



Test Report

No.: ETR23301467M01

Date: 21-Mar-2023

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YEA SHIN TECHNOLOGY CO., LTD.

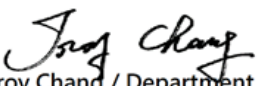
NO. 51, NEIXI RD., LUZHU DISTRICT, TAOYUAN CITY 338, TAIWAN

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

Sample Name : SEMICONDUCTOR DEVICE (GREEN COMPOUND)
Style/Item No. : SMA
Other Info. : SMA、SMB、SMC、SOD-123、SOD-123F、SOD-123L、SOD-123FL、SOD-123G、SOD-123M、SOD-123S、SOD-123ST、SMAD、SAME、SMAF、SMBF、EBS、TO-277、ITO-220AB、ITO-220AC、TO-220AB、TO-220AC、D2PAK(TO-263)、DPAK(TO-252)、IPAK(TO-251)、I2PAK(TO-262)、TO-247、TO-3P、DO-41、DO-15、DO-201、DO-201AD、DO-27、R-1、R-6、R-7、DO-35、MBS、MBSG、DF、DB、DFS、DBS、KBL、WOB、WOBM、RS-1、RS-2、KBP、GBP、TBP、2GBJ、BR3、KBU、GBU-C、GBU、TBL、TBU、RS-5、MP6、4GBJ、BR6、GBJ、KBJ、ABS、D3K、DBM、MBF、MBM、GBPC、KBPC、DBF、GBL、ABH、ABS、DO-218、PPAK5X6 SERIES、MB SERIES、MDI、DIP、TBS、SDIP、KBPM、WOM

Sample Receiving Date : 07-Mar-2023
Testing Period : 07-Mar-2023 to 14-Mar-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) Please refer to next pages for the other item(s).
Test Results : Please refer to following pages.
Conclusion : (1) Based on the performed tests on submitted sample(s) and the declaration from the applicant, 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 with the exemption of Annex III 7(a) and 7(c)-I 【No.1】.


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 : BLACK BODY
No.2 : PLATING LAYER OF SILVER COLORED METAL PIN
No.3 : BASE MATERIAL OF SILVER COLORED METAL PIN
No.4 : SILVER COLORED METAL PIN (INCLUDING THE PLATING LAYER)

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result				Limit
				No.1	No.2	No.3	No.4	
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	---	---	100
Lead (Pb)		mg/kg	2	22500	---	---	---	(*E)
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
Cadmium (Cd)	IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	---	---	100
Lead (Pb)		mg/kg	2	---	16.6	---	---	1000
Mercury (Hg)	IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	---	---	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	µg/cm ²	0.1	---	n.d.	n.d.	---	-
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	---	---	n.d.	---	100
Lead (Pb)		mg/kg	2	---	---	15.5	---	1000

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Test Item(s)	Method	Unit	MDL	Result				Limit
				No.1	No.2	No.3	No.4	
Mercury (Hg)	With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	---	---	n.d.	---	1000
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	---	---	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	---	---	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	---	---	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Decabromodiphenyl ether		mg/kg	5	n.d.	---	---	n.d.	-
Sum of PBDEs		mg/kg	-	n.d.	---	---	n.d.	1000
Butyl benzyl phthalate (BBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	---	---	n.d.	1000
Dibutyl phthalate (DBP)		mg/kg	50	n.d.	---	---	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)		mg/kg	50	n.d.	---	---	n.d.	1000
Diisobutyl phthalate (DIBP)		mg/kg	50	n.d.	---	---	n.d.	1000
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α -HBCDD, β -HBCDD, γ -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.	---	---	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result				Limit
				No.1	No.2	No.3	No.4	
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	---	---	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	79.4	---	---	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	---	---	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	n.d.	---	---	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.	---	---	n.d.	-
PFOA and its salts (CAS No.: 335-67-1 and its salts)		mg/kg	0.01	n.d.	---	---	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.	µg/m ²	0.5	---	n.d.	---	---	-
PFOA and its salts (CAS No.: 335-67-1 and its salts)		µg/m ²	0.5	---	n.d.	---	---	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3050B: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	---	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)		mg/kg	2	n.d.	---	---	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. "---" = Not Conducted
6. PFOS and its salts including :
CAS No.: 1763-23-1, 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7, 91036-71-4, 4021-47-0 and others.
7. PFOA and its salts including :
CAS No.: 335-67-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0, 3825-26-1 and others.

