Cypress Semiconductor Corporation – An Infineon Technologies Company
198 Champion Court, San Jose, CA 95134. Tel: (408) 943-2600

PRODUCT CHANGE NOTIFICATION

PCN: PCN212103 **Date:** May 28, 2021

Subject: New BOM for Premolded Wettable Flank 56-Lead QFN Package at Cypress Philippines

To: PCN Coordinator PCN Coordinator
FUTURE
PCN.System@Future.ca

Change Type: Major

Description of Change:
Cypress announces the qualification of new bill of materials (BOM) for the premolded wettable flank 56-Lead QFN package (7x7x0.6mm) assembled at Cypress Philippines (Gateway Business Park, SEPZA, Javalera, Gen. Trias Cavite, Philippines).

Material	New Bill of Materials	Current Bill of Materials
Mold Compound	Kyocera KEG3000NAS (High Spiral Flow)	Sumitomo G700Y (High Spiral Flow)
Leadframe	Premolded Wettable Flank QFN, NiPdAu (RT-uPPF)	Standard QFN, NiPdAu
Lead Finish	NiPdAu	NiPdAu
Die Attach Material	Sumitomo CRM1577E (Non-conductive)	Henkel QMI519 (Conductive)
Bond Wire	MKE 0.9mil CuPdAu wire	Heraeus 0.9mil CuPd wire

The new BOM is consistent with industry standards and results in improved product quality and reliability. The green and lead-free RoHS-compliant Kyocera KEG3000NAS mold compound is compatible with industry standard reflow temperatures for applicable package volume, thickness, and lead finish. The new die attach material is compatible with industry standard reflow conditions for applicable package volume, thickness, and lead finish. There is no change in the moisture sensitivity level (MSL).

Benefit of Change:
The qualification of the new bill of materials on existing qualified package and devices allows for an improvement in product quality and reliability.

Part Numbers Affected: 59
See the attached 'Affected Parts List' file for a list of all part numbers affected by this change. Note that any new parts that are introduced after the publication of this PCN will include all changes outlined in this PCN.

Qualification Status:
This change has been qualified through a series of tests documented in the Qualification Test Plan QTP# 201216. This qualification report can be found as an attachment to this PCN or by visiting www.cypress.com and typing the QTP number in the keyword search window.

Sample Status:
Qualification samples may not be built ahead of time for all part numbers affected by this change. Please review the attached 'Affected Parts List' file for a list of affected part numbers with their associated sample ordering part numbers. Samples are available now unless there is an indication that the sample ordering part numbers are subject to lead times. If you require qualification samples, please contact your local Cypress sales representative as soon as possible, preferably within 30 days of the date of this PCN, to place any sample orders.

Approximate Implementation Date:
Effective 90 days from the date of this notification or upon customer approval, whichever comes first, all shipments of commercial/industrial grade part numbers in the attached file will be assembled at Cypress Philippines or other approved assembly sites.

Anticipated Impact:
Products assembled with the new BOM are compatible with existing products from form, fit, functional, parametric and quality performance perspectives.

Cypress also recommends that customers take this opportunity to review these changes against current application notes, system design considerations and customer environment conditions to assess impact (if any) to their application.

Method of Identification:
Cypress maintains traceability of product to wafer level, including wafer fabrication location, through the lot number marked on the package.

Response Required:
No response is required.

For additional information regarding this change, contact your local sales representative or contact the PCN Administrator at pcn_adm@cypress.com.

Sincerely,

Cypress PCN Administration

On 16 April 2020, Infineon Technologies acquired Cypress.
We are now in the process of merging and consolidating our tools and processes for PCN, Information Notes, Errata and Product Discontinuance.
For further details, please visit our website:
https://www.infineon.com/cms/en/about-infineon/company/cypress-acquisition/

Material Composition Declaration

This document is a declaration of the substances within the manufacturer listed item. Note: if the item is an assembly with lower level parts, the declaration encompasses all lower level materials for which the manufacturer has engineering responsibility.

Adobe Reader version 7.0.5 is required to complete this declaration.

1752-2 1.1	IPC Web Site for Information on IPC-1752 Standard **http://www.ipc.org/IPC-175x**	**Form Type *** **Distribute**	**Declaration Class *** **Class 6 - RoHS Yes/No, Homogeneous Materials and Mfg Informat**

Supplier Information

Company Name *	Company Unique ID	Unique ID Authority	**Response Date ***	Response Document ID	
Cypress Semiconductor Corp	CYPRESS		**2021-01-11**		
Contact Name *	Title - Contact	**Phone - Contact ***	**Email - Contact ***	Duplicate Contact -> Authorized Representative	
QA Customer Support	QA Customer Support	**+6328497500**	**qacs_team@cypress.com**		
Authorized Representative *	Title - Representative	**Phone - Representative ***	**Email - Representative** *	Supplier Comments or URL for Additional Information	
Jeff Gary Ballesca	Staff EHS Engineer	**+6328497500**	**jgtb@cypress.com**	http://app.cypress.com/portal/server.pt?space=Communi	

Requester Item Number	Mfr Item Number	Mfr Item Name	Effective Date	Version	Manufacturing Site	**Weight ***	UOM	Unit Type
QFN 56_LD56_7x7x0.6mm	QFN 56_LD56_7x7x0.6mm	QFN 56_LD56_7x7x0.6mm	2021-01-11		CML	85.4442	mg	Each
Alternate Recommendation				Alternate Item Comments	QTP No.201216			

Manufacturing Process Information

Terminal Plating / Grid Array Material	Terminal Base Alloy	J-STD-020 MSL Rating	Peak Process Body Temperature	Max Time at Peak Temperature	Number of Reflow Cycles
Nickel/Palladium/Gold (Ni/Pd/Au)	**CU Alloy**	**3**	**260** C	**30** seconds	**3**

Comments

Test Reports: MC (002-28184); DA (002-28182); PLATING (001-98040); BW (002-25777) ; LF (001-98040)

*** Required Field**

Form enabled by Adobe

Save the fields in this form to a file	Export Data	Import fields from a file into this form	Import Data	Clear all of the fields on this form	Reset Form	Lock the fields on this form to prevent changes	Lock Supplier Fields

RoHS Material Composition Declaration

Declaration Type * **Detailed**

RoHS Directive 2002/95/EC	**RoHS Definition:** Quantity limit of 0.1% by mass (1000 PPM) in homogeneous material for: Lead (Pb), Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB), Polybrominated Diphenyl Ethers (PBDE) and quantity limit of 0.01% by mass (100 PPM) of homogeneous material for Cadmium

Please indicate whether any homogeneous material (as defined by the RoHS Directive, EU 2002/95/EC and implemented by the laws of the European Union member states) of the part identified on this form contains lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and/or polybrominated diphenyl ethers (each a "RoHS restricted substance") in excess of the applicable quantity limit identified above. If a homogeneous material within the part contains a RoHS restricted substance in excess of an applicable quantity limit, please indicate below which, if any, RoHS exemption you believe may apply. If the part is an assembly with lower level components, the declaration shall encompass all such components. Supplier certifies that it gathered the information it provides in this form using appropriate methods to ensure its accuracy and that such information is true and correct to the best of its knowledge and belief, as of the date that Supplier completes this form. Supplier acknowledges that Company will rely on this certification in determining the compliance of its products with European Union member state laws that implement the RoHS Directive. Company acknowledges that Supplier may have relied on information provided by others in completing this form, and that Supplier may not have independently verified such information. However, in situations where Supplier has not independently verified information provided by others, Supplier agrees that, at a minimum, its suppliers have provided certifications regarding their contributions to the part, and those certifications are at least as comprehensive as the certification in this paragraph. If the Company and the Supplier enter into a written agreement with respect to the identified part,the terms and conditions of that agreement, including any warranty rights and/or remedies provided as part of that agreement, will be the sole and exclusive source of the Supplier's liability and the Company's remedies for issues that arise regarding information the Supplier provides in this form. In the absence of such written agreement, the warranty rights and/or remedies of Supplier's Standard Terms and Conditions of Sale applicable to such part shall apply.

RoHS Declaration *	1 - Item(s) does not contain RoHS restricted substances per the definition above	**Supplier Acceptance ***	**Accepted**

Exemptions: If the declared item does not contain RoHS restricted substances per the definition above except for defined RoHS exemptions, then select the corresponding response in the RoHS Declaration above and choose all applicable exemptions.

Declaration Signature

Instructions: Complete all of the required fields on all pages of this form. Select the "Accepted" on the Supplier Acceptance drop-down. This will display the signature area. Digitally sign the declaration (if required by the Requester) and click on Submit Form to have the form returned to the Requester.

Supplier Digital Signature	Jeff Gary Ballesca	Digitally signed by Jeff Gary Ballesca DN: cn=Jeff Gary Ballesca, o, ou, email=jgtb@cypress.com, c=US Date: 2019.04.12 14:00:51 +08'00'	

*** Required Field**

Homogeneous Material Composition Declaration for Electronic Products

SubItem Instructions: The presence of any JIG Level A or B substances must be declared. [1] indicate the subpart in which the substance is located, [2] provide a description of the homogeneous material [3], enter the weight of the homogeneous material.

Substance Instructions: [A] select the Level (JIG A, JIG B, Requester or Supplier) [B] select the substance category (JIG or Requester) or enter a value (Supplier). [C] select the substance (JIG) or enter the substance and CAS (Other). [D] select a RoHS exemption, if applicable [E] enter the weight of the substance or the PPM concentration [F] Optionally enter the positive (+) and negative (-) tolerance in percent (Note: percent tolerance values are expected to cover a 3 sigma range of distribution unless otherwise noted).

