



# Test Report

No.: ETR21C00892

Date: 13-Dec-2021

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NORDIC SEMICONDUCTOR ASA  
KARENSLYST ALLÉ 5, 0213 OSLO, NORWAY

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

Sample Submitted By : NORDIC SEMICONDUCTOR ASA  
Sample Name : INTEGRATED CIRCUITS  
Style/Item No. : nRF51x22-CxAx  
Buyer/Order No. : PO-0020684  
Other Info. : BUMPED IN NEPES USING FAB 3 WAFER

Sample Receiving Date : 06-Dec-2021  
Testing Period : 06-Dec-2021 to 13-Dec-2021

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) Please refer to next pages for the other item(s).  
Test Results : Please refer to following pages.

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



PIN CODE: A48878B4

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## Test Part Description

No.1 : INTEGRATED CIRCUITS

## Test Result(s)

| Test Item(s)                                     | Method   | Unit  | MDL | Result |
|--|--|-------|-----|--------|
|  |  |       |     | No.1   |
| Cadmium (Cd) (CAS No.: 7440-43-9)                | With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.            | mg/kg | 2   | n.d.   |
| Lead (Pb) (CAS No.: 7439-92-1)                   | With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.            | mg/kg | 2   | n.d.   |
| Mercury (Hg) (CAS No.: 7439-97-6)                | With reference to IEC 62321-4: 2013+AMD1: 2017, analysis was performed by ICP-OES. | mg/kg | 2   | n.d.   |
| Hexavalent Chromium Cr(VI) (CAS No.: 18540-29-9) | With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.           | mg/kg | 8   | n.d.   |
| 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.   |
| 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.   |

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| Test Item(s)   | Method  | Unit  | MDL  | Result |
|--|---|-------|------|--------|
|  |   |       |      | No.1   |
| Dibutyl phthalate (DBP) (CAS No.: 84-74-2)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Butyl benzyl phthalate (BBP) (CAS No.: 85-68-7)  | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Di-(2-ethylhexyl) phthalate (DEHP) (CAS No.: 117-81-7)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)  | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)  | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)  | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Diisobutyl phthalate (DIBP) (CAS No.: 84-69-5)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Di-n-pentyl phthalate (DNPP) (CAS No.: 131-18-0)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)   | With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.     | mg/kg | 50   | n.d.   |
| Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ - HBCDD, $\beta$ - HBCDD, $\gamma$ - HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8)) | With reference to IEC 62321-9: 2021, analysis was performed by GC/MS.     | mg/kg | 20   | n.d.   |
| Chlorine (Cl) (CAS No.: 22537-15-1)  | With reference to BS EN 14582: 2016, analysis was performed by IC.        | mg/kg | 50   | n.d.   |
| Bromine (Br) (CAS No.: 10097-32-2)   | With reference to BS EN 14582: 2016, analysis was performed by IC.        | mg/kg | 50   | n.d.   |
| PFOS and its salts (CAS No.: 1763-23-1 and its salts)  | With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS. | mg/kg | 0.01 | n.d.   |
| PFOA and its salts (CAS No.: 335-67-1 and its salts)   |   | mg/kg | 0.01 | n.d.   |

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| Test Item(s)                        | Method  | Unit  | MDL | Result |
|-------------------------------------|---|-------|-----|--------|
|                                     |   |       |     | No.1   |
| Antimony (Sb) (CAS No.: 7440-36-0)  | With reference to US EPA 3052: 1996, analysis was performed by ICP-OES. | mg/kg | 2   | n.d.   |
| Beryllium (Be) (CAS No.: 7440-41-7) | With reference to US EPA 3052: 1996, analysis was performed by ICP-OES. | mg/kg | 2   | n.d.   |

## Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected ( Less than MDL)
4. "-" = Not Regulated
5. PFOS and its salts including :  
CAS No.: 29081-56-9, 2795-39-3, 29457-72-5, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7.
6. PFOA and its salts including :  
CAS No.: 3825-26-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0.