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8. (#2) =

- a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than $0.13 \mu\text{g}/\text{cm}^2$. The sample coating is considered to contain Cr(VI).
- b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than $0.10 \mu\text{g}/\text{cm}^2$). The coating is considered a non-Cr(VI) based coating
- c. The result between $0.10 \mu\text{g}/\text{cm}^2$ and $0.13 \mu\text{g}/\text{cm}^2$ is considered to be inconclusive - unavoidable coating variations may influence the determination.

9. 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.

10. (*E): By client's claim, it is on the RoHS exemption list.

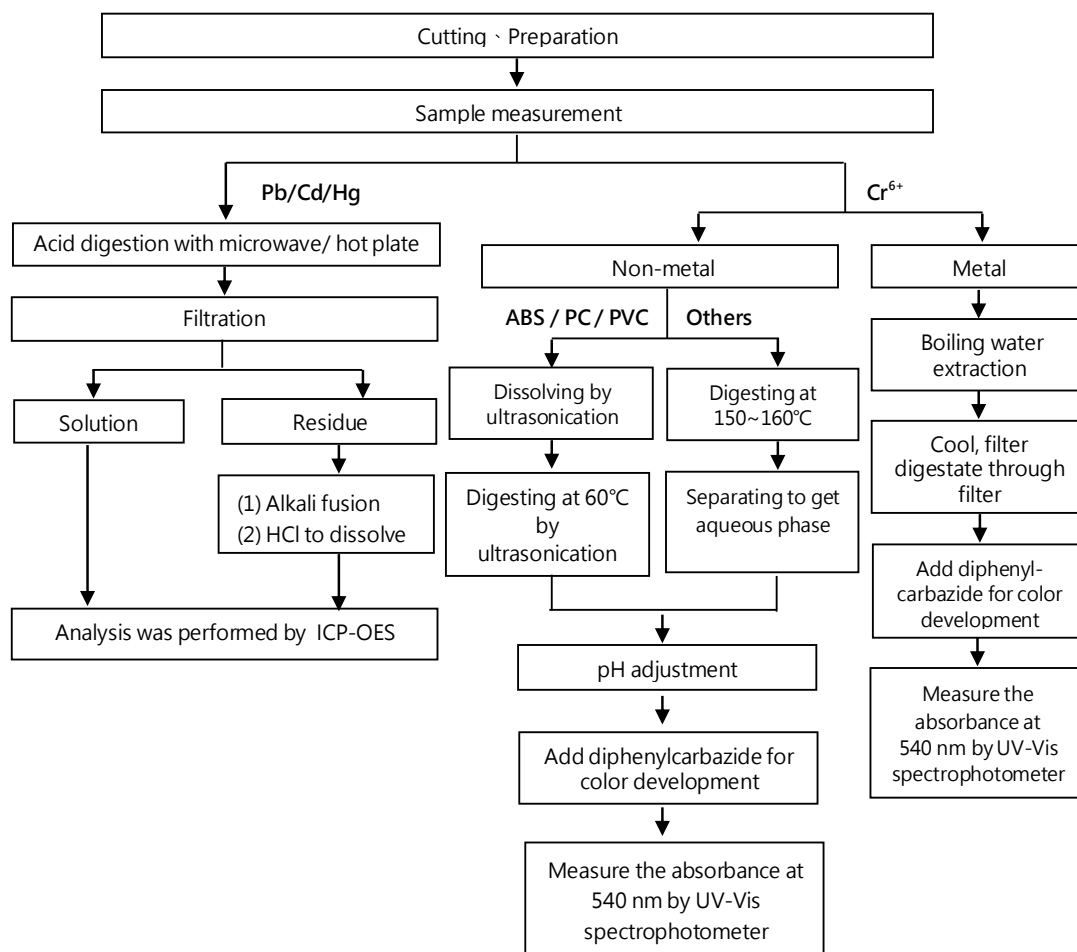
11. This is the additional test report of ETR23301467.

