dibromobiphenyl | | mg/kg | 5 | n.d. | - |
| Tribromobiphenyl | | mg/kg | 5 | n.d. | - |
| Tetrabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Pentabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Hexabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Heptabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Octabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Nonabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Decabromobiphenyl | | mg/kg | 5 | n.d. | - |
| Sum of PBBs | | mg/kg | - | n.d. | 1000 |
| Monobromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Dibromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Tribromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Tetrabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Pentabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Hexabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Heptabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Octabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Nonabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Decabromodiphenyl ether | | mg/kg | 5 | n.d. | - |
| Sum of PBDEs | | mg/kg | - | n.d. | 1000 |

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| Test Item(s) | Method | Unit | MDL | Result | Limit |
|-------------------------------------|---|-------|-----|--------|-------|
| | | | | No.1 | |
| Butyl benzyl phthalate (BBP) | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS. | mg/kg | 50 | n.d. | 1000 |
| Dibutyl phthalate (DBP) | | mg/kg | 50 | n.d. | 1000 |
| Di-(2-ethylhexyl) phthalate (DEHP) | | mg/kg | 50 | n.d. | 1000 |
| Diisobutyl phthalate (DIBP) | | mg/kg | 50 | n.d. | 1000 |
| Fluorine (F) (CAS No.: 14762-94-8) | With reference to BS EN 14582: 2016, analysis was performed by IC. | mg/kg | 50 | n.d. | - |
| Chlorine (Cl) (CAS No.: 22537-15-1) | | mg/kg | 50 | n.d. | - |
| Bromine (Br) (CAS No.: 10097-32-2) | | mg/kg | 50 | n.d. | - |
| Iodine (I) (CAS No.: 14362-44-8) | | mg/kg | 50 | n.d. | - |

Note :

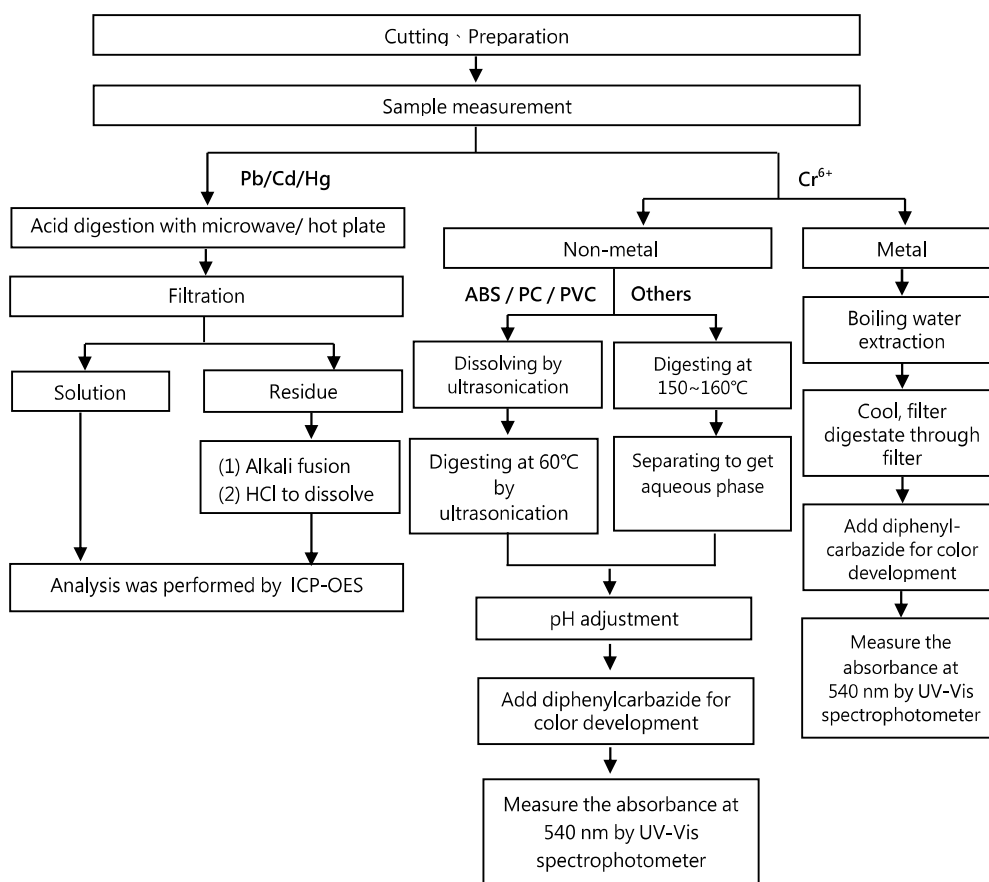
1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

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Analytical flow chart of heavy metal