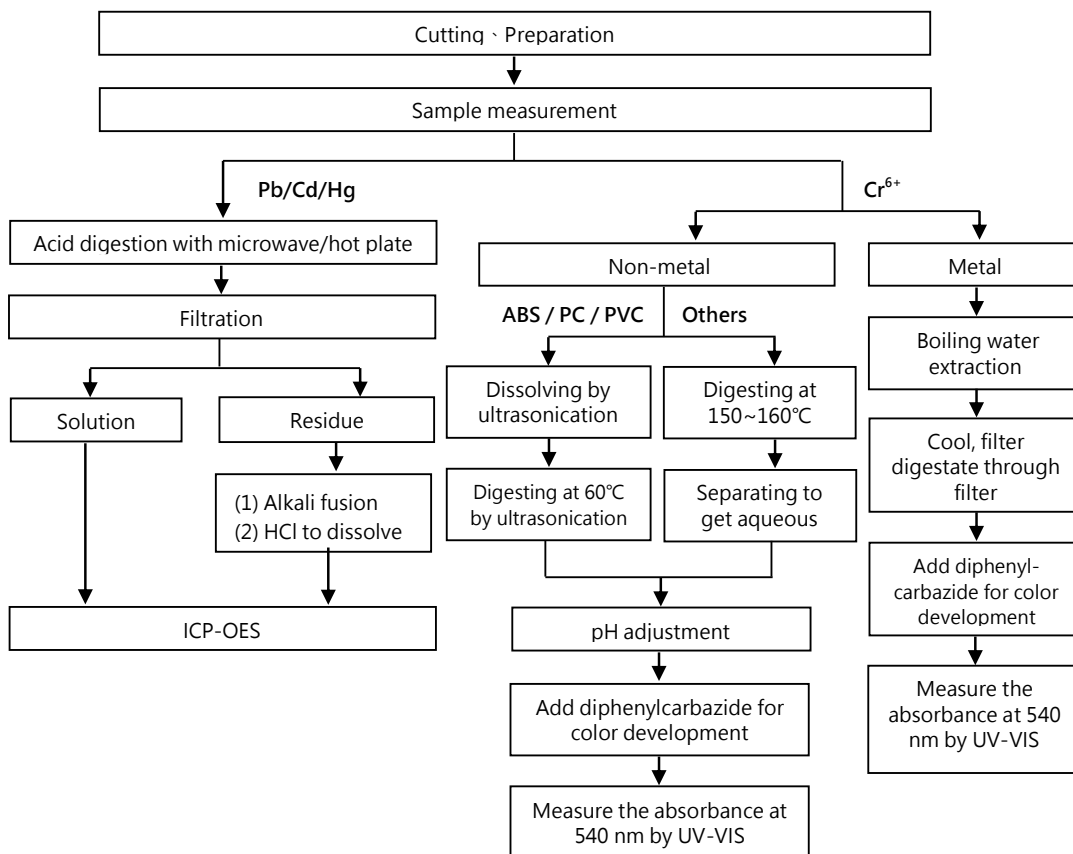
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KARENSLYST ALLÉ 5, 0213 OSLO, NORWAY

## Analytical flow chart of Heavy Metal

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

(  $\text{Cr}^{6+}$  test method excluded )



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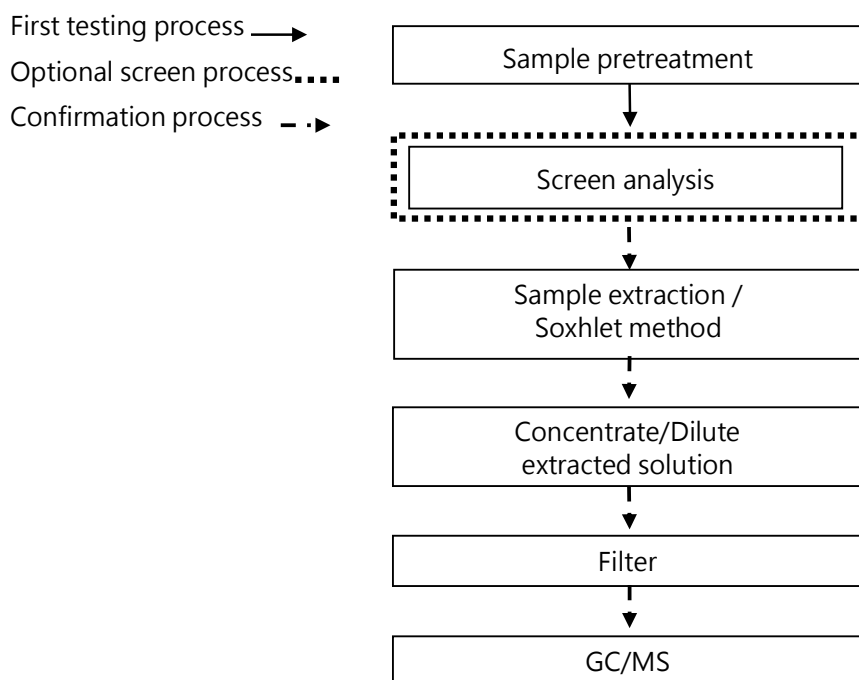
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## Analytical flow chart – PBBs / PBDEs



