



Test Report

No. 4291279-CH01-R3

Date: May 22, 2018

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Texas Instruments Inc.
13121 TI Blvd., MS 368
Dallas, TX 75243
United States

"This report supersedes all previous documents bearing the test report number 4291279-CH01-R2."

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

Standard TI Wafer

Sample Received Date:

3/30/2018

Testing Period:

4/3/2018 – 4/17/2018

Revision Summary : R1: Updated picture.
R2: Updated Sample Description
R3: Additional test results added.

Test Requested : Please refer to the test results.

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

Result Summary :

Test Requested	Comment
1. RoHS Directive 2011/65/EU Annex II	PASS
2. Halogen content (Cl, Br) of the submitted sample(s) with reference to BS EN 14582:2016	See Test Results
3. Antimony Content	See Test Results
4. Beryllium Content	See Test Results
5. European Regulation (EC) No. 1907/2006 (REACH) Annex XVII and its amendments – Phthalates content (Formerly Directive 2005/84/EC)	PASS
6. Diisobutyl Phthalate (DIBP) Content	See Test Results

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

Prepared By:

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1. RoHS Directive 2011/65/EU Annex II

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		ND	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to IEC 62321; EPA 3060A (Determination of CrVI by UV-VIS)	ND*	2	1000
Sum of PBBs	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	-
Hexabromobiphenyl	mg/kg		ND	5	-
Pentabromobiphenyl	mg/kg		ND	5	-
Heptabromobiphenyl	mg/kg		ND	5	-
Octabromobiphenyl	mg/kg		ND	5	-
Nonabromobiphenyl	mg/kg		ND	5	-
Decabromobiphenyl	mg/kg		ND	5	-
Sum of PBDEs	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	-
Conclusion	/	/	PASS	/	/

Sample Description:

- Standard TI 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

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2. Halogen content (Cl, Br) of the submitted sample(s) with reference to BS EN 14582:2016:

With reference to **BS EN 14582:2016** "Characterization of waste – Halogen and sulfur content – Oxygen Combustion in closed systems and determination methods". Analysis was performed by Ion Chromatography.

Test Items	Unit	Method Detection Limit	1
Halogen – Chlorine (Cl) CAS # 007782-50-5	mg/kg	50	ND
Halogen – Bromine (Br) CAS # 007726-95-6	mg/kg	50	ND

Sample Description:

1. Standard TI Wafer

Note: 1. mg/kg = ppm

2. ND = Not Detected, reported when the reading is less than the detection limit value.

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3. Antimony Content

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

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Antimony (Sb)	21.6	2

Sample Description:

1. Standard TI Wafer

Note :

1. ND = Not Detected = denoted less than reporting limit

4. Beryllium Content

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

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Beryllium (Be)	ND	2

Sample Description:

1. Standard TI Wafer

Note :

1. ND = Not Detected = denoted less than reporting limit

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5. European Regulation (EC) No. 1907/2006 (REACH) Annex XVII and its amendments – Phthalate content

Method : With reference to IEC 62321-8:2017. Analysis was performed by Gas Chromatography / Mass Spectrometry.

Test Item	Result (%)	Detection Limit (%)	Permissible Limit (%)
	1		
Dibutyl Phthalate (DBP)	ND	0.005	--
Benzylbutyl Phthalate (BBP)	ND	0.005	--
Bis-(2-ethylhexyl) Phthalate (DEHP)	ND	0.005	--
DBP + BBP + DEHP	< 0.05	--	0.1
Diisononyl Phthalate (DINP)	ND	0.005	--
Di-n-octyl Phthalate (DNOP)	ND	0.005	--
Diisodecyl Phthalate (DIDP)	ND	0.005	--
DINP + DNOP + DIDP	< 0.05	--	0.1
Comment	PASS	--	--

Sample Description:

1. Standard TI Wafer

Note : 1. % = percentage by weight

2. ND = Not Detected

3. < = less than

6. Diisobutyl Phthalate (DIBP) Content

Method : With reference to IEC 62321-8:2017. Analysis was performed by Gas Chromatography / Mass Spectrometry.

Test Item	Result (%)	Detection Limit (%)
	1	
Diisobutyl Phthalate (DIBP)	ND	0.005

Sample Description:

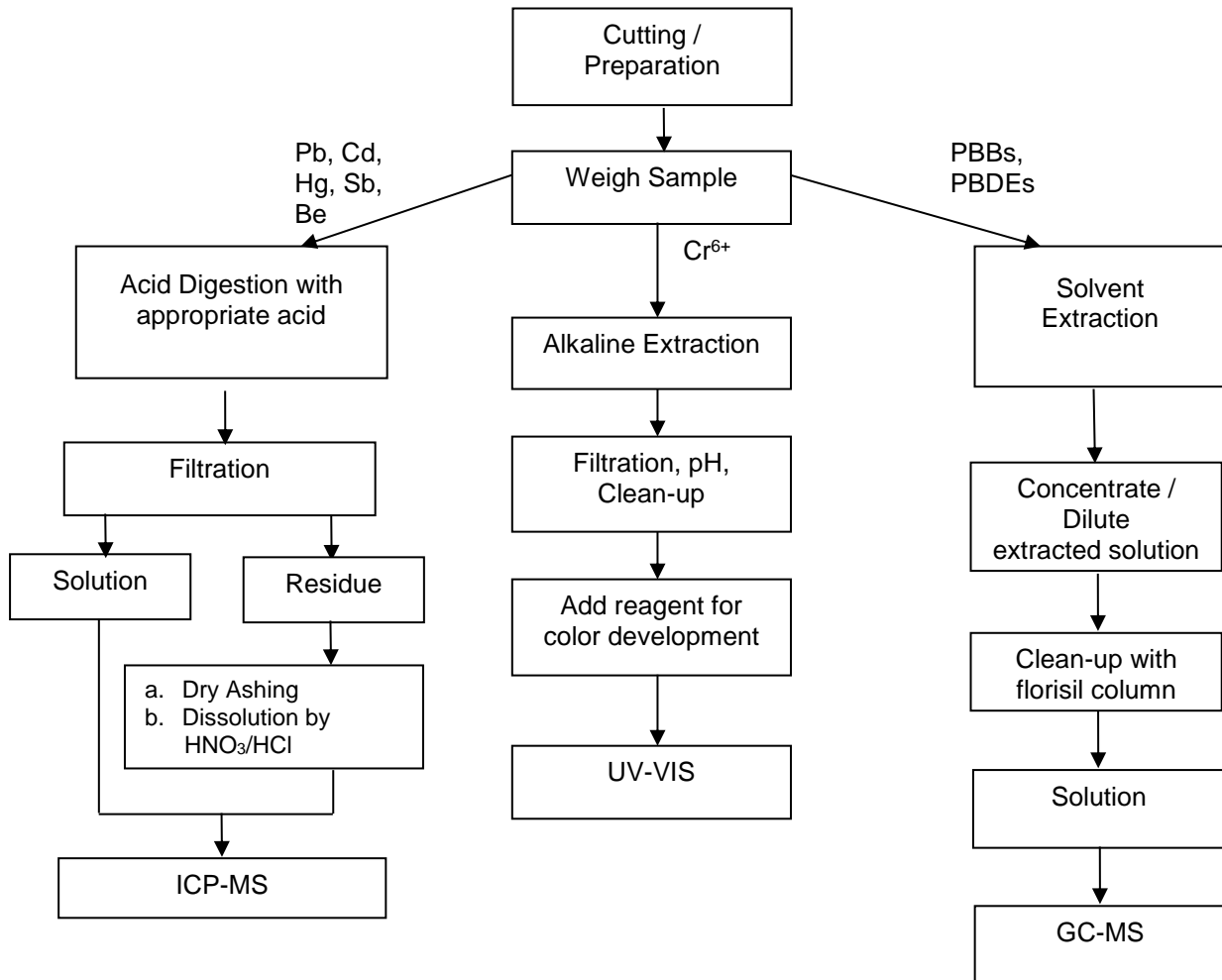
1. Standard TI Wafer

Note : 1. % = percentage by weight

2. ND = Not Detected

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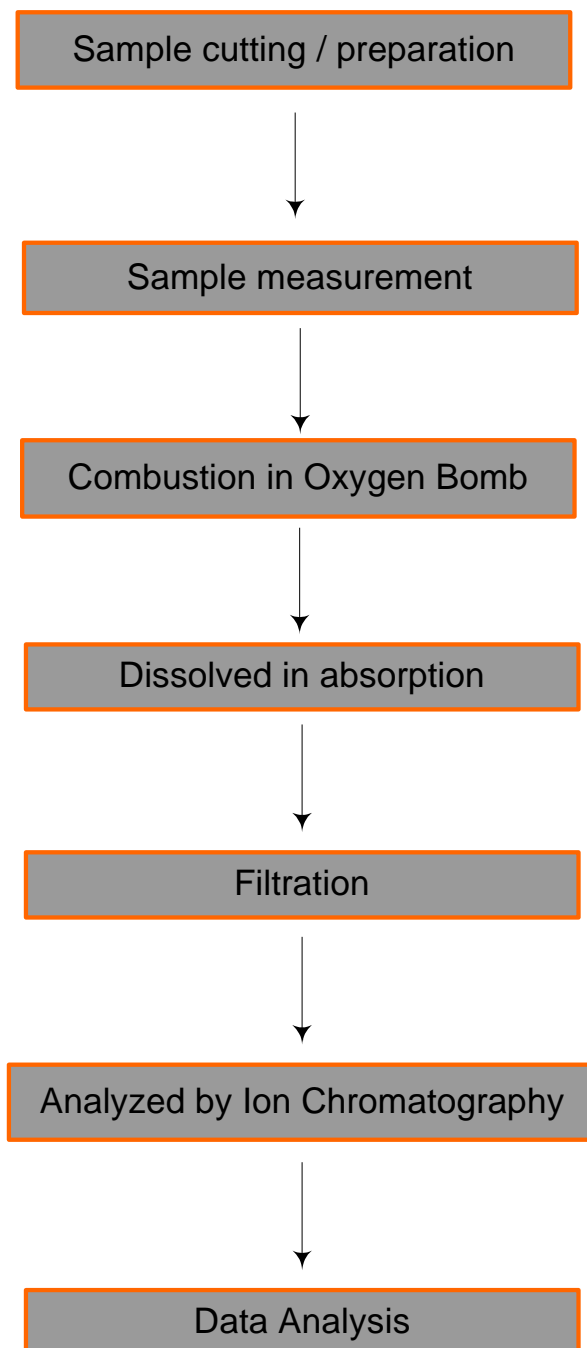
Flowchart for ROHS Testing:



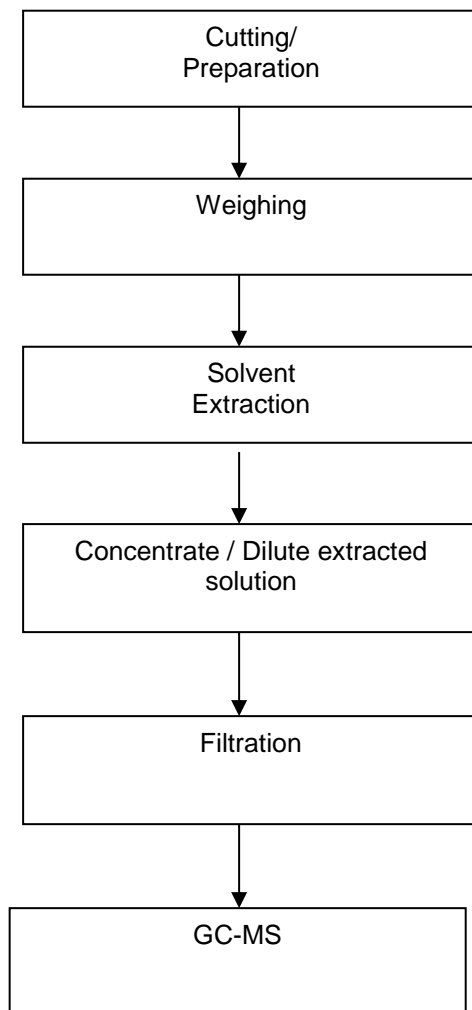
- Note : 1. For Cr(VI), spot test and boiling water extraction method is adopted for metal sample.
2. For Cd, Pb, Hg, Sb and Be contents test samples were dissolved totally by pre-conditioning method according to above flow chart.

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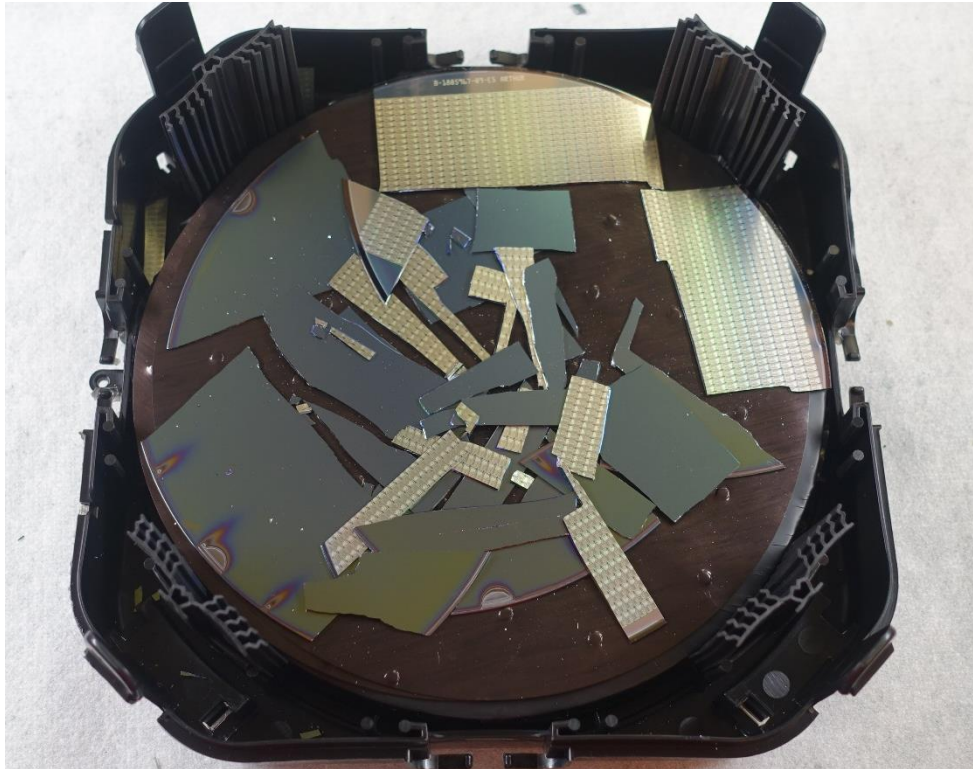
Halogen Testing Flow Chart



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Flowchart for Phthalates


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Sample Photo(s):


SGS authenticates the photo(s) on the original report only

*** End of Report ***

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