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Analytical flow chart of heavy metal

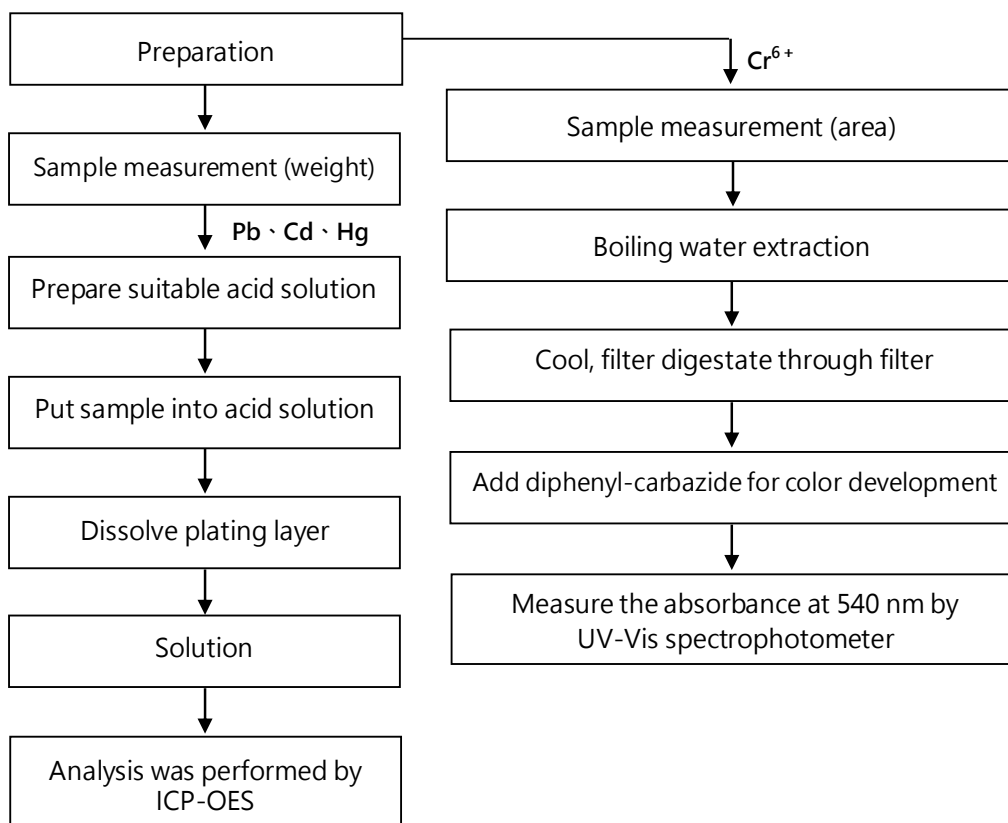
These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr^{6+} test method excluded)

