



Technical Documentation

: CE RoHS II Compliance for Module Product

Supplier Quality Assurance Team

Date: Jan. 3rd , 2013

Prepared By : S. K. Koh

Senior Engineer of SQA

Quality Reliability Assurance

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: Material and Supplier Name, RoHS Compliance & Exemption

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: Substance Composition Table, Analysis Report

4. Harmonized Standards for the Technical Document

■ Purpose of Generation

- SK Hynix generated the Technical Document for the RoHS compliance of the SK Hynix module and CE marking.
- SK Hynix understand Recast RoHS (RoHS II) to prepare Technical Document to implement CE Marking.
- The technical document was prepared based on the requirement of RoHS Directive 2011/65/EU and Decision 768/2008/EC. And it technical document fulfill basic requirement of Decision 768/2008/EC.
- SK Hynix certify that module product the regulation of RoHS Directive based the technical document.

Guarantee letter

Guarantee for the RoHS2 Directive

SK hynix acknowledges that the RoHS2 Directive:2011/65/EU entitled “Restriction of the use of certain Hazardous Substances (RoHS)” effective on 1ST July 2011 newly. SK hynix already closed to confirm each item as below whether to be applicable and to need compliance. In conclusion, SK hynix guarantees that SK hynix is able to comply on the specific changes and contents of the new Directive as below.

■ Major change item

1. Extend the application category from 8 to 11 category.
: Inserted Medical Machine, Monitoring & Control Machine and so on
2. CE Marking Execution from 2013 if applied and needed
: In case of application, execute CE Mark and prepare technical document
3. Delete Exemption Item from 2011 step by step
: Delete exemption 1, 1(a) in 2011, 7(c-3) in 2013 and so on

- Date : 2012.01.08
- Name : Sanghoo Hong
- Title : Senior Director
- Signature : 

• Company Seal :



1. General Description of Product

1-1. Product Feature

Item	Feature
General Product Name	Memory Module
Base Memory	DDR3 DRAM
Operation Voltage	1.25~1.5V
Memory Density	1 ~ 32G
Product Type	SODIMM / UBDIMM / REGDIMM
Major Application	Server / Desktop Computer/ Laptop Computer
Environment	RoHS Compliance and Halogen Free

1-2. RoHS Compliance

- Module product comply with RoHS only with exemption no. 7C1 which exemption is lead in electronic component. The exempted part is only resistor in which glass contain lead and it function resistivity in the part.

1-3. Product Type and its Figure

*DIMM (Dual inline Memory Module)

Type	Structure & Figure	Remark
SO DIMM		<p>*Small Outline DIMM</p> <ul style="list-style-type: none"> •Applied at Laptop Computer • General size (DDR3) : 30mm(H) × 67.6mm (L)
UB DIMM		<p>*Un-Buffered DIMM</p> <ul style="list-style-type: none"> •Applied at Desktop Computer •General size (DDR3) : 30mm(H) × 133.35mm (L)
REG DIMM		<p>*Registered DIMM</p> <ul style="list-style-type: none"> •Applied at Server •General size (DDR3) : 30mm(H) × 133.35mm (L) •Divided heat-sink and non H/S type

Bill of Homogeneous based Material and Part

2. Bill of Homogeneous based Material and Part

2-1. Bill of material by Product type

Material list	SODIMM	UBDIMM	REGDIMM	Remark
Memory IC	V	V	V	Common
EEPROM IC	V	V	V	
Resistor	V	V	V	
Capacitor	V	V	V	
Solder Paste	V	V	V	
PCB	V	V	V	
Register IC			V	Additional
Heat Sink			V	
Inductor			V	

