

No.: ETR23301468M01 Date: 21-Mar-2023 Page: 1 of 15

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 (NON GREEN COMPOUND)

Style/Item No. : DO-201

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 Alwan
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



PIN CODE: FF494C4



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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		Limit			
				No.1	No.2	No.3	No.4	
Cadmium (Cd)	With reference to IEC 62321-5:	mg/kg	2	n.d.				100
Lead (Pb)	2013, analysis was performed by ICP-OES.	mg/kg	2	5270				(*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	mg/kg	2		n.d.			100
Lead (Pb)	surface etching, analysis was performed by ICP-OES.	mg/kg	2		15.9			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/cm²	0.1		n.d.	n.d.		-
Cadmium (Cd)	With reference to IEC 62321-5:	mg/kg	2			n.d.		100
Lead (Pb)	2013, analysis was performed by ICP-OES.	mg/kg	2			n.d.		1000



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Test Item(s)	(s) Method Unit		MDL		Limit			
				No.1	No.2	No.3	No.4	
Mercury (Hg)	With reference to IEC 62321-4:	mg/kg	2			n.d.		1000
	2013+ AMD1: 2017, analysis							
	was performed by ICP-OES.							
Monobromobiphenyl		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	With reference to IEC 62321-6:	mg/kg	5	n.d.			n.d.	-
Sum of PBBs		mg/kg	-	n.d.			n.d.	1000
Monobromodiphenyl ether	2015, analysis was performed by GC/MS.	mg/kg	5	n.d.			n.d.	-
Dibromodiphenyl ether	by GC/M3.	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	1 1	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)	W/th	mg/kg	50	n.d.			n.d.	1000
Dibutyl phthalate (DBP)	With reference to IEC 62321-8:	mg/kg	50	n.d.			n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)	2017, analysis was performed	mg/kg	50	n.d.			n.d.	1000
Diisobutyl phthalate (DIBP)	by GC/MS.	mg/kg	50	n.d.			n.d.	1000
Hexabromocyclododecane	With reference to IEC 62321-9:	mg/kg	20	n.d.			n.d.	-
(HBCDD) and all major	2021, analysis was performed							
diastereoisomers identified (α-	by GC/MS.							
HBCDD, β- HBCDD, γ- HBCDD)								
(CAS No.: 25637-99-4, 3194-55-6								
(134237-51-7, 134237-50-6,								
134237-52-8))								



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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	mg/kg	50	n.d.			n.d.	-
Chlorine (Cl) (CAS No.: 22537-15- 1)		mg/kg	50	96.3			n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)	performed by IC.	mg/kg	50	2760			n.d.	-
lodine (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.	1	1	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/m²	0.5		n.d.			-
PFOA and its salts (CAS No.: 335-67-1 and its salts)		μg/m²	0.5		n.d.			-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA	mg/kg	2	n.d.			n.d.	-
Antimony (Sb) (CAS No.: 7440-36- 0)	3050B: 1996, analysis was performed by ICP-OES.	mg/kg	2	2820			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  $\mu$ g/cm<sup>2</sup>. 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  $\mu$ g/cm<sup>2</sup>). The coating is considered a non-Cr(VI) based coating
  - c. The result between 0.10  $\mu$ g/cm² and 0.13  $\mu$ g/cm² 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 ETR23301468.



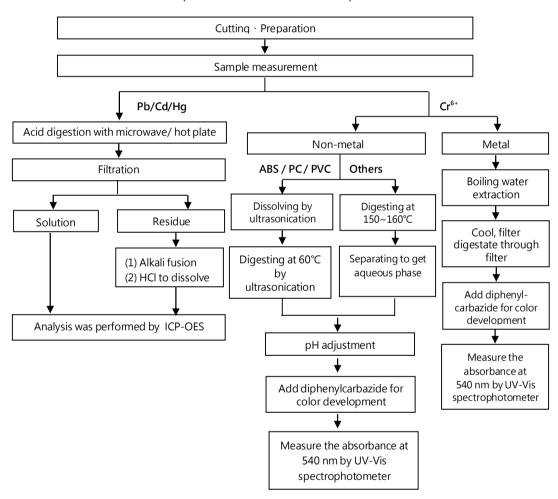
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#### Analytical flow chart of heavy metal

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

( Cr<sup>6+</sup> test method excluded )



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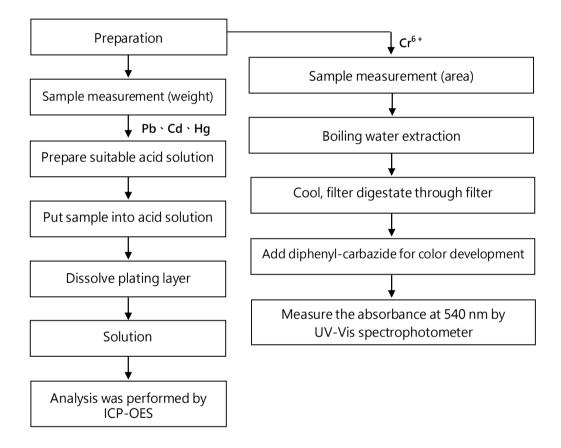