Line Functions: +I Inserts a New Item /SubItem +M Inserts a new Material +C Inserts a new Substance Category +S Inserts a new Substance - Deletes the element line

	Item/SubItem Name		Homogeneous Material	Weight	Unit of Measure		Level	Substance Category		Substance	CAS	Exempt	Weight	Unit of Measure	Tolerance -	Tolerance +	PPM
+I -I	Lead frame	+M -M	Base Material	53.9781	mg	+C -C	Supplier	Copper	+S -S	Copper	7440-50-8		52.1927	mg			610,84
						+C -C	Supplier	Iron	+S -S	Iron	7439-89-6		1.6514	mg			19,327
						+C -C	Supplier	Phosphorus	+S -S	Phosphorus	7723-14-0		0.052	mg			609
						+C -C	Supplier	Zinc	+S -S	Zinc	7440-66-6		0.082	mg			960
+I -I	Leadfinish	+M -M	External Plating	0.9714	mg	+C -C	B	Nickel (external applic	+S -S	Nickel	7440-02-0		0.9286	mg			10,868
						+C -C	Supplier	Palladium	+S -S	Palladium	7440-05-3		0.0214	mg			250
						+C -C	Supplier	Gold	+S -S	Gold	7440-57-5		0.0214	mg			250
+I -I	Die Attach	+M -M	Adhesive	2.0389	mg	+C -C	Supplier	Organic Filler	+S -S	Organic Filler	Trade Secret		0.2946	mg			3,448
						+C -C	Supplier	Silica	+S -S	Silica	Trade Secret		0.6015	mg			7,040
						+C -C	Supplier	Acrylate Resin	+S -S	Acrylate Resin	Trade Secret		0.2231	mg			2,611
						+C -C	Supplier	Diluent A	+S -S	Diluent A	Trade Secret		0.2231	mg			2,611
						+C -C	Supplier	Diluent B	+S -S	Diluent B	Trade Secret		0.2231	mg			2,611
						+C -C	Supplier	Diluent C	+S -S	Diluent C	Trade Secret		0.2231	mg			2,611
						+C -C	Supplier	Elastomer	+S -S	Elastomer	Trade Secret		0.2231	mg			2,611
						+C -C	Supplier	Peroxide	+S -S	Peroxide	80-43-3		0.0273	mg			320
+I -I	Die	+M -M	Silicon Die	3.3	mg	+C -C	Supplier	Silicon	+S -S	Silicon	7440-21-3		3.3	mg			38,622
+I -I	Bondwire	+M -M	Interconnect	0.7025	mg	+C -C	Supplier	Cu	+S -S	Cu	7440-50-8		0.7023	mg			8,219
						+C -C	Supplier	Palladium	+S -S	Palladium	7440-05-3		0.0001	mg			1
						+C -C	Supplier	Gold	+S -S	Gold	7440-57-5		0.0001	mg			1
+I -I	Mold Compound	+M -M	Encapsulation	24.4533	mg	+C -C	Supplier	Silica Fused	+S -S	Silica Fused	60676-86-0		21.0989	mg			246,93
						+C -C	Supplier	Epoxy Resin (1)	+S -S	Epoxy Resin (1)	Trade Secret		0.9848	mg			11,526
						+C -C	Supplier	Epoxy Resin (2)	+S -S	Epoxy Resin (2)	Trade Secret		0.9848	mg			11,526
						+C -C	Supplier	Phenol resin (1)	+S -S	Phenol resin (1)	Trade Secret		0.9848	mg			11,526

*** Required Field**

+C	-C	Supplier	Phenol resin (2)	+S	-S	Phenol resin (2)	Trade Secret		0.1836	mg			2,149
+C	-C	Supplier	Carbon Black	+S	-S	Carbon Black	1333-86-4		0.2164	mg			2,533

*** Required Field**

Test Report

No. : CE/2019/A0797 Date : 2019/10/14

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The following samples was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By	:	MK ELECTRON CO., LTD.
Sample Description	:	Au FLASHED Pd COATING Cu WIRE
Sample Receiving Date	:	2019/10/04
Testing Period	:	2019/10/04 to 2019/10/14

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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 Result(s) : 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 / Manager -Tec
Signed for and behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Result(s)

PART NAME No.1 : SILVER COLORED METAL WIRE

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+ AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)(#2)	µg/cm²	With reference to IEC 62321-7-1 (2015) and performed by UV-VIS.	0.10	n.d.	-
Sum of PBBs	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl	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 PBDEs	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.	-

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Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DNPP (Di-n-pentyl phthalate) (CAS No.: 131-18-0)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321 (2008). Analysis was performed by GC/MS.	5	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Polychlorinated Biphenyls (PCBs) (CAS No.: 1336-36-3)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-
Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	100	n.d.	-
Tributyl Tin (TBT)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD.	0.03	n.d.	-
Triphenyl Tin (TphT)	mg/kg		0.03	n.d.	-
Dibutyl Tin (DBT)	mg/kg		0.03	n.d.	-
Dioctyl Tin (DOT)	mg/kg		0.03	n.d.	-
Bis(tributyltin)oxide (TBTO) (CAS No.: 56-35-9)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD. Calculated from the result of Tributyl Tin (TBT).	0.03 (▲)	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.	2	n.d.	-
Beryllium (Be)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.	2	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MS.	0.01	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to CEN/TS 15968 (2010). Analysis was performed by LC/MS.	0.01	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Arsenic (As)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-OES.	2	n.d.	-
Red phosphorus	**	Analysis was performed by Pyrolyzer-GC/MS.	-	Negative	-

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. ** = Qualitative analysis (No Unit)
6. Negative = Undetectable / Positive = Detectable
7. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm². 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 µg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
8. (▲)：The MDL was evaluated for element / tested substance.
   Conversion Formula：AX ＝ A × F

AX	A	F
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.024

9. Parameter Conversion Table： http://twap.sgs.com/sgsrsts/chn/download-REACH_tw.asp

PFOS Reference Information : POPs - (EU) 2019/1021

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m².

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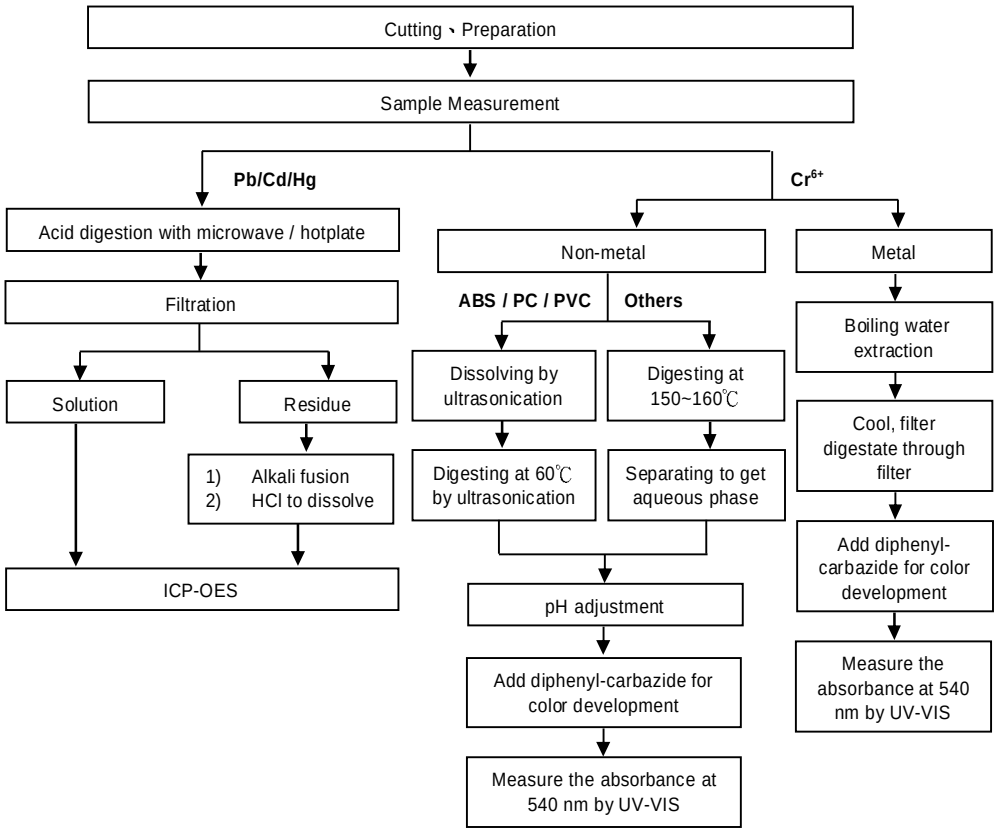
Analytical flow chart of Heavy Metal

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

- Technician : Rita Chen
- Supervisor: Troy Chang



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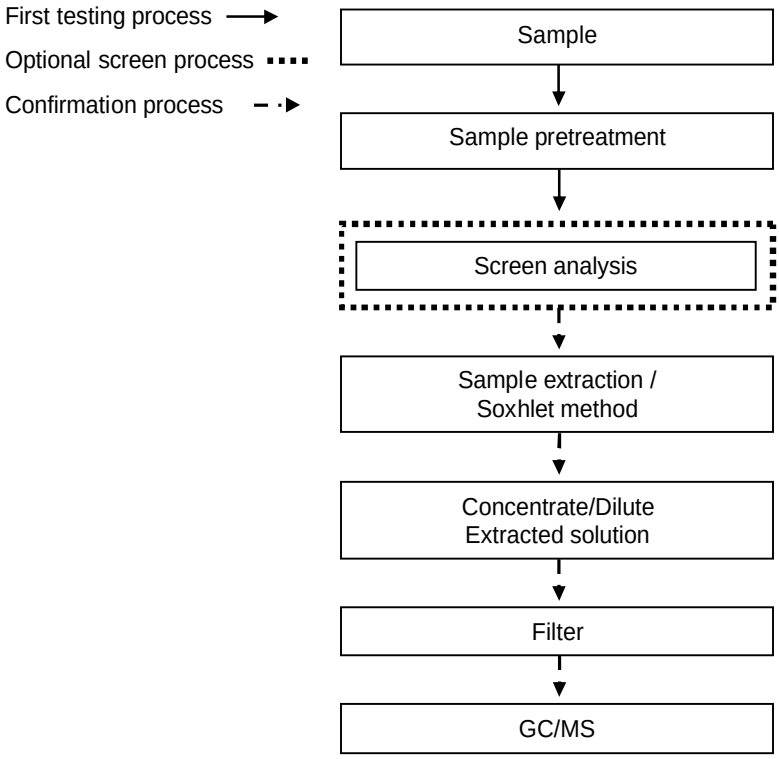
Analytical flow chart – PBB / PBDE

- Technician : Yaling Tu
- Supervisor: Troy Chang



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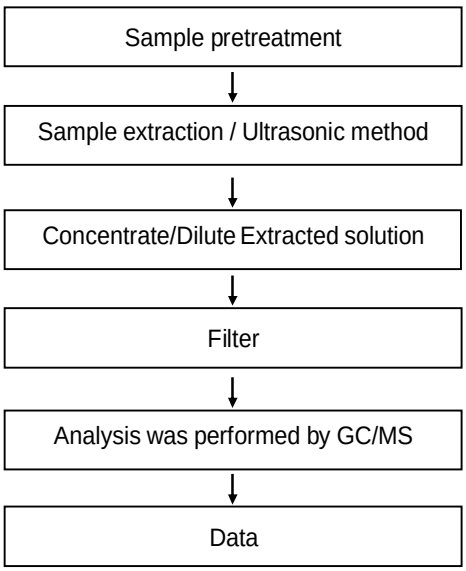
Analytical flow chart - PCBs