2-2. Material and Its Supplier Information

Material list	RoHS Compliance	Exemption	Improvement	Tier1	Tier2
Memory IC	Yes	Not Applied	Not Applied	SK Hynix	-
EEPROM IC	Yes	Not Applied	Not Applied	Atmel	SCG
Resistor	Complied with Exemption	Applied, 7C-1	By end of 2013	Samsung Eng.	Samhwa
Capacitor	Yes	Not Applied	Not Applied	Samsung Eng.	Samhwa
Solder Paste	Yes	Not Applied	Not Applied	Eco Join	Alpha Metal
PCB	Yes	Not Applied	Not Applied	Daeduk	Simmtech
Register IC	Yes	Not Applied	Not Applied	Inphi	IDT
Heat Sink	Yes	Not Applied	Not Applied	Poong Soung	Phoenix
Inductor	Yes	Not Applied	Not Applied	Samsung Eng.	Samhwa

3. RoHS Certifying Document for the Material and Part

3-1. Substance Composition information of Material

→ Memory IC

Component	Homogeneous Material	Substance	CAS No.
MEMORY IC	Si Chip	Silicon	7440-21-3
		Aluminum	7429-90-5
		Titanium	7440-32-6
		Tungsten	7440-33-7
	Epoxy	Polymer	29690-82-2
	Gold Wire	Gold	7440-57-5
	Mold Compound	Silica fused	60676-86-0
		Polymer	29690-82-2
	Solder Ball	Tin	7440-31-5
		Silver	7440-22-4
		Copper	7440-50-8
	Substrate	Nickel	7440-02-0
		Copper	7440-50-8
		Gold	7440-57-5
Polymer		29690-82-2	

➔ Active Element

Component	Homogeneous Material	Substance	CAS No.
EEPROM IC	Si Chip	Silicon	7440-21-3
	Lead Frame	Copper	7440-50-8
	Mold Compound	Silica Vitreous	60676-86-0
		Polymer	29690-82-2
	Terminal Plating	Nickel	7440-02-0
	Die Attach	Silver	7440-22-4
	Bond Wire	Gold	7440-57-5

Component	Homogeneous Material	Substance	CAS No.
REGISTOR IC	Si Chip	Silicon	7440-21-3
	Die Attach	Silver	7440-22-4
	Substrate	Glass Fiber	65997-17-3
		Copper	7440-50-8
		Gold	7440-57-5
		Nickel	7440-02-0
		Bond Wire	Gold
	Mold Compound	Fused Silica	60676-86-0
		Polymer	29690-82-2
	Solder Ball	Tin	7440-31-5
		Copper	7440-50-8
		Silver	7440-22-4

→ Passive Element

Component	Homogeneous Material	Substance	CAS No.
RESISTOR	Topside Conductor	Silver	7440-22-4
	Backside Conductor	Silver	7440-22-4
	Terminal Conductor	Nickel	7440-02-0
	1st Plating	Nickel	7440-02-0
	Resistive Layer	Silver	7440-22-4
	1st Coating	Glass	65997-18-4
	2nd Coating	Polymer	29690-82-2
	Marking	Polymer	29690-82-2
	Substrate	Calcium oxide	1305-78-8
		Magnesium oxide	1309-48-4
Aluminum oxide		1344-28-1	
2nd Plating	Tin	7440-31-5	

Component	Homogeneous Material	Substance	CAS No.
CAPACITOR	Dielectric Ceramic Body	Barium Titanate	12047-27-7
	Inner Electrode	Nickel	7440-02-0
	Terminal Electrode	Copper	7440-50-8
	1st Plating	Nickel	7440-02-0
	2st Plating	Tin	7440-31-5

Component	Homogeneous Material	Substance	CAS No.
INDUCTOR	Ferrite	Iron oxide	1309-37-1
	Internal Electrode	Silver	7440-22-4
	External Electrode	Silver	7440-22-4
	1st_Plating	Nickel	7440-03-0
	2nd_Plating	Tin	7440-31-5