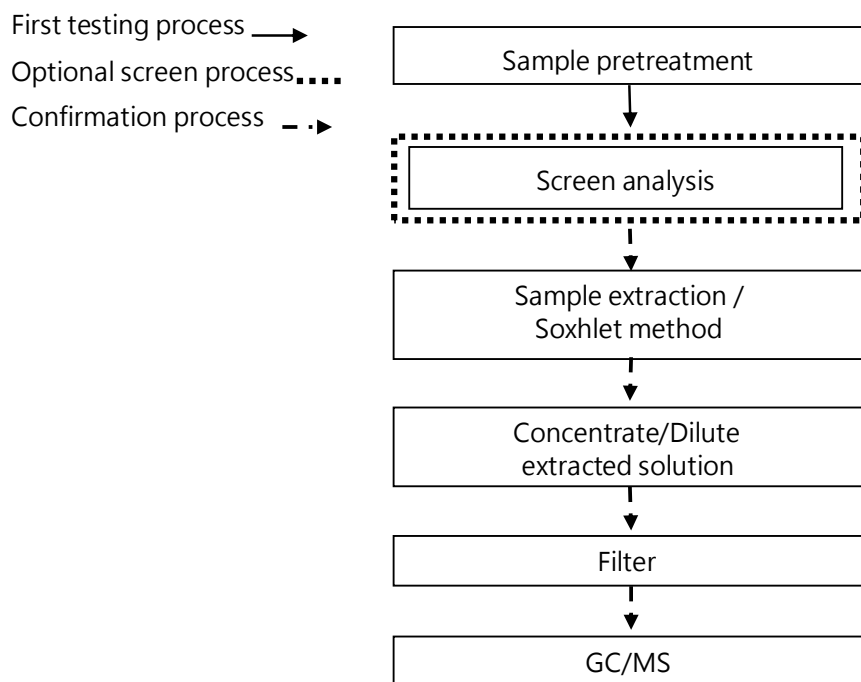


Flow chart of stripping method for metal analysis

The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



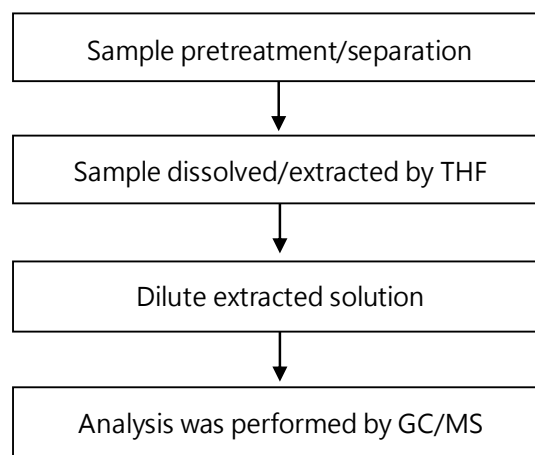
Analytical flow chart – PBBs / PBDEs



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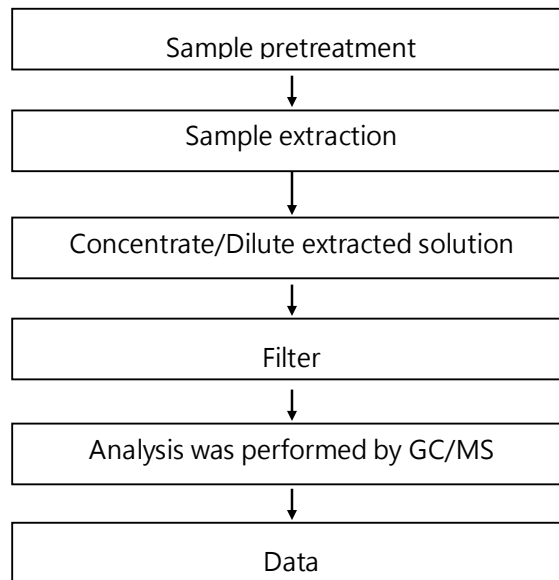
Analytical flow chart - Phthalate

【Test method: IEC 62321-8】



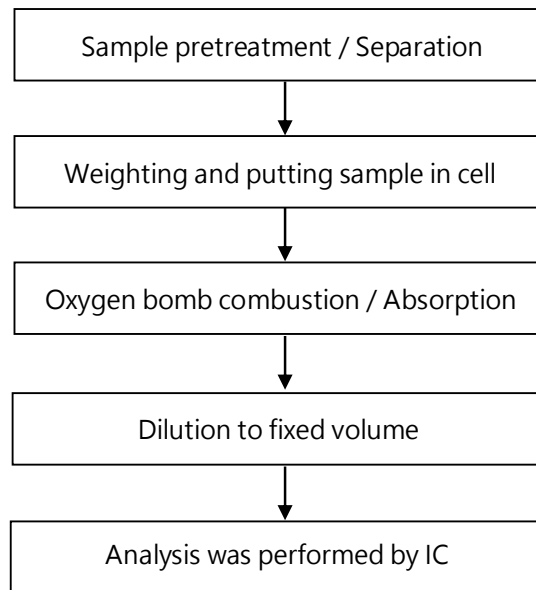
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Analytical flow chart - HBCDD



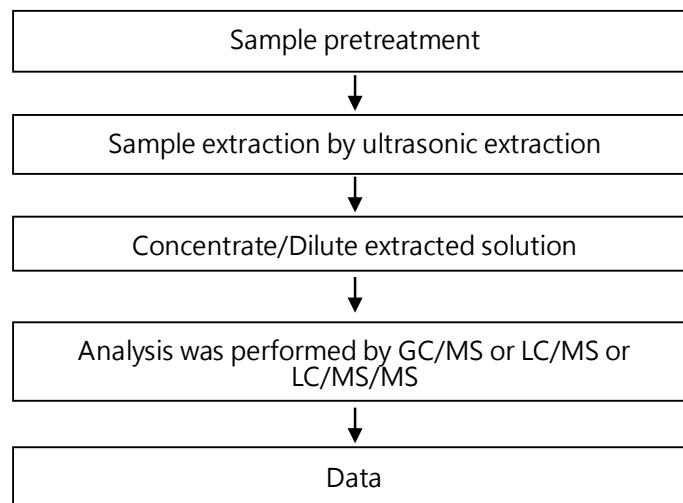
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Analytical flow chart - Halogen