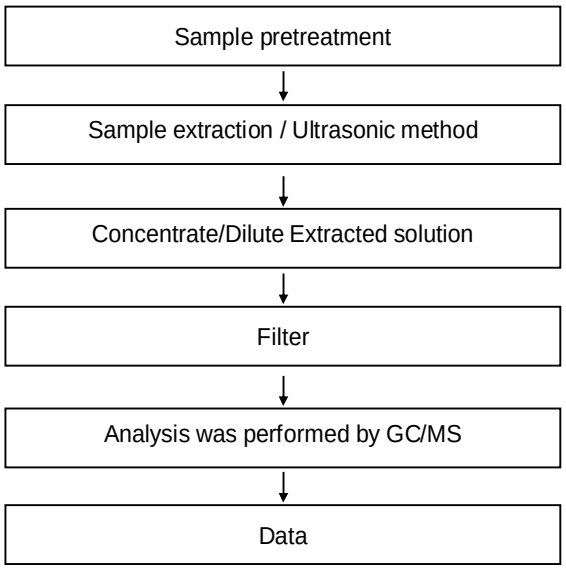
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - PCNs

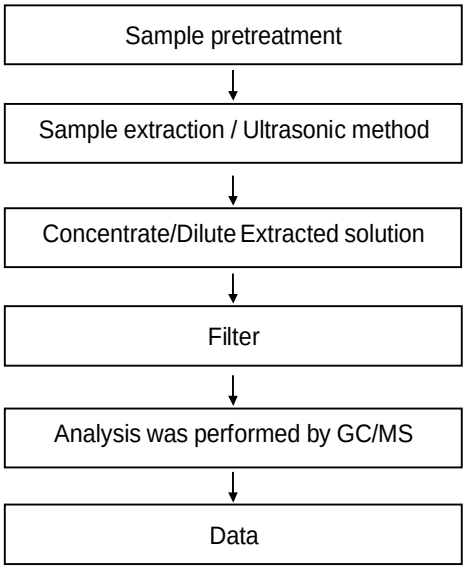
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - PCTs

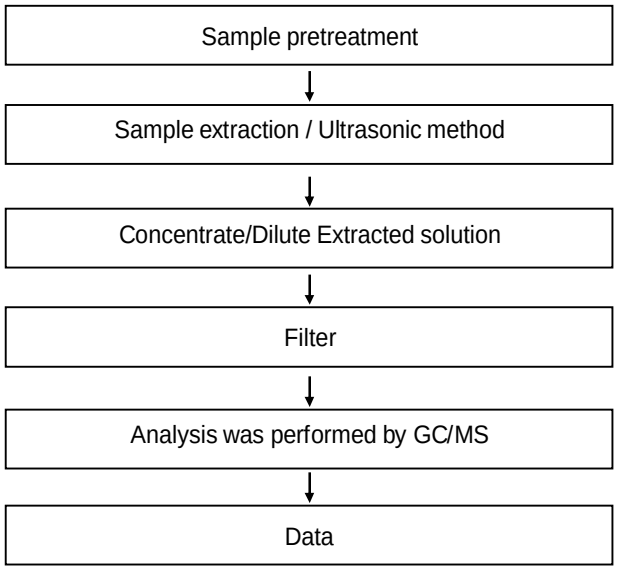
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - Chlorinated Paraffins

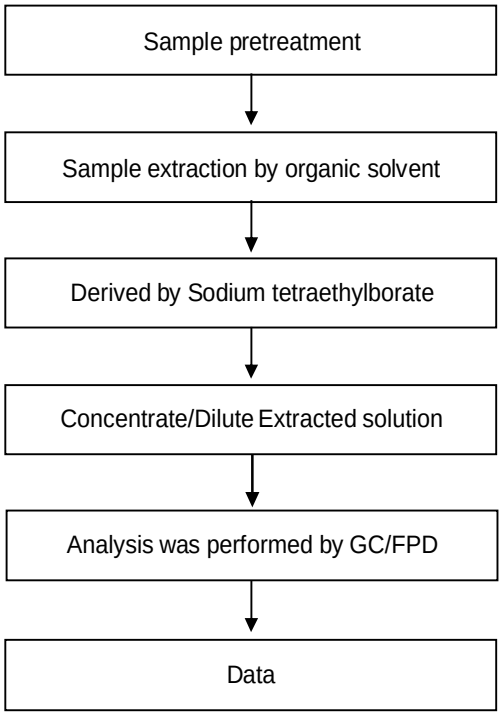
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - Organic-Tin

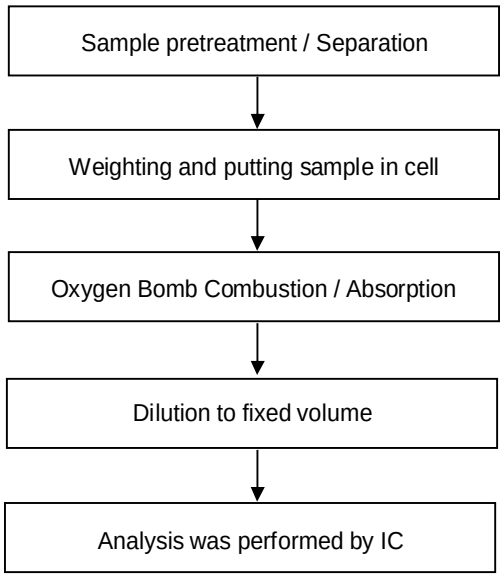
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang

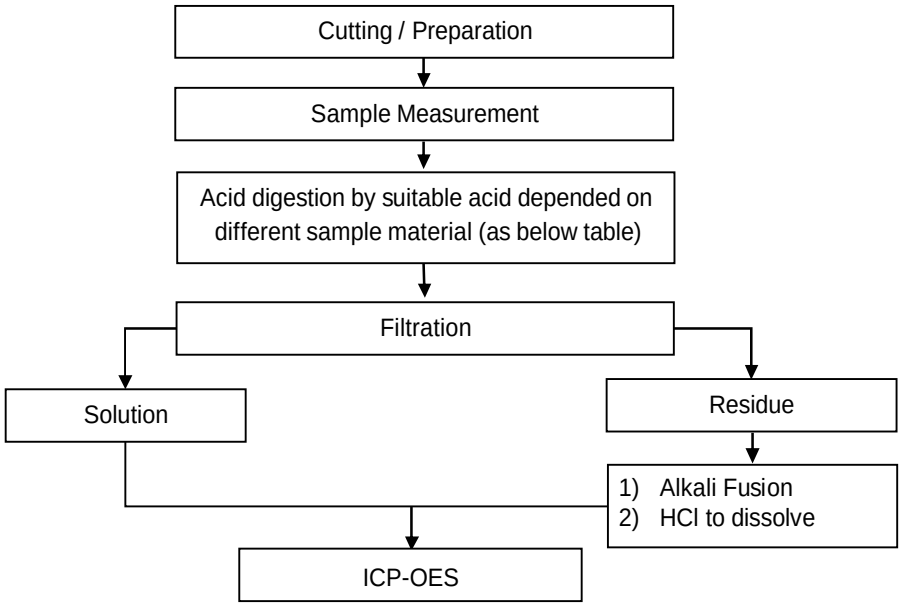


MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

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

- Technician: Rita Chen
- Supervisor: Troy Chang

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

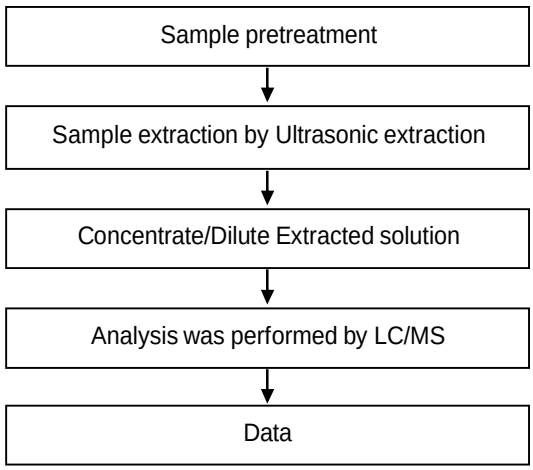


Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - PFOA/PFOS

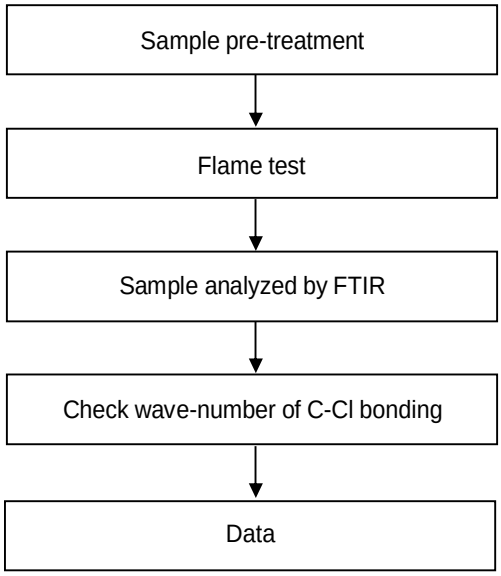
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analysis flow chart - PVC

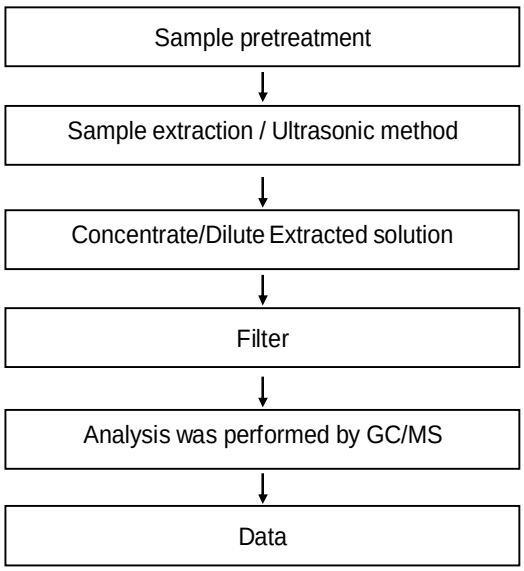
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - HBCDD

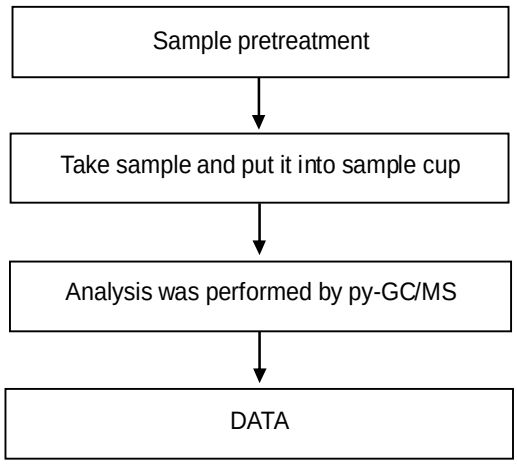
- Technician: Yaling Tu
- Supervisor: Troy Chang