➔ Additional Part

Component	Homogeneous Material	Substance	CAS No.
PCB	Au Plating	Gold	7440-57-5
	Cu Plating	Copper	7440-50-8
	Ni Plating	Nickel	7440-02-0
	Glass Fabric	Dipotassium oxide	37382-43-7
		Calcium oxide	1305-78-8
		Magnesium oxide	1309-48-4
		Sodium oxide	1313-59-3
		Aluminum oxide	1344-28-1
		Silica Vitreous	60676-86-0
		Epoxy Resin	Epichlorohydrin
	2-Propanol,1-methoxy-,2-acetate		108-65-6
	Aluminum Hydroxide		21645-51-2
	9,10-Dihydro-9oxa-10-Phosphaph enanthrene 1-oxide		35948-25-5
	Dicyandiamide		461-58-5
	Formaldehyde, Polymer with Meth ylphenol		9016-83-5
	4,4-(1-Methylethylidene)bisphenol		36484-54-5
	Copper Foil	Copper	7440-50-8
Solder Mask	2-Propanol,1-methoxy-,2-acetate	108-65-6	
	2-Methoxypropyl Acetate	71868-10-5	
OSP Coating	Alkylbenzimidazole	131044-79-6	

Component	Homogeneous Material	Substance	CAS No.
HEAT SINK	PLATE	Aluminum	7429-90-5
		Silcon	7440-21-3
		Iron	7439-89-6
		Copper	7440-50-8
		Titanium	7440-32-6
	TIM	Aluminum Powder	7429-90-5
	CLIP	Iron	7439-89-6
		Chrome	7440-47-3
		Nickel	7440-02-0
		Silicon	7440-21-3
		Copper	7440-50-8
		Manganese	7439-96-5
		Titanium	7440-32-6

Component	Homogeneous Material	Substance	CAS No.
SOLDER PASTE	Tin	Tin	7440-31-5
	Silver	Silver	7440-22-4
	Copper	Copper	7440-50-8
	Rosin	Rosin	8050-09-7
	Carbitol	Carbitol	112-34-5

3-2. Analysis Report Compliance and System

→ Theoretical concentration level (Homogeneous material base)

() : RoHS limit

Material list	RoHS Compliance	Pb (<1000ppm)	Cr+6 (<1000ppm)	Cd (<100ppm)	Hg (<1000ppm)	PBB	PBDE
Memory IC	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
EEPROM IC	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
Resistor	Yes (Complied with Exemption 7C-1)	(R1)Around 20000ppm	Not Use	Not Use	Not Use	Not Use	Not Use
Capacitor	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
Solder Paste	Yes	Around 200ppm	Not Use	Not Use	Not Use	Not Use	Not Use
PCB	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
Register IC	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
Heat Sink	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use
Inductor	Yes	Not Use	Not Use	Not Use	Not Use	Not Use	Not Use

Remarks) 1. Contained the 20000ppm level in resistive part Glass and it is applied in exemption 7C1.
 7C1 : Electrical and electronic components containing lead in a glass or ceramic ..

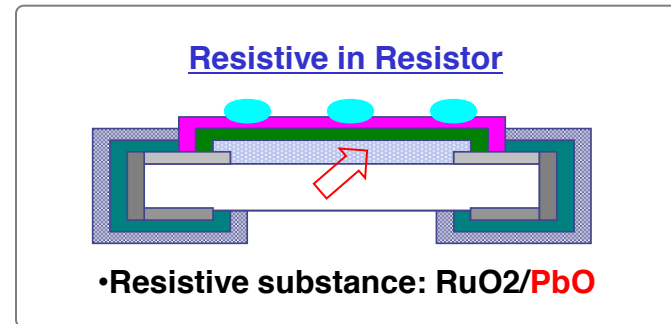
→ Resistor Pb status and improvement plan