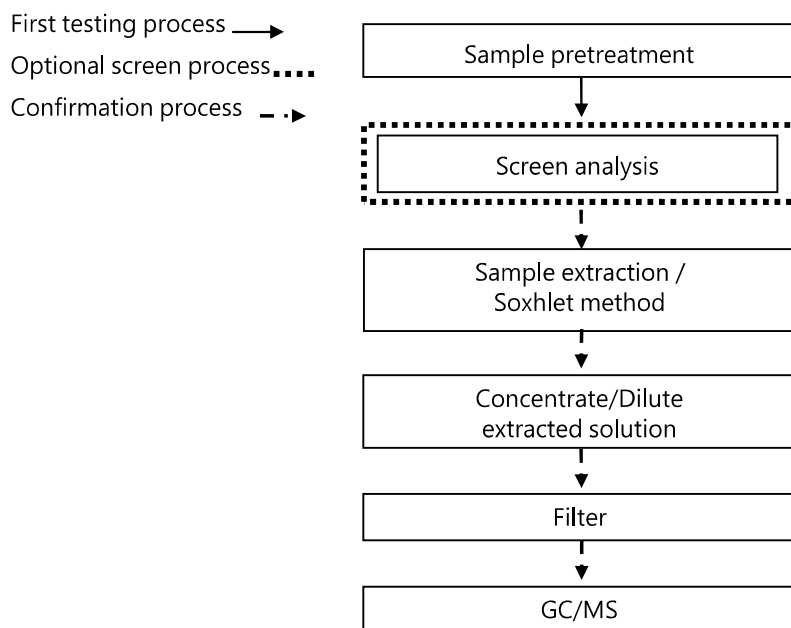
These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr^{6+} test method excluded)



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Analytical flow chart – PBBs / PBDEs



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Test Report

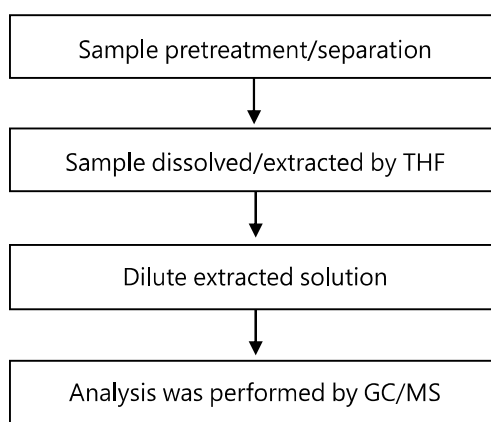
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Analytical flow chart - Phthalate

【Test method: IEC 62321-8】



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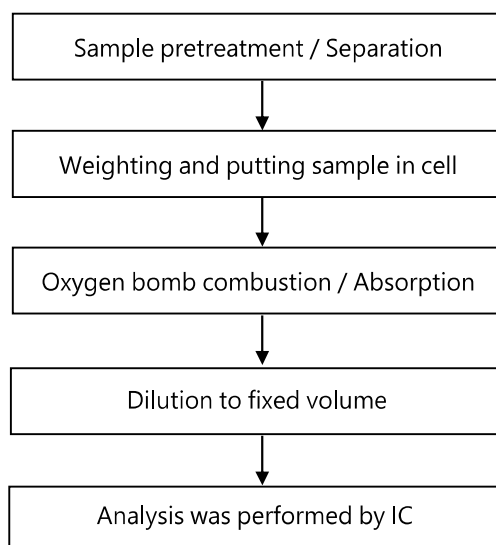
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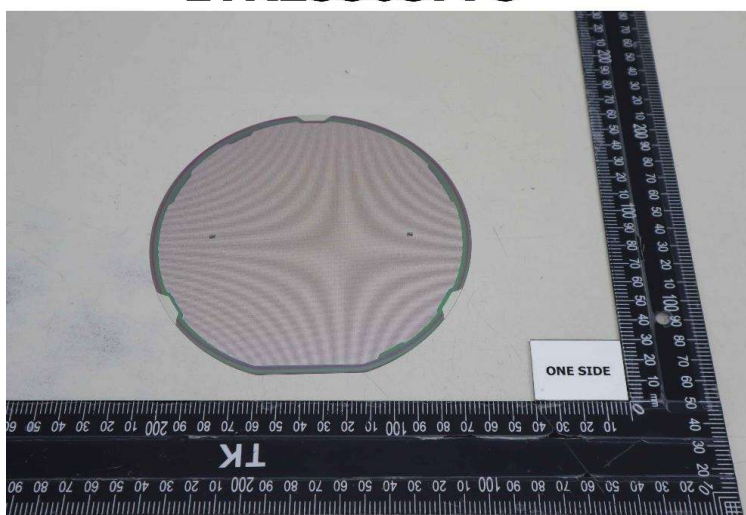
Analytical flow chart - Halogen



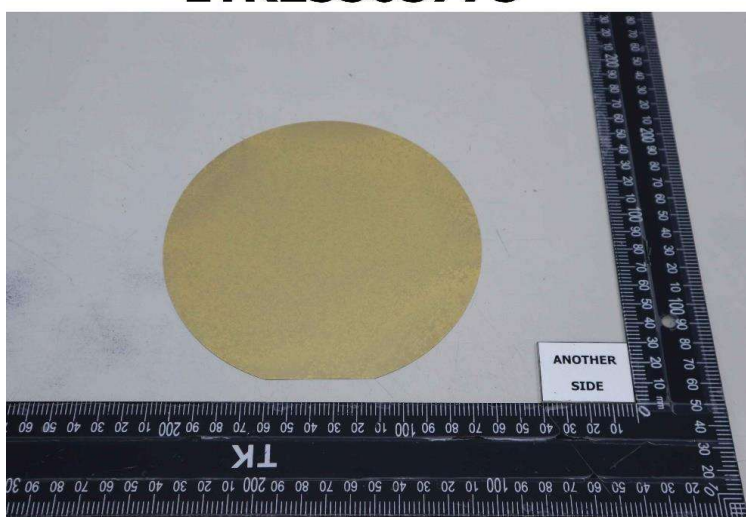
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* The tested sample / part is marked by an arrow if it's shown on the photo. *

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** End of Report **

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