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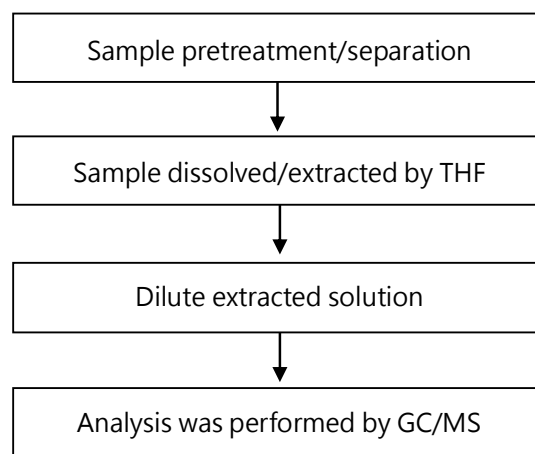
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## Analytical flow chart - Phthalate

【Test method: IEC 62321-8】



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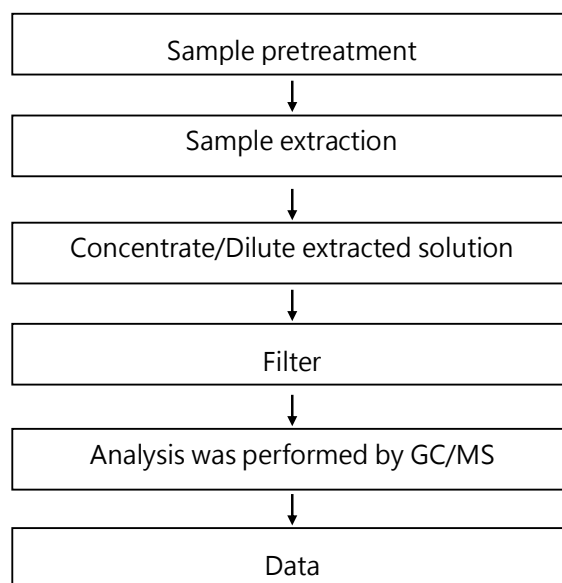
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## Analytical flow chart - HBCDD



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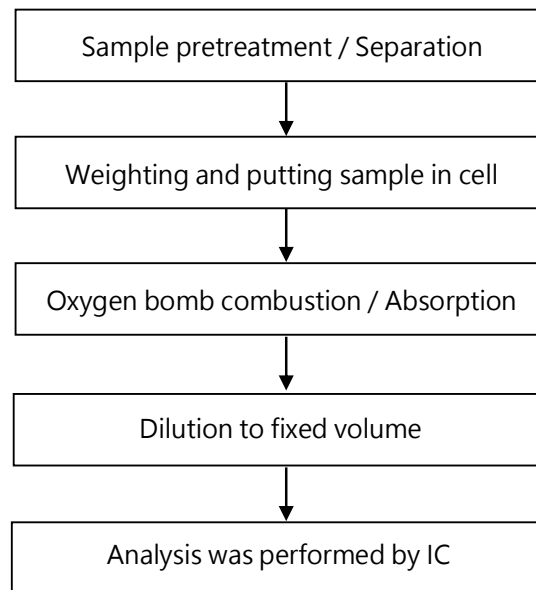
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## Analytical flow chart - Halogen



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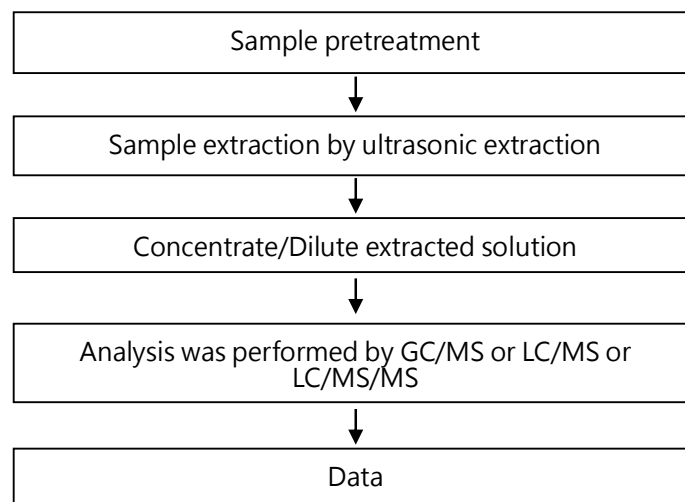
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## Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