✓ Resistor Pb Concentration

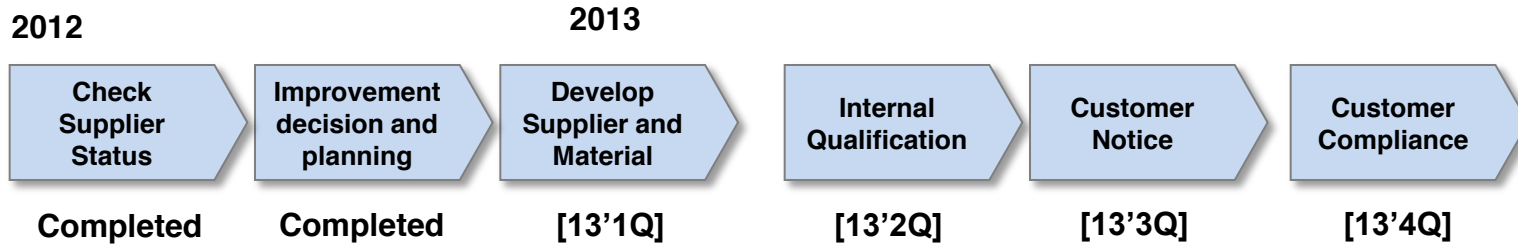
- Resistive material was over the RoHS Pb limit.

Supplier	Resistor itself	Resistive
Tier1	430ppm	200,000ppm
Tier2	400ppm	180,000ppm

•RoHS Pb Limit : < 1000ppm (In homogeneous material)



✓ Improvement Plan



→ Analysis Report Compliance

✓ Preparation & compliance

- Analysis report is prepared by 2 type, material base and sub-material base(homogeneous material base).
- Each analysis report of a product can be provided when request from customer or relevant organization.