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - Red phosphorus

- Technician: Yaling Tu
- Supervisor: Troy Chang

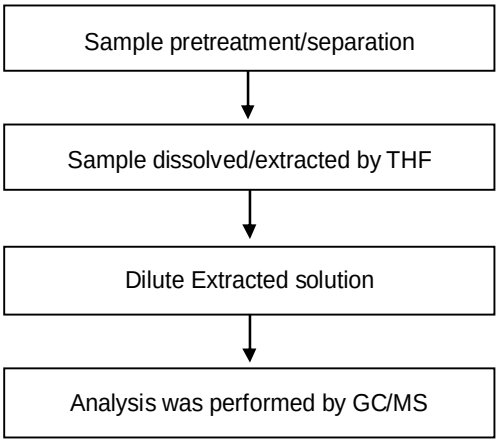


MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

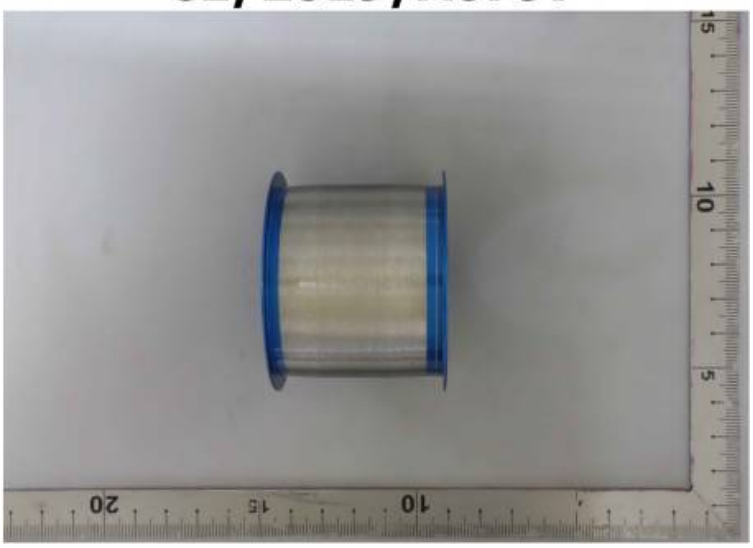
【Test method: IEC 62321-8】



MK ELECTRON CO., LTD.
405, GEUMEO-RO, POGOK-EUP, CHEOIN-GU, YONGIN-SI, GYEONGGI-DO, KOREA

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

CE/2019/A0797



** End of Report **

Chemical Laboratory - Kao., SGS Taiwan Ltd.

Test Report

No. : KA/2018/C1986 Date : 2018/12/27

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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

Sample Description	:	DIE ATTACHED PASTE
Style/Item No.	:	CRM-1577E
Sample Receiving Date	:	2018/12/22
Testing Period	:	2018/12/22 TO 2018/12/27
Sample Submitted By	:	SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.

==========

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.

(2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to next page(s).

Conclusion :

(1) Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS and amending Directive (EU) 2015/863.

Ray Chang

Ray Chang Ph.D. / Manager - Tech
Signed for and on behalf of
SGS Taiwan Limited

Test Report

No. : KA/2018/C1986 Date : 2018/12/27

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Result(s)

PART NAME No.1 : BEIGE DIE ATTACHED PASTE

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4: 2013 and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6: 2015 and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl			5	n.d.	-
Dibromobiphenyl			5	n.d.	-
Tribromobiphenyl			5	n.d.	-
Tetrabromobiphenyl			5	n.d.	-
Pentabromobiphenyl			5	n.d.	-
Hexabromobiphenyl			5	n.d.	-
Heptabromobiphenyl			5	n.d.	-
Octabromobiphenyl			5	n.d.	-
Nonabromobiphenyl			5	n.d.	-
Decabromobiphenyl			5	n.d.	-

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Sum of PBDEs	mg/kg	With reference to IEC 62321-6: 2015 and performed by GC/MS.	-	n.d.	1000
Monobromodiphenyl ether			5	n.d.	-
Dibromodiphenyl ether			5	n.d.	-
Tribromodiphenyl ether			5	n.d.	-
Tetrabromodiphenyl ether			5	n.d.	-
Pentabromodiphenyl ether			5	n.d.	-
Hexabromodiphenyl ether			5	n.d.	-
Heptabromodiphenyl ether			5	n.d.	-
Octabromodiphenyl ether			5	n.d.	-
Nonabromodiphenyl ether			5	n.d.	-
Decabromodiphenyl ether			5	n.d.	-
Beryllium (Be)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	n.d.	-
Arsenic (As)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321: 2008 method. Analysis was performed by GC/MS.	5	n.d.	-
Perfluorooctane sulfonates (PFOS)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 000335-67-1)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-

Test Report

No. : KA/2018/C1986 Date : 2018/12/27

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.	-
Phthalates					
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DIPP (Di-isopentyl phthalate) (CAS No.: 605-50-5)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DPP (Di-pentyl phthalate) DnPP (Di-n-pentyl phthalate) (CAS NO.:131-18-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Note：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

PFOS Reference Information : POPs - (EU) 757/2010

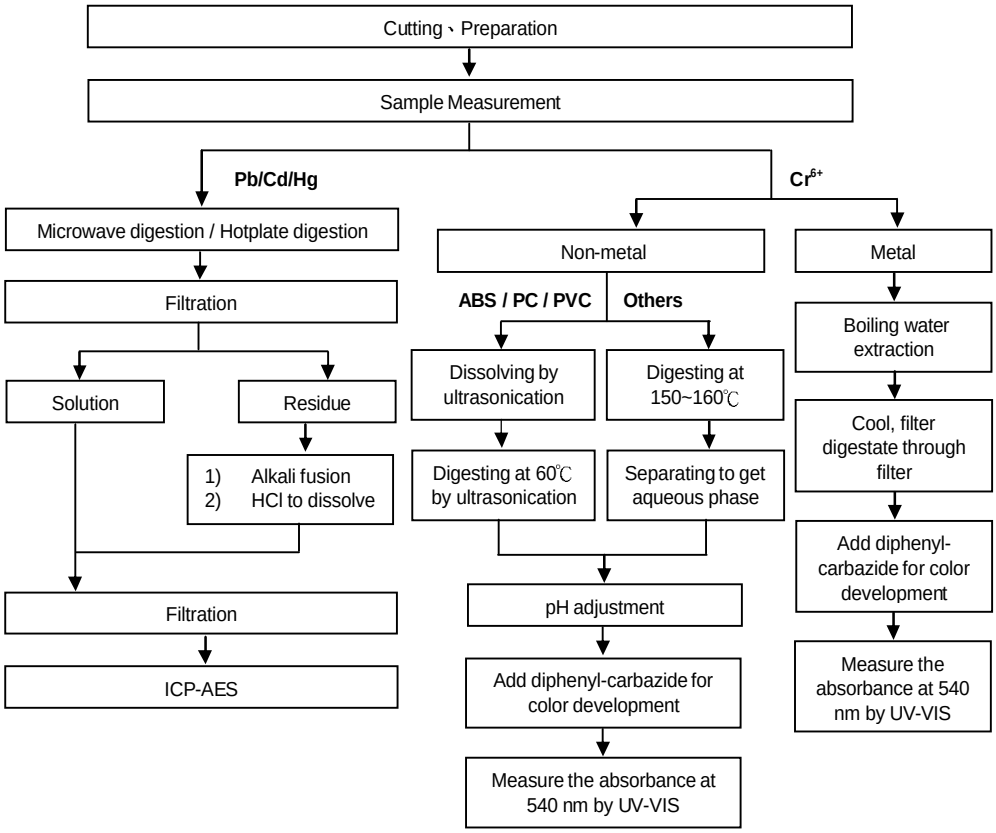
Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1μg/m².
PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluoroctanesulfonic acid, Perfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamide, N-Ethylperfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamidoethanol and N-Ethylperfluoroctane sulfonamidoethanol.

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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）

- Technician : Jony Liu
- Supervisor: Ray Chang

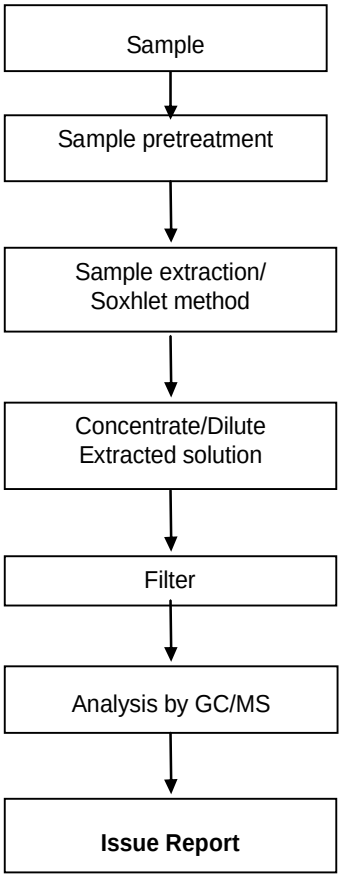


SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

PBB/PBDE analytical FLOW CHART

1) Name of the person who made measurement: Dorothy Chen

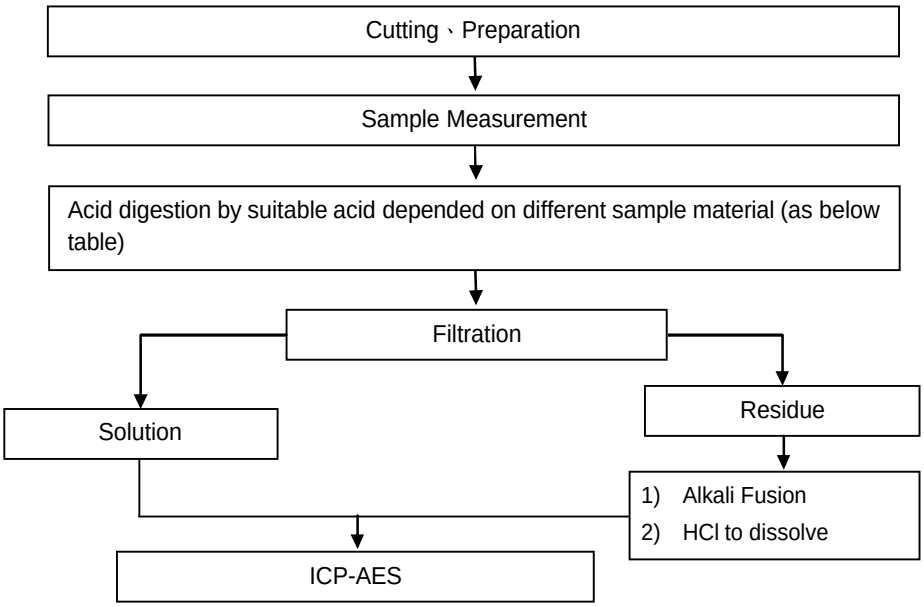
2) Name of the person in charge of measurement: Ray Chang



SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
2) Name of the person who made measurement: Jony Liu
3) Name of the person in charge of measurement: Ray Chang

Flow Chart of digestion for the elements analysis performed by ICP-AES

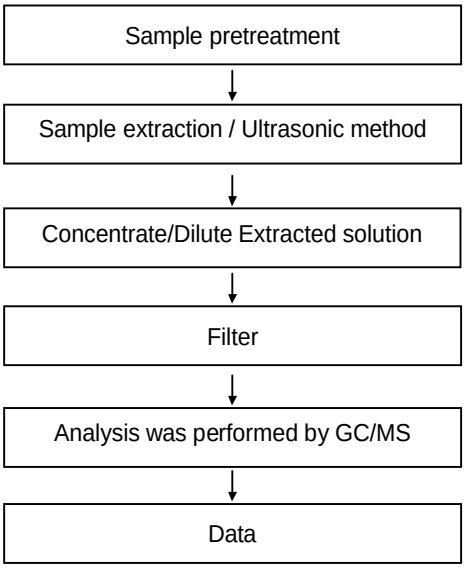


Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Any acid to total digestion

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

HBCDD analytical flow chart

1) Name of the person who made measurement: Dorothy Chen
2) Name of the person in charge of measurement: Ray Chang

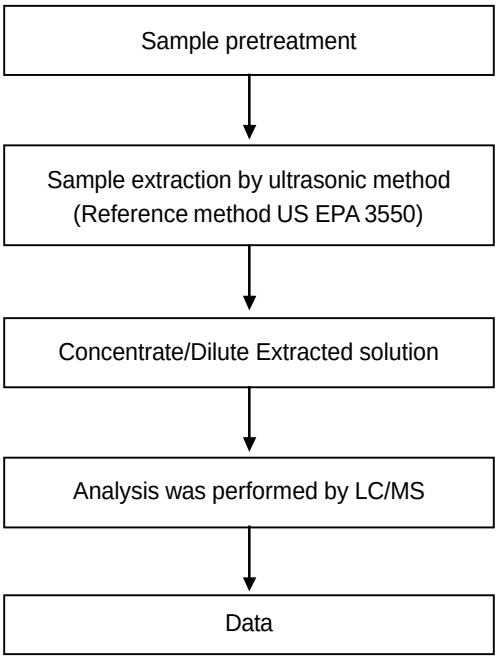


SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of PFOA/PFOS content

1) Name of the person who made measurement: Ginny Huang

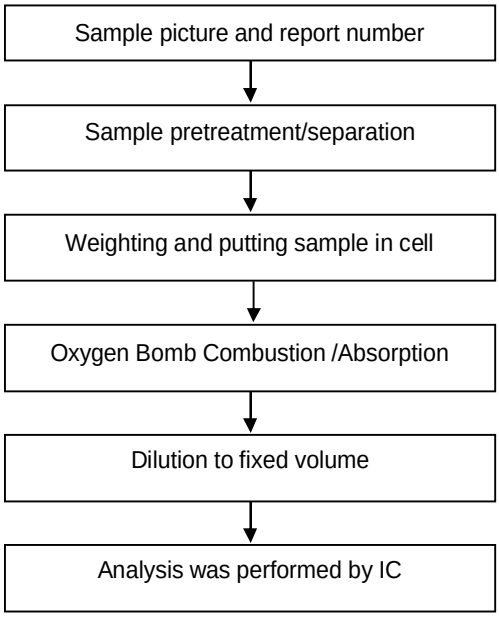
2) Name of the person in charge of measurement: Ray Chang



SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of halogen content

1) Name of the person who made measurement: Jean Hung
2) Name of the person in charge of measurement: Ray Chang

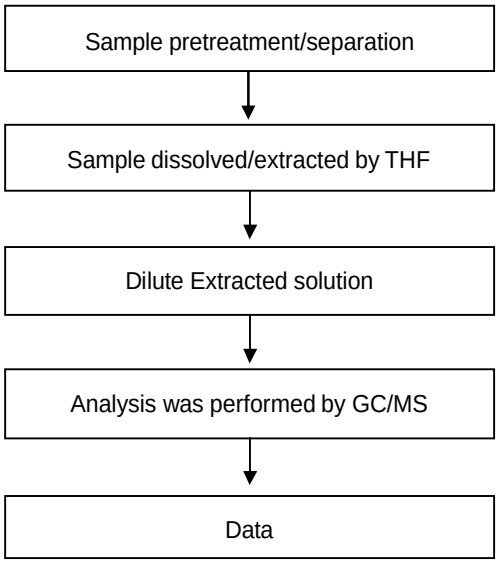


SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of phthalate content

- Name of the person who made measurement: Dorothy Chen
- Name of the person in charge of measurement: Ray Chang

【Test method: IEC 62321-8】



Test Report

No. : KA/2018/C1986 Date : 2018/12/27

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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

KA/2018/C1986

** End of Report **

Test Report

KYOCERA Asia Pacific Pte Ltd (Tuas Factory)
43 Tuas Ave 9 Singapore 639195

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

Sample Name	:	Epoxy Molding Compound, KE-G3000, G6000 series
Sample Receiving Date	:	03-Apr-19
Testing Period	:	03-Apr-19 to 15-Apr-19
Test Requested	:	In accordance with the RoHS Directive 2011/65/EU Annex II.

Test Result(s)	:	Please refer to next page(s).
Conclusion	:	Based on the performed tests on submitted sample(s), the results **comply with** the RoHS Directive 2011/65/EU Annex II ; recasting 2002/95/EC.

Signed for and on behalf of
SGS Testing & Control Services Singapore Pte Ltd

Y.C. Tham
Laboratory Manager

SGS TESTING & CONTROL SERVICES SINGAPORE PTE LTD ★ LABORATORY

Test Location: 3 Toh Tuck Link, #01-02, Singapore 596228

Test Result(s):

Sample Description : Black solid

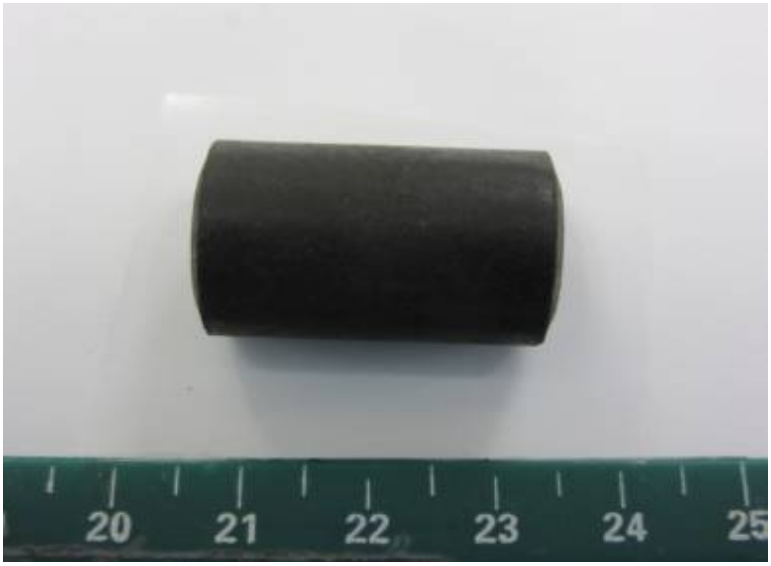
Test Item(s):	Unit	Method	Results	MDL	RoHS Limit
Cadmium(Cd)	mg/kg	With reference to IEC62321-5 :2013. Analysis was performed by ICP/AES	n.d.	2	100
Lead (Pb)	mg/kg	With reference to IEC62321-5 :2013. Analysis was performed by ICP/AES	n.d.	2	1000
Mercury (Hg)	mg/kg	With reference to IEC62321-4 :2013 +A1:2017. Analysis was performed by ICP/AES	n.d.	2	1000
Hexavalent Chromium (Cr(VI))	mg/kg	With reference to IEC62321-7-2 :2017. Analysis was performed by UV/Vis Spectrometry	n.d.	8	1000
Sum of PBBs	mg/kg	With reference to IEC62321-6 :2015. Analysis was performed by GC/MS	**n.d.**	-	1000
Monobromobiphenyl	mg/kg		n.d.	5	-
Dibromobiphenyl	mg/kg		n.d.	5	-
Tribromobiphenyl	mg/kg		n.d.	5	-
Tetrabromobiphenyl	mg/kg		n.d.	5	-
Pentabromobiphenyl	mg/kg		n.d.	5	-
Hexabromobiphenyl	mg/kg		n.d.	5	-
Heptabromobiphenyl	mg/kg		n.d.	5	-
Octabromobiphenyl	mg/kg		n.d.	5	-
Nonabromobiphenyl	mg/kg		n.d.	5	-
Decabromobiphenyl	mg/kg		n.d.	5	-
Sum of PBDEs	mg/kg		**n.d.**	-	1000
Monobromodiphenyl ether	mg/kg		n.d.	5	-
Dibromodiphenyl ether	mg/kg		n.d.	5	-
Tribromodiphenyl ether	mg/kg		n.d.	5	-
Tetrabromodiphenyl ether	mg/kg		n.d.	5	-
Pentabromodiphenyl ether	mg/kg		n.d.	5	-
Hexabromodiphenyl ether	mg/kg		n.d.	5	-
Heptabromodiphenyl ether	mg/kg		n.d.	5	-
Octabromodiphenyl ether	mg/kg		n.d.	5	-
Nonabromodiphenyl ether	mg/kg		n.d.	5	-
Decabromodiphenyl ether	mg/kg		n.d.	5	-

Note: (1) mg/kg = ppm ; 0.1wt% = 1000ppm
(2) n.d.= Not Detected
(3) MDL = Method Detection Limit
(4) "-" = Not regulated
(5) * : Exceeds limit