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#### Flow chart of stripping method for metal analysis

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



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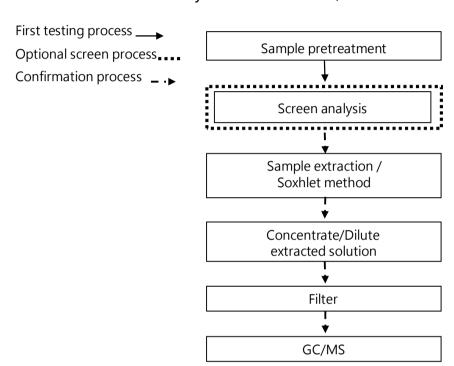
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#### Analytical flow chart - PBBs / PBDEs



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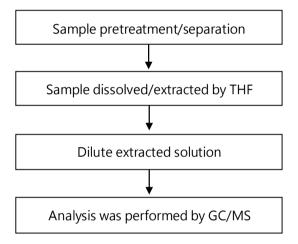


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Analytical flow chart - Phthalate

[Test method: IEC 62321-8]



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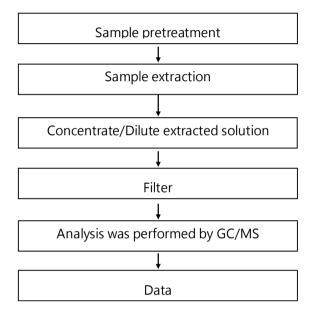
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#### Analytical flow chart - HBCDD



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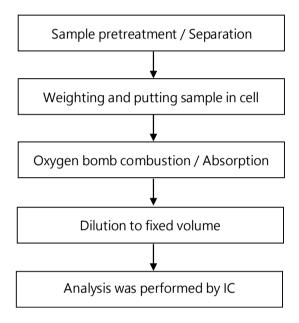
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#### Analytical flow chart - Halogen



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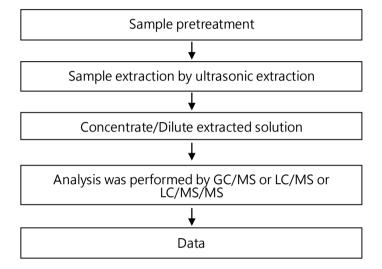
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#### Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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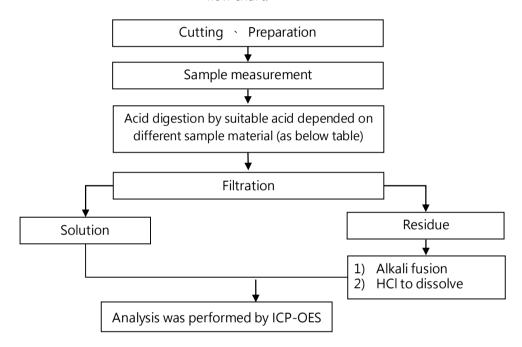


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#### Flow chart of digestion for the elements analysis performed by ICP-OES

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



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

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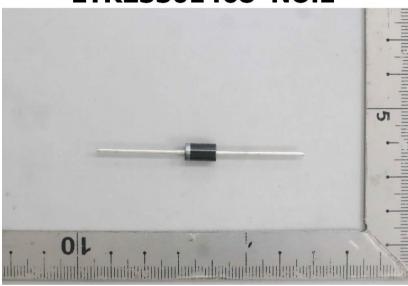


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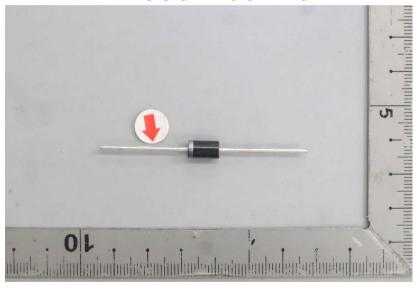
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\* The tested sample / part is marked by an arrow if it's shown on the photo. \*

#### ETR23301468 NO.1



#### ETR23301468 NO.2



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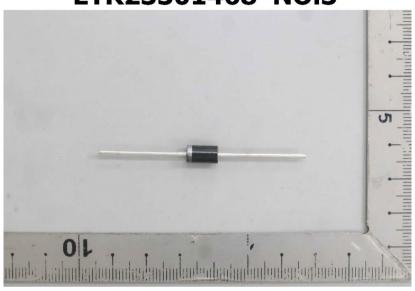
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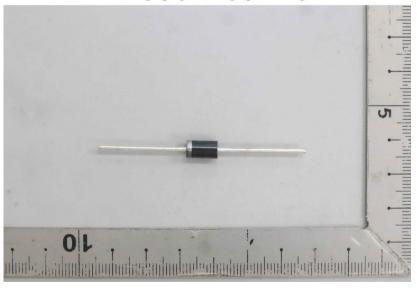
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#### ETR23301468 NO.3



#### ETR23301468 NO.4



\*\* End of Report \*\*

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