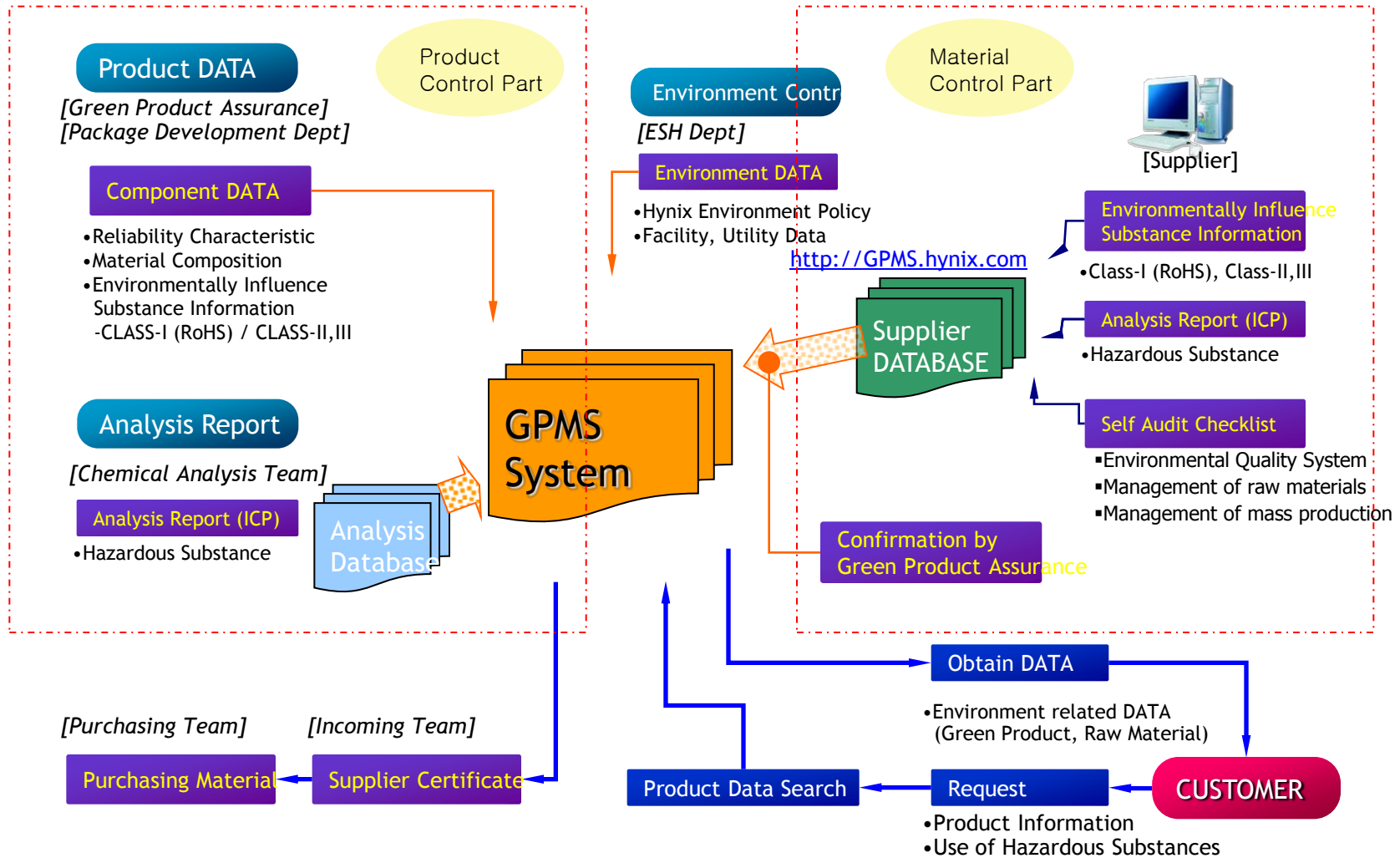
✓ Report follow IEC62321

- Following IEC62321, official analytical standard method, Analysis is implemented with exact method, machine and procedure.

✓ Document Control

- Basically Analysis reports are surveyed from supplier and controlled using electrical system GPMS.
- Analysis report re-registered and check annual base. GPMS means Green Product Management System.
- Refer to the GPMS system figure of structure in next page.

→ GPMS System



➔ Analysis Report Example

TEST REPORT

Applicant : Samsung Electro-Mechanics Co., Ltd.
Address : 314, Maetan-3dong, Yeongtong-gu,
 Suwon-si, Gyeonggi-do, 443-743 Korea

Page: 1 of 5
Date: Feb. 21, 2012



Report No. RT12R-50671-E
Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : CHIP RESISTOR
Sample ID No. : RT12R-50671
Item No. : RC type (RC1005FR100)
Manufacturer/Vender : Samsung Electro-Mechanics Co., Ltd.

Sample received : Jan. 13, 2012
Testing Date : Feb. 16, 2012 ~ Feb. 21, 2012
Testing Environment : Temperature : (24 ± 2) °C, Humidity : (60 ± 5) % R.H.

Test Type : RoHS wet chemical analysis
Test Method(s) : Please see the following page(s).
Test Result(s) : Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.
 * Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.
 * Note 3 : The item no. is assigned by client and indicated according to their requirement and guarantee letter.

Approved by,  **Authorized by,** 

Jede Jeng / Lab. Technical Manager Bo Park / Lab. General Manager

Intertek Testing Services Korea Ltd.
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 Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea

TEST REPORT

Page: 2 of 5
Date: Feb. 21, 2012

Report No. RT12R-50671-E
Sample ID No. : RT12R-50671
Sample Description : CHIP RESISTOR