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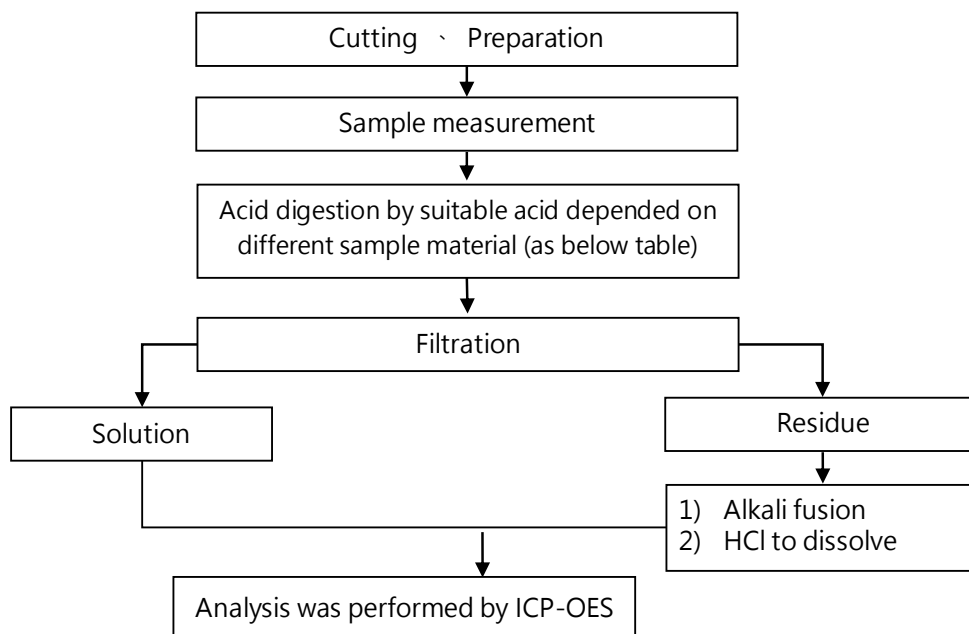
Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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Flow chart of digestion for the elements analysis performed by ICP-OES

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



Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Added appropriate reagent to total digestion

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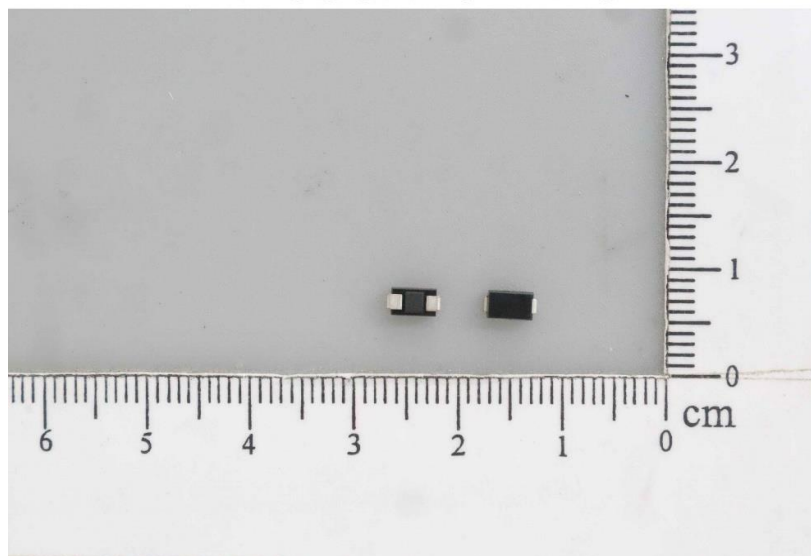
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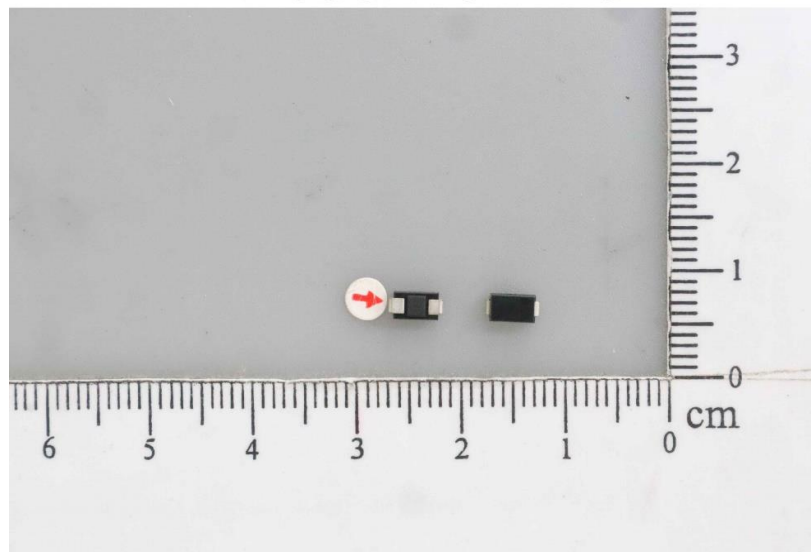
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* The tested sample / part is marked by an arrow if it's shown on the photo. *