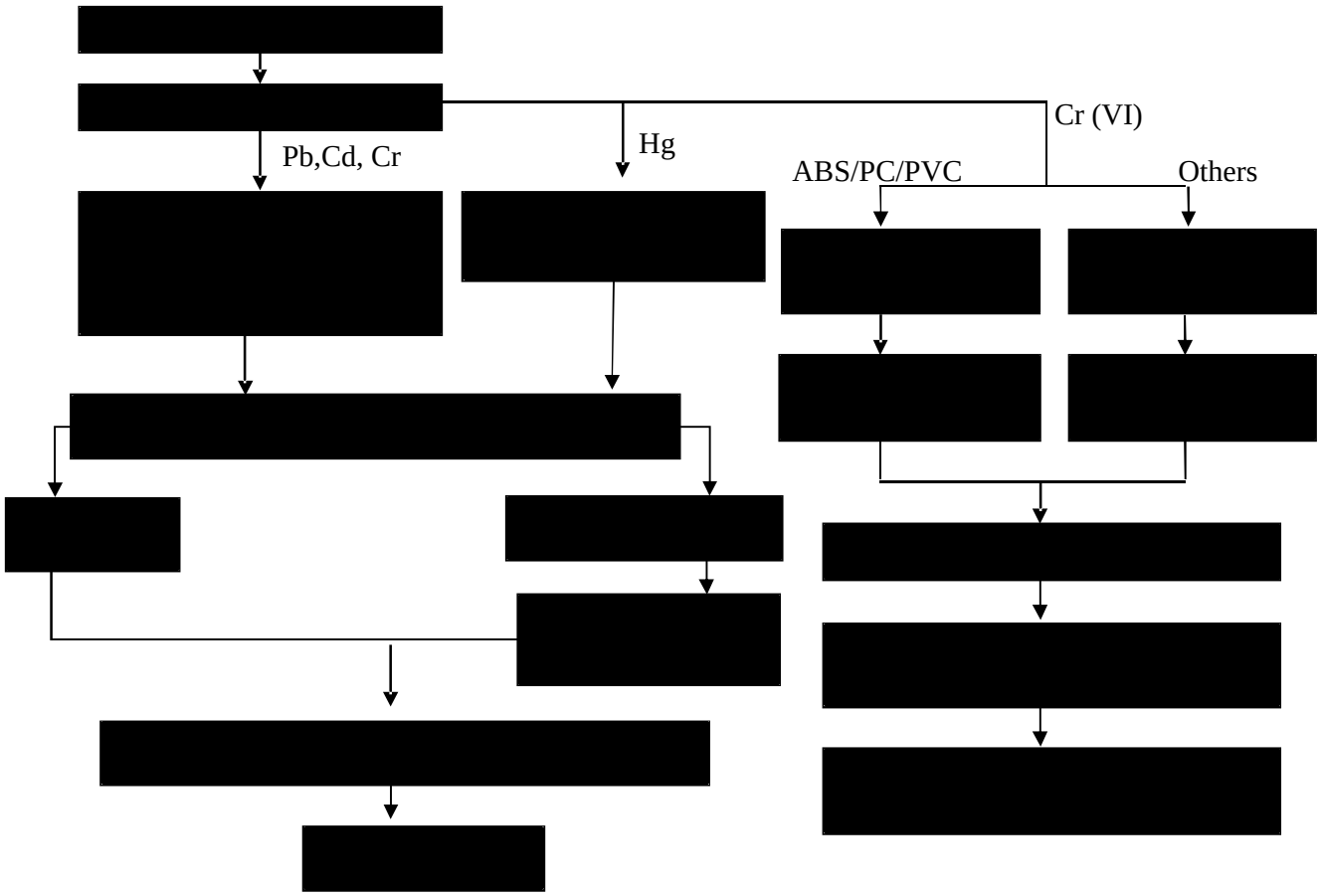
Remarks: Sample received was totally dissolved by preconditioning method.
Lab Analyst(s): AQ, Pheng and ZH

Sample photo:
Sample Description : Black solid

SGS authenticate the photo on original report only



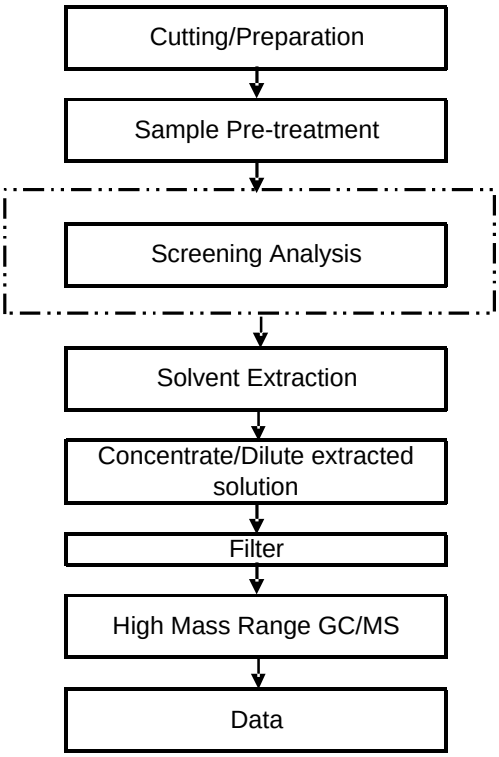
Process Flow of IEC 62321 (Pb, Cd, Hg, Cr & Cr(VI))



Remarks: Sample received was totally dissolved by preconditioning method. (CrVI method excluded)

Process Flow of PBBs and PBDEs by GC/MS (IEC 62321)

First Testing Process → Optional screen process …… Confirmation process ...→



End of Report

Test Report No. F690101/LF-CTSAYGU20-05851

Issued Date : 2020. 06. 09

HAESUNGDS CO., LTD.
(Seongju-dong) 726 Ungnam-ro,Seongsan-gu
Changwon-si,Gyeongnam
Korea

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

SGS File No.	:	AYGU20-05851
Product Name	:	Rt-QFN u-PPF
Item No./Part No.	:	N/A
Received Date	:	2020. 06. 04
Test Period	:	2020. 06. 04 to 2020. 06. 09
Test Comments	:	By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.
/ LTS Busan Laboratory

Dongju Lee / Technical Manager

SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

Sample No. : AYGU20-05851.001
Sample Description : Rt-QFN u-PPF
Item No./Part No. : N/A
Materials : Cu Alloy

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013(Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013(Determination of Lead by ICP-OES)	5	22.1
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013(Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321-7-2:2017, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis and/or with reference to IEC 62321-5:2013, determination of Chromium by ICP-OES	8	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

Sample No. : AYGU20-05851.001
Sample Description : Rt-QFN u-PPF
Item No./Part No. : N/A
Materials : Cu Alloy

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

Phthalates

Test Items	Unit	Test Method	MDL	Results
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8:2017, GC/MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8:2017, GC/MS	50	N.D.
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8:2017, GC/MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8:2017, GC/MS	50	N.D.

Halogen Contents

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	EN 14582:2016 , IC	30	N.D.
Chlorine(Cl)	mg/kg	EN 14582:2016 , IC	30	N.D.
Fluorine(F)	mg/kg	EN 14582:2016 , IC	30	N.D.
Iodine(I)	mg/kg	EN 14582:2016 , IC	50	N.D.

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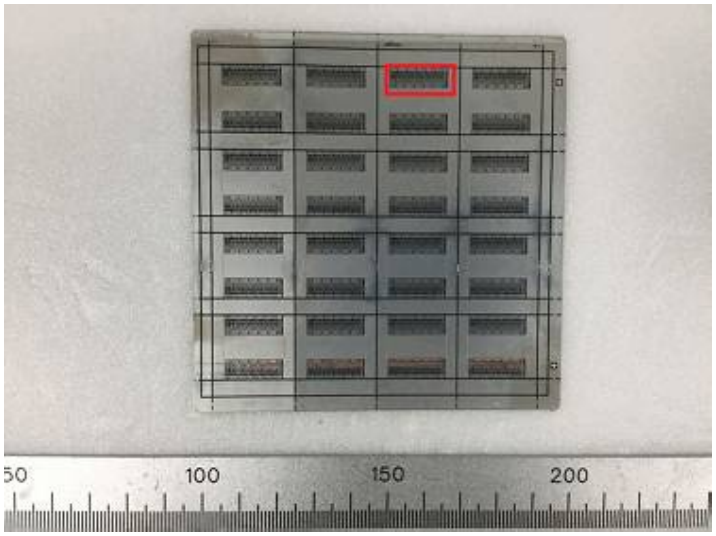
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
b. If the Chromium (Cr) content is greater than the MDL of Hexavalent Chromium (Cr(VI)), confirmation test of Hexavalent Chromium (Cr(VI)) is required.
(8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report is not related to Korea Laboratory Accreditation Scheme.

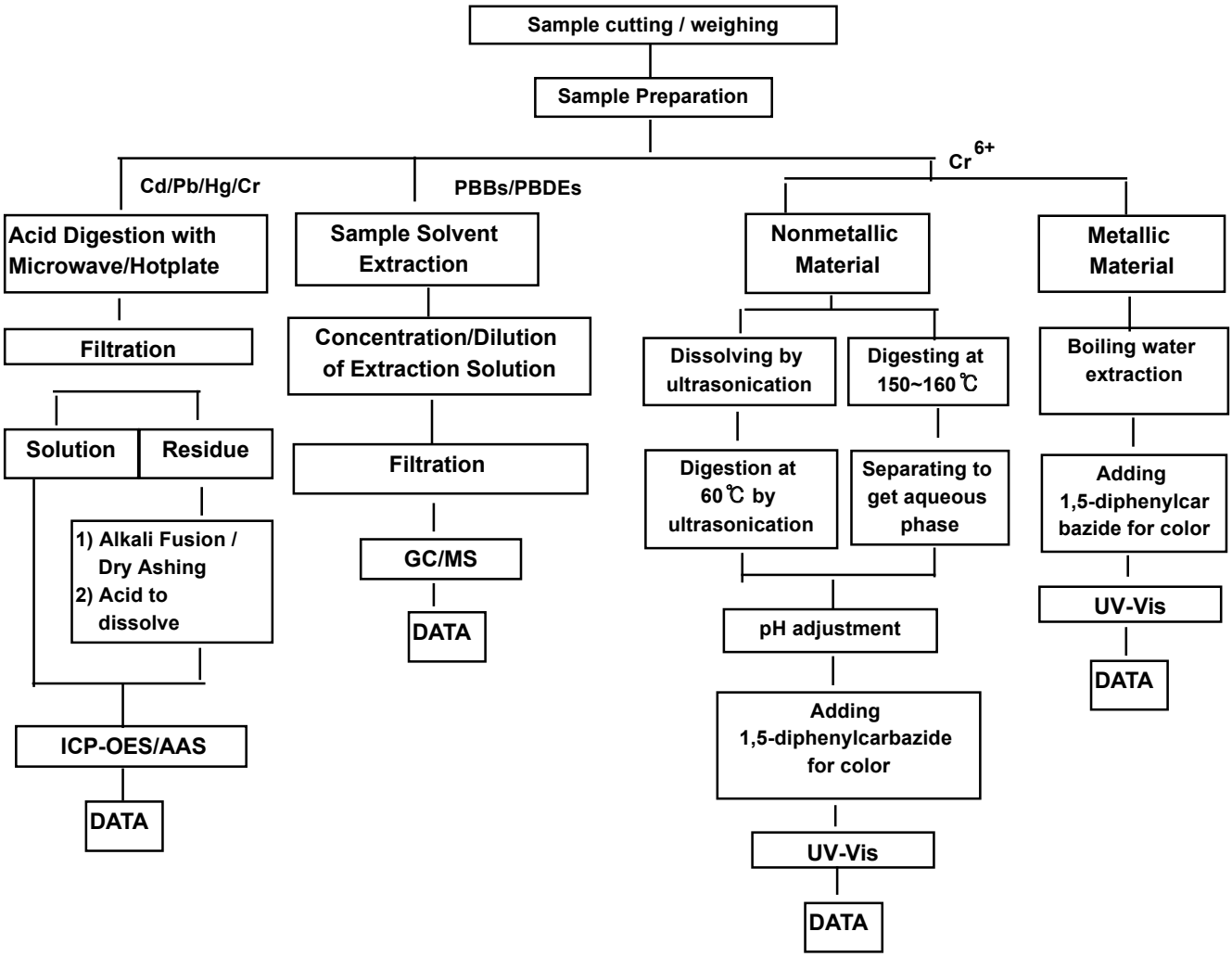
Picture of Sample as Received:



AYGU20-05851.001

SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

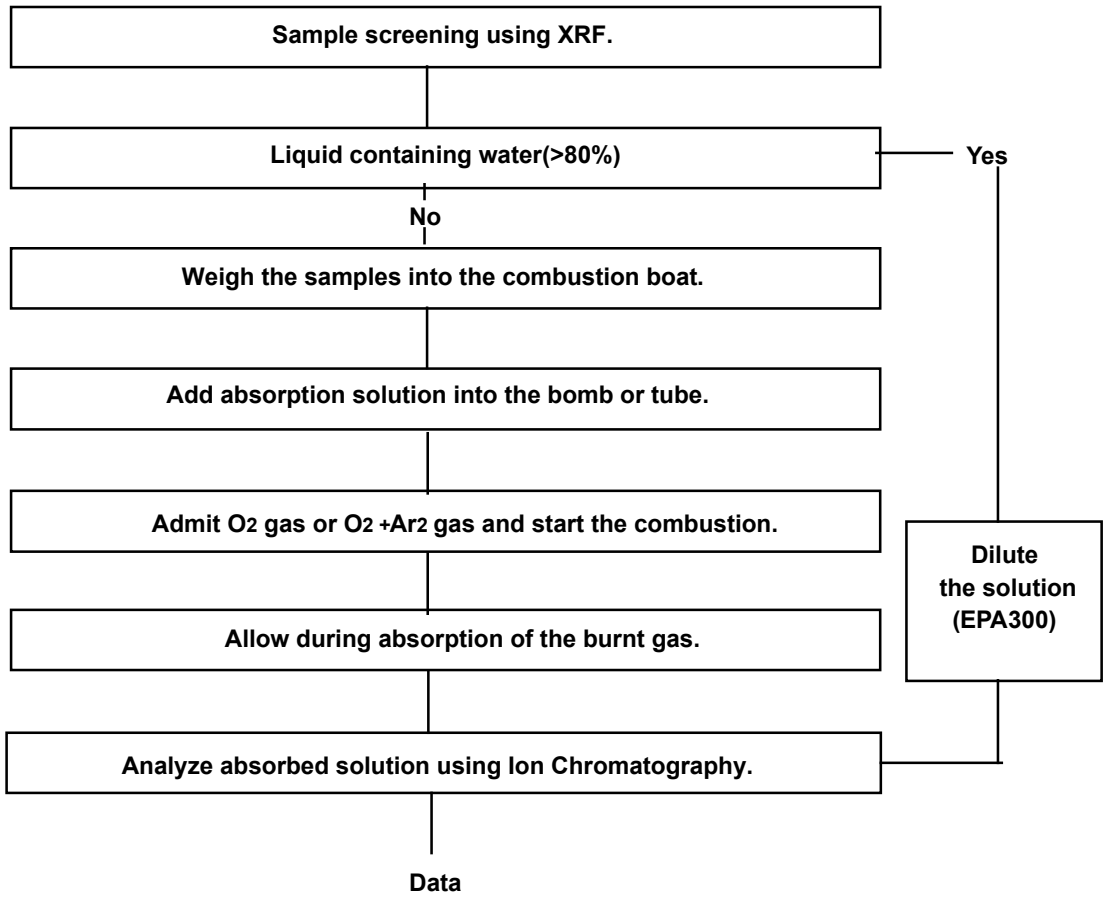
Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
Section Chief : Gihwan Kim

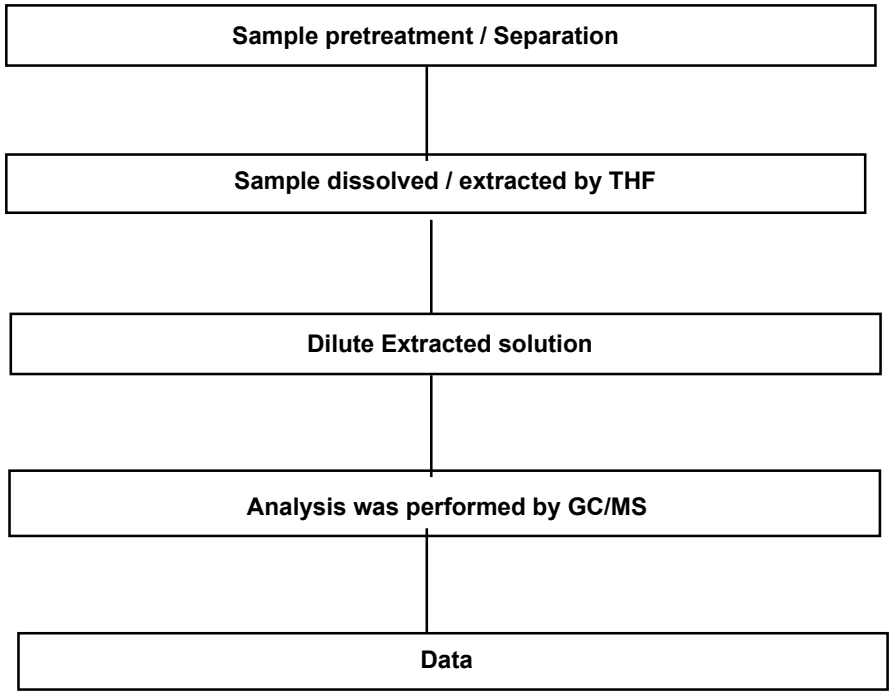
SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

Flow Chart for Halogen Test



SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

Flow Chart for Phthalate Test



*** End of Report ***

SGS Korea Co.,Ltd.
50, Sinsan-ro 29beon-gil, Saha-gu, Busan, Korea 49432
t +82 (0)51 795 7300 f +82 (0)51 795 7310 http://www.sgsgroup.kr

Cypress Semiconductor
Reliability Qualification Report

QTP# 201216
Version **

Issue Date: 4/21/2021

CY8C4127LQI

Qualification of: 201216: Premolded QFN56 7x7mm Wettable Flank Qualification at CML-Philippines (RA)

Notice: The information in this report is prepared to assist in the qualification of our products. It is declassified for the internal use of our customers only, and may be modified to meet the needs of specific customers

The package details (material set, assembly location, etc.) are specific to the qual vehicles used for qualification. Alternate material sets and assembly locations may be qualified for the affected products. Production material may be assembled with any qualified material set and at any qualified assembly location.

FOR ANY QUESTION ON THIS REPORT, Please Contact
reliability@cypress.com

Prepared By:
Honesto Sintos
Reliability Engineer

Reviewed By:
Lorena Zapanta
Reliability Manager

Approved By:
Kurt Buchbauer

Reliability Director

1.0 Product and Package Information

1.0.1 Product Description

Product Part Number	CY8C4127LQI-BL473	Cypress Division	MCD
Device Description	PSoC 4xx7 BLE		

1.0.2 Package Information

Package Designation	LQ56A	Qual Record	QTP 201216
Package Outline	56-pin QFN 7x7x0.6mm		
Assembly	RA	Mold Compound	KEG-3000NA-S
Electrical Test	RA	Die Attach	CRM1577E
Substrate/Leadframe	Copper	Flammability	V-0
O2 Index	>28%	Lead Finish	NiPdAu (Premolded WF)
Number of Die	1		

1.0.3 Die information

Die 1	CY8C4127LQI-BL473	Process	S8PIR-10R
Type	SRT2NND	FAB	FAB25

2.0 Summary of stress test result

2.1 Reliability data collected from Qualification

Stress	Condition	Fab lot	Lot	Package	Assembly Site	TV	Read Point	SS	Reject	Comment
ABSORPTION/DESORPTION CURVES	As specified	4801023K	611843886	LQ24B	RA	4	COMP	50	0	
BALL BOND SHEAR	As specified	4950784K	612014794	LQ56A	RA	2	COMP	30	0	
		4950784K	612014793	LQ56A	RA	1	COMP	30	0	
		4950784K	612014795	LQ56A	RA	3	COMP	30	0	
BIASED HAST	130°C / 85%RH	4950784K	612014793	LQ56A	RA	1	96 128	30 30	0	
		4950784K	612014794	LQ56A	RA	2	96 128	30 30	0	
		4950784K	612014795	LQ56A	RA	3	96 128	30 30	0	
BOND PULL STRENGTH	As specified	4950784K	612014793	LQ56A	RA	1	COMP	30	0	
		4950784K	612014794	LQ56A	RA	2	COMP	30	0	
		4950784K	612014795	LQ56A	RA	3	COMP	30	0	
CONSTRUCTION ANALYSIS	As specified	4950784K	612014794	LQ56A	RA	2	COMP	5	0	
		4950784K	612014793	LQ56A	RA	1	COMP	5	0	
		4950784K	612014795	LQ56A	RA	3	COMP	0	0	
DIE SHEAR	As specified	4950784K	612014793	LQ56A	RA	1	COMP	30	0	
		4950784K	612014794	LQ56A	RA	2	COMP	30	0	
		4950784K	612014795	LQ56A	RA	3	COMP	30	0	
DYE PENETRANT	As specified	4950784K	612014793	LQ56A	RA	1	COMP	15	0	
		4950784K	612014794	LQ56A	RA	2	COMP	15	0	
		4950784K	612014795	LQ56A	RA	3	COMP	15	0	
EARLY LIFE FAILURE RATE	150°C	4801023K	611843886	LQ24B	RA	4	48	1526	0	
ESD (CDM) SENSITIVITY	As specified	4801023K	611843886	LQ24B	RA	4	COMP	15	0	
FINAL VISUAL INSPECTION	As specified	4950784K	612014793	LQ56A	RA	1	COMP	524	0	
		4950784K	612014794	LQ56A	RA	2	COMP	524	0	
		4950784K	612014795	LQ56A	RA	3	COMP	534	0	
GLUE ADHESION	As specified	3822002K	611843678	LQ24A	RA	5	COMP	15	0	
		4744508K	611843959	LQ32A	RA	6	COMP	15	0	
		3822020K	611844065	LQ32B	RA	7	COMP	15	0	
HIGH TEMP STORAGE LIFE	150°C	3822020K	611844070	LQ40A	RA	8	500 1000	45 45	0	
HTSL PRE CONDITIONING	260°C -0 / +5°C C -65°C to 150°C	3822020K	611844070	LQ40A	RA	8	COMP	45	0	
INHERENT LIFE FAILURE RATE	150°C	4801023KMIBA	611843886	LQ24B	RA	4	80 500	80 80	0	
INTERNAL VISUAL	As specified	4950784K	612014793	LQ56A	RA	1	COMP	5	0	
		4950784K	612014794	LQ56A	RA	2	COMP	5	0	
		4950784K	612014795	LQ56A	RA	3	COMP	5	0	
PHYSICAL DIMENSIONS	As specified	4950784K	612014793	LQ56A	RA	1	COMP	30	0	
		4950784K	612014794	LQ56A	RA	2	COMP	30	0	
		4950784K	612014795	LQ56A	RA	3	COMP	30	0	
PRE CONDITIONING	260°C -0 / +5°C 	4950784K	612014794	LQ56A	RA	2	COMP	190	0	
		4950784K	612014793	LQ56A	RA	1	COMP	190	0	
		4950784K	612014795	LQ56A	RA	3	COMP	190	0	