Test Item	Unit	Test Method	MDL	Result
Cadmium (Cd)	ug/kg	With reference to IEC 62321 Edition 1.0 : 2008, by acid digestion and determined by ICP-OES	0.5	N.D.
Lead (Pb)	ug/kg		5	144
Mercury (Hg)	ug/kg		2	N.D.
Hexavalent Chromium (Cr ⁶⁺) (For non-metal)	ug/kg	With reference to IEC 62321 Edition 1.0 : 2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1	N.D.
Polybrominated Biphenyl (PBBs)				
Monobromobiphenyl	ug/kg	With reference to IEC 62321 Edition 1.0 : 2008, by solvent extraction and determined by GC/MS	5	N.D.
Dibromobiphenyl	ug/kg		5	N.D.
Tribromobiphenyl	ug/kg		5	N.D.
Tetrabromobiphenyl	ug/kg		5	N.D.
Pentabromobiphenyl	ug/kg		5	N.D.
Hexabromobiphenyl	ug/kg		5	N.D.
Heptabromobiphenyl	ug/kg		5	N.D.
Octabromobiphenyl	ug/kg		5	N.D.
Nonabromobiphenyl	ug/kg		5	N.D.
Decabromobiphenyl	ug/kg		5	N.D.
Polybrominated Diphenyl Ether (PBDEs)				
Monobromodiphenyl ether	ug/kg	With reference to IEC 62321 Edition 1.0 : 2008, by solvent extraction and determined by GC/MS	5	N.D.
Dibromodiphenyl ether	ug/kg		5	N.D.
Tribromodiphenyl ether	ug/kg		5	N.D.
Tetrabromodiphenyl ether	ug/kg		5	N.D.
Pentabromodiphenyl ether	ug/kg		5	N.D.
Hexabromodiphenyl ether	ug/kg		5	N.D.
Heptabromodiphenyl ether	ug/kg		5	N.D.
Octabromodiphenyl ether	ug/kg		5	N.D.
Nonabromodiphenyl ether	ug/kg		5	N.D.
Decabromodiphenyl ether	ug/kg		5	N.D.

Tested by : Nikkie Lee, Leo Kim, Ellen Jung, Jessica Kang

Notes : ug/kg = ppm = parts per million
 < = Less than
 N.D. = Not detected (< MDL)
 MDL = Method detection limit

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 Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea



TEST REPORT

Report No. RT12R-50671-E Page: 3 of 5
Date: Feb. 21, 2012
Sample ID No. : RT12R-50671
Sample Description : CHIP RESISTOR

Test Item	Unit	Test Method	MDL	Result
Bromine (Br)	µg/kg	With reference to EN 14582, by oxygen combustion with bomb and determined by IC	30	N.D.
Chlorine (Cl)	µg/kg	With reference to EN 14582, by oxygen combustion with bomb and determined by IC	30	N.D.

Tested by : Nikkie Lee

Notes : µg/kg = ppm = parts per million
< = Less than
N.D. = Not detected (<MDL)
MDL = Method detection limit

* View of sample as received:-



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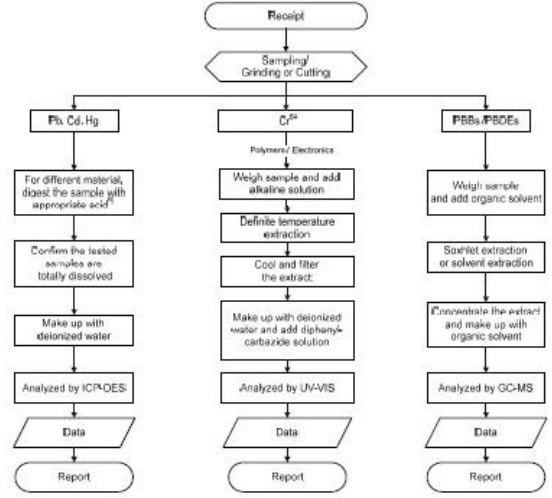
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Ulsan Lab. Address : #340-2, Yongam-Ri, Chonggyang-Myun, Ulsan-Gun, Ulsan 689-865 Korea



TEST REPORT

Report No. RT12R-50671-E Page: 4 of 5
Date: Feb. 21, 2012
Sample ID No. : RT12R-50671
Sample Description : CHIP RESISTOR

Flow Chart (IEC 62321 Edition 1.0:2008)



Remarks :

*1 : List of appropriate acid :

Material	Acid added for digestion
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₂ SO ₄
Metals	HNO ₃ , HCl, HF
Electronics	HNO ₃ , HCl, H ₂ O ₂ , HBF ₄

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Ulsan Lab. Address : #340-2, Yongam-Ri, Chonggyang-Myun, Ulsan-Gun, Ulsan 689-865 Korea

■ Referenced Document

- RoHS Directive : 2011/65/EU
- CE Marking Decision : 768/2008/EC

These related document were review and will be saved for 10 years.