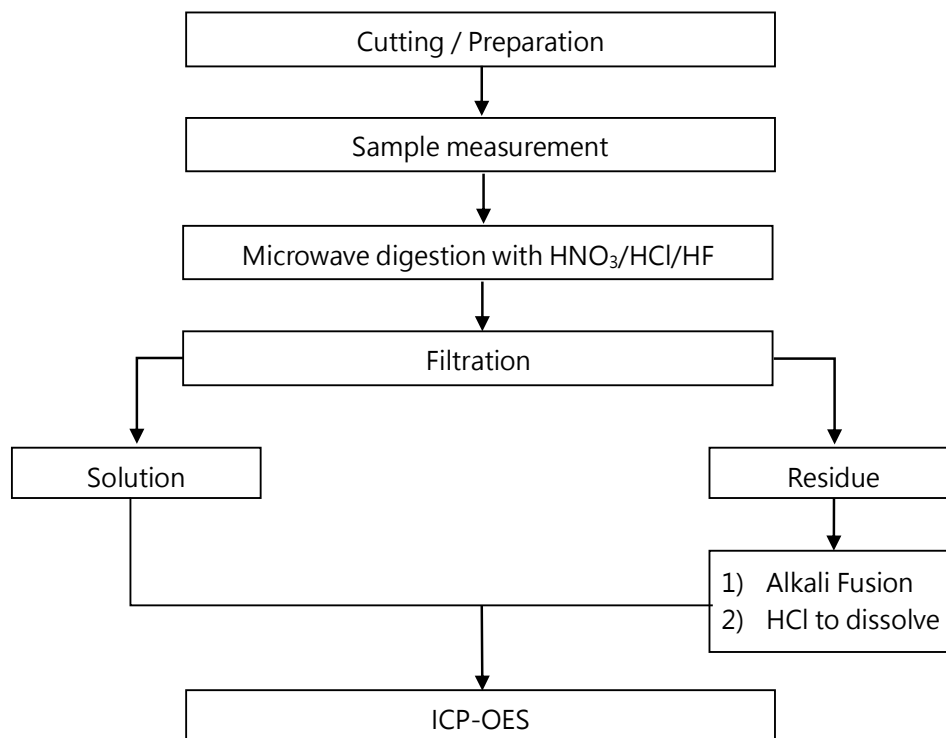
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## Analytical flow chart of Elements (Heavy Metal included)

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

【Reference method : US EPA 3051A 、US EPA 3052】



\* US EPA 3051A method does not add HF.

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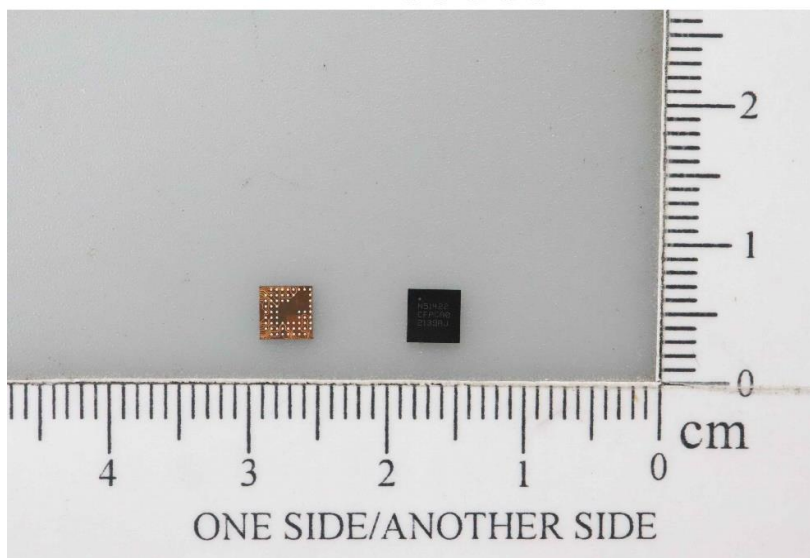
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\* The tested sample / part is marked by an arrow if it's shown on the photo. \*

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\*\* End of Report \*\*

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