	MSL3_30°C / 60%RH for 192 hrs	3822020K	611844070	LQ40A	RA	8	COMP	77	0	
		3822020K	611844065	LQ32B	RA	7	COMP	77	0	
PRESSURE COOKER TEST	121°C / 100%RH / 15psig	4950784K	612014793	LQ56A	RA	1	168 288	80 80	0	
		4950784K	612014794	LQ56A	RA	2	168 288	80 80	0	
		4950784K	612014795	LQ56A	RA	3	168 288	80 80	0	
TEMP CYCLE	C -65°C to 150°C	4950784K	612014793	LQ56A	RA	1	500 1000	80 80	0	
		4950784K	612014794	LQ56A	RA	2	500 1000	80 80	0	
		4950784K	612014795	LQ56A	RA	3	500 1000	80 80	0	
UNBIASED HAST TEST	130°C / 85%RH	3822020K	611844065	LQ32B	RA	7	96 192	77 77	0	
		3822020K	611844070	LQ40A	RA	8	96 192	77 77	0	
WETTING BALANCE	As specified	4801023K	611843886	LQ24B	RA	4	COMP	3	0	
		3822002K	611843678	LQ24A	RA	5	COMP	3	0	
		4744508K	611843959	LQ32A	RA	6	COMP	3	0	
X-RAY FA	As specified	4950784K	612014794	LQ56A	RA	2	COMP	15	0	
		4950784K	612014793	LQ56A	RA	1	COMP	15	0	
		4950784K	612014795	LQ56A	RA	3	COMP	15	0	

Reliability Tests Performed per Specification Requirement

Stress	Condition	Specification Reference
ABSORPTION/DESORPTION CURVES	As specified	J-STD-020
BALL BOND SHEAR	As specified	JESD22-B116
		MIL-STD-883, MET 2011.9
BIASED HAST	130°C / 85%RH	JESD22-A110
CONSTRUCTION ANALYSIS	As specified	Per internal spec
DIE SHEAR	As specified	MIL-STD-883, MET 5005./2019/TM 2027
DYE PENETRANT	As specified	Per internal spec
EARLY LIFE FAILURE RATE	150°C	JESD22-A108
ESD (CDM) SENSITIVITY	As specified	JS-002
FINAL VISUAL INSPECTION	As specified	Meet Criteria
GLUE ADHESION	As specified	JESD22-A111
HIGH TEMP STORAGE LIFE	150°C	JESD22-A103
INHERENT LIFE FAILURE RATE	150°C	JESD22-A108
INTERNAL VISUAL	As specified	Per internal spec
PHYSICAL DIMENSIONS	As specified	JESD22-B100 , JESD22B108
PHYSICAL DIMENSIONS	As specified	MIL-STD-883 MET 2016
		JESD22-B100, JESD22B-108
PRE CONDITIONING	MSL3_30°C / 60%RH for 192 hrs	JTD-020, JESD22-A113
PRESSURE COOKER TEST	121°C / 100%RH / 15psig	JESD22-A102
TEMP CYCLE	C -65°C to 150°C	MIL-STD-883 MET 1010 , MILPRF-38535 JESD22-A104,JESD47
UNBIASED HAST TEST	130°C / 85%RH	JESD22-A118
WETTING BALANCE	As specified	Per internal spec

Revision History

Document Title:	NEW QUALIFICATION REPORT FOR - DEVICE (CY8C4127LQI-BL473) , TECHNOLOGY (S8P) , ASSEMBLY SITE (RA) , QTP #(201216)
Document Number:	002-33120

Rev.	Issue Date	ECN No.	Originator	Description
**	04/21/2021	7127343	SINTOS	New Qualification Report for - Device (CY8C4127LQI-BL473) , Technology (S8P) , Assembly Site (RA) , QTP #(201216)

Item	Marketing Part Number	Family	Sample Ordering Part Number
1	CY8C4127LQI-BL453	BTBLE	CY8C4127LQI-BL453X
2	CY8C4127LQI-BL453T	BTBLE	CY8C4127LQI-BL453TX
3	CY8C4127LQI-BL473	BTBLE	CY8C4127LQI-BL473X
4	CY8C4127LQI-BL473T	BTBLE	CY8C4127LQI-BL473X
5	CY8C4127LQI-BL483	BTBLE	CY8C4127LQI-BL483X
6	CY8C4127LQI-BL483T	BTBLE	CY8C4127LQI-BL483TX
7	CY8C4127LQI-BL493	BTBLE	CY8C4127LQI-BL493X
8	CY8C4127LQI-BL493T	BTBLE	CY8C4127LQI-BL493TX
9	CY8C4128LQI-BL543	BTBLE	CY8C4128LQI-BL543X
10	CY8C4128LQI-BL543T	BTBLE	CY8C4128LQI-BL543TX
11	CY8C4128LQI-BL553	BTBLE	CY8C4128LQI-BL553X
12	CY8C4128LQI-BL553T	BTBLE	CY8C4128LQI-BL553TX
13	CY8C4128LQI-BL563	BTBLE	CY8C4128LQI-BL563X
14	CY8C4128LQI-BL563T	BTBLE	CY8C4128LQI-BL563X
15	CY8C4128LQI-BL573	BTBLE	CY8C4128LQI-BL573X
16	CY8C4128LQI-BL573T	BTBLE	CY8C4128LQI-BL573X
17	CY8C4128LQI-BL583	BTBLE	CY8C4128LQI-BL583X
18	CY8C4128LQI-BL583T	BTBLE	CY8C4128LQI-BL583TX
19	CY8C4128LQI-BL593	BTBLE	CY8C4128LQI-BL593X
20	CY8C4128LQI-BL593T	BTBLE	CY8C4128LQI-BL593TX
21	CY8C4247LQI-BL453	BTBLE	CY8C4247LQI-BL453X
22	CY8C4247LQI-BL453T	BTBLE	CY8C4247LQI-BL453X
23	CY8C4247LQI-BL463	BTBLE	CY8C4247LQI-BL463X
24	CY8C4247LQI-BL463T	BTBLE	CY8C4247LQI-BL463X
25	CY8C4247LQI-BL473	BTBLE	CY8C4247LQI-BL473X
26	CY8C4247LQI-BL473T	BTBLE	CY8C4247LQI-BL473X
27	CY8C4247LQI-BL483	BTBLE	CY8C4247LQI-BL483X
28	CY8C4247LQI-BL483T	BTBLE	CY8C4247LQI-BL483X
29	CY8C4247LQI-BL493	BTBLE	CY8C4247LQI-BL493X
30	CY8C4247LQI-BL493T	BTBLE	CY8C4247LQI-BL493TX
31	CY8C4247LQQ-BL483	BTBLE	CY8C4247LQQ-BL483X
32	CY8C4247LQQ-BL483T	BTBLE	CY8C4247LQQ-BL483X
33	CY8C4248LQI-BL543	BTBLE	CY8C4248LQI-BL543X
34	CY8C4248LQI-BL543T	BTBLE	CY8C4248LQI-BL543TX
35	CY8C4248LQI-BL553	BTBLE	CY8C4248LQI-BL553X
36	CY8C4248LQI-BL553T	BTBLE	CY8C4248LQI-BL553X
37	CY8C4248LQI-BL563	BTBLE	CY8C4248LQI-BL563X
38	CY8C4248LQI-BL563T	BTBLE	CY8C4248LQI-BL563TX
39	CY8C4248LQI-BL573	BTBLE	CY8C4248LQI-BL573X
40	CY8C4248LQI-BL573T	BTBLE	CY8C4248LQI-BL573X
41	CY8C4248LQI-BL583	BTBLE	CY8C4248LQI-BL583X
42	CY8C4248LQI-BL583T	BTBLE	CY8C4248LQI-BL583TX
43	CY8C4248LQI-BL593	BTBLE	CY8C4248LQI-BL593X
44	CY8C4248LQI-BL593T	BTBLE	CY8C4248LQI-BL593TX
45	CY8C4248LQQ-BL583	BTBLE	CY8C4248LQQ-BL583X
46	CY8C4248LQQ-BL583T	BTBLE	CY8C4248LQQ-BL583TX

47	CY8C4249LQI-BL583	BTBLE	CY8C4249LQI-BL583X
48	CG8671AA	BTBLE	CG8671XA
49	CG8671AAT	BTBLE	CG8671XAT
50	CG8672AA	BTBLE	CG8672XA
51	CG8672AAT	BTBLE	CG8672AAT
52	CG9166AM	BTBLE	CG9166XMT
53	CG9166AMT	BTBLE	CG9166XMT
54	CP8928AT	BTBLE	CP8928XT
55	CP8928ATT	BTBLE	CP8928XTT
56	CS8537AA	BTBLE	CS8537XA
57	CS8537AAT	BTBLE	CS8537XAT
58	CS8808AM	BTBLE	CS8808XM
59	CS8808AMT	BTBLE	CS8808XMT