ETR23301467 NO.1



ETR23301467 NO.2



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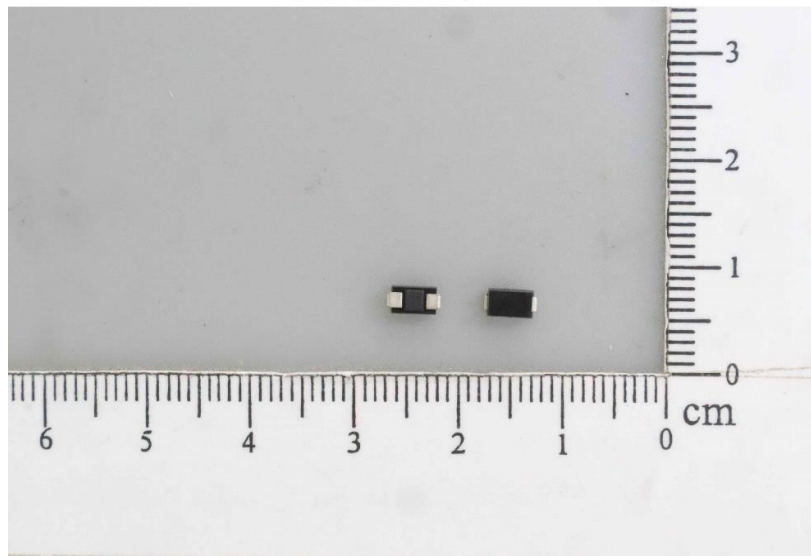
Date: 21-Mar-2023

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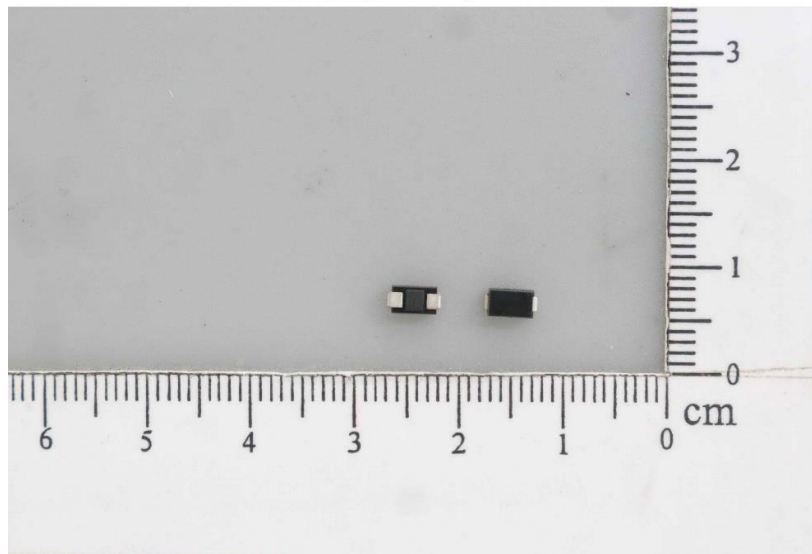
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ETR23301467 NO.3



ETR23301467 NO.4



**** End of Report ****

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