



The report shall not be reproduced without written approval from Intertek  
The results relate only to the item tested.

## TEST REPORT

Number: BKKH16002170

Applicant: ROYAL ELECTRONIC FACTORY (THAILAND) CO., LTD.  
20/1-2 MOO.2, KLONG-NA, MUANG, CHACHOENGSAO  
24000 THAILAND  
ATTN: MS.KAMONTHICHA

Date: Feb 23, 2016

### Sample Submitted:

Quantity of sample:	One (1) bag
Sample description:	Electronic part
Date sample received:	February 17, 2016
Testing period:	February 17, 2016 to February 23, 2016

### Client Information:

Item Name:	Chip & Chip Array Resistor Series (over coated Pb-free)
Country of Origin:	Thailand



\*\*\*\*\*

### Test conducted:

As requested by the applicant, for details please refer to attached page(s)  
Type of test: RoHS wet chemical analysis

\*\*\*\*\*

Authorized by :  
For Intertek Testing Services (Thailand)

*Ladtaka W.*

-----  
Ladtaka Wongwiboonporn  
Laboratory Manager  
Hardlines Department

Page 1 of 5

**Intertek Testing Services (Thailand) Ltd.**  
1285/5 Prachachuen Road, Wong-Sawang, Bangsue, Bangkok 10800 Thailand  
Tel.: (662) 837-2999 Fax: (662) 837-2936  
E-mail Address: [tth.thailand@intertek.com](mailto:tth.thailand@intertek.com)

Attention is drawn to the Terms and Conditions printed overleaf.

## TEST REPORT

Number: BKKH16002170

Test conducted:

(A) Test result summary:

Testing item	Result	LOD	LOQ
	Submitted samples		
Cadmium (Cd) Content (mg/kg)	ND	1	5
Lead (Pb) Content (mg/kg)	ND	2	13
Mercury (Hg) Content (mg/kg)	ND	3	13
Chromium VI (Cr <sup>6+</sup> ) Content (mg/kg)	<1	0.2	1
Polybrominated Biphenyls (PBBs) (mg/kg)			
Monobromobiphenyl (MonoBB)	ND	1	5
Dibromobiphenyl (DiBB)	ND	1	5
Tribromobiphenyl (TriBB)	ND	1	5
Tetrabromobiphenyl (TetraBB)	ND	1	5
Pentabromobiphenyl (PentaBB)	ND	1	5
Hexabromobiphenyl (HexaBB)	ND	1	5
Heptabromobiphenyl (HeptaBB)	ND	1	5
Octabromobiphenyl (OctaBB)	ND	1	5
Nonabromobiphenyl (NonaBB)	ND	1	5
Decabromobiphenyl (DecaBB)	ND	1	5
Sum. of Polybrominated Biphenyls (PBBs) (mg/kg)	ND	1	5
Polybrominated Diphenyl Ethers (PBDEs) (mg/kg)			
Monobromodiphenyl Ether (MonoBDE)	ND	1	5
Dibromodiphenyl Ether (DiBDE)	ND	1	5
Tribromodiphenyl Ether (TriBDE)	ND	1	5
Tetrabromodiphenyl Ether (TetraBDE)	ND	1	5
Pentabromodiphenyl Ether (PentaBDE)	ND	1	5
Hexabromodiphenyl Ether (HexaBDE)	ND	1	5
Heptabromodiphenyl Ether (HeptaBDE)	ND	1	5
Octabromodiphenyl Ether (OctaBDE)	ND	1	5
Nonabromodiphenyl Ether (NonaBDE)	ND	1	5
Decabromodiphenyl Ether (DecaBDE)	ND	1	5
Sum. of Polybrominated Diphenyl Ethers (PBDEs) (mg/kg)	ND	1	5

Testing item	Testing method
Cadmium (Cd) Content	With reference to IEC 62321-5 Edition 1.0 2013-06, by microwave digestion and determined by ICP-OES
Lead (Pb) Content	With reference to IEC 62321-5 Edition 1.0 2013-06, by microwave digestion and determined by ICP-OES
Mercury (Hg) Content	With reference to IEC 62321-4 Edition 1.0 2013-06, by microwave digestion and determined by ICP-OES
Chromium VI (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0 : 2008 Annex C, by alkaline digestion and determined by UV-VIS spectrophotometer
Polybrominated Biphenyls (PBBs) & Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0 : 2008 Annex A, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary

Name of operation: Phanupong C. / Chakkrin K.

Remark: mg/kg = Milligram per kilogram based on weight of sample = ppm  
 LOD = Limit of detection  
 LOQ = Limit of quantitation  
 ND = Not detected (Less than LOD)  
 < = Less than

\*\*\*\*\*

## TEST REPORT

Number: BKKH16002170

Test conducted:

Testing item	Testing method	Result	LOD	LOQ
Phthalate Content (% w/w) ▲	With reference to EN14372 and Phthalate content was determined by GC-MS analysis.			
Dibutyl phthalate (DBP)		ND	0.0004	0.0025
Diethyl hexyl phthalate (DEHP)		ND	0.0004	0.0025
Benzyl butyl phthalate (BBP)		ND	0.0004	0.0025
Di-isobutyl phthalate (DIBP)		ND	0.0004	0.0025

Name of operation: Chakkrin K.

Remark: mg/kg = Milligram per kilogram based on weight of sample = ppm  
 %, w/w = Percentage weight of sample  
 LOD = Limit of detection  
 LOQ = Limit of quantitation  
 ND = Not detected (Less than LOD)  
 ▲ = Tested items are not included in the TISI Accreditation

According to the standard, individual testing should be performed, however, as request by the applicant, mix testing has been conducted on the submitted samples.

Tested component: Electronic part (Mix of submitted sample)

(B) RoHS Requirement:

Restricted substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium VI (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The above limits were quoted from 2011/65/EU for homogeneous material.

\*\*\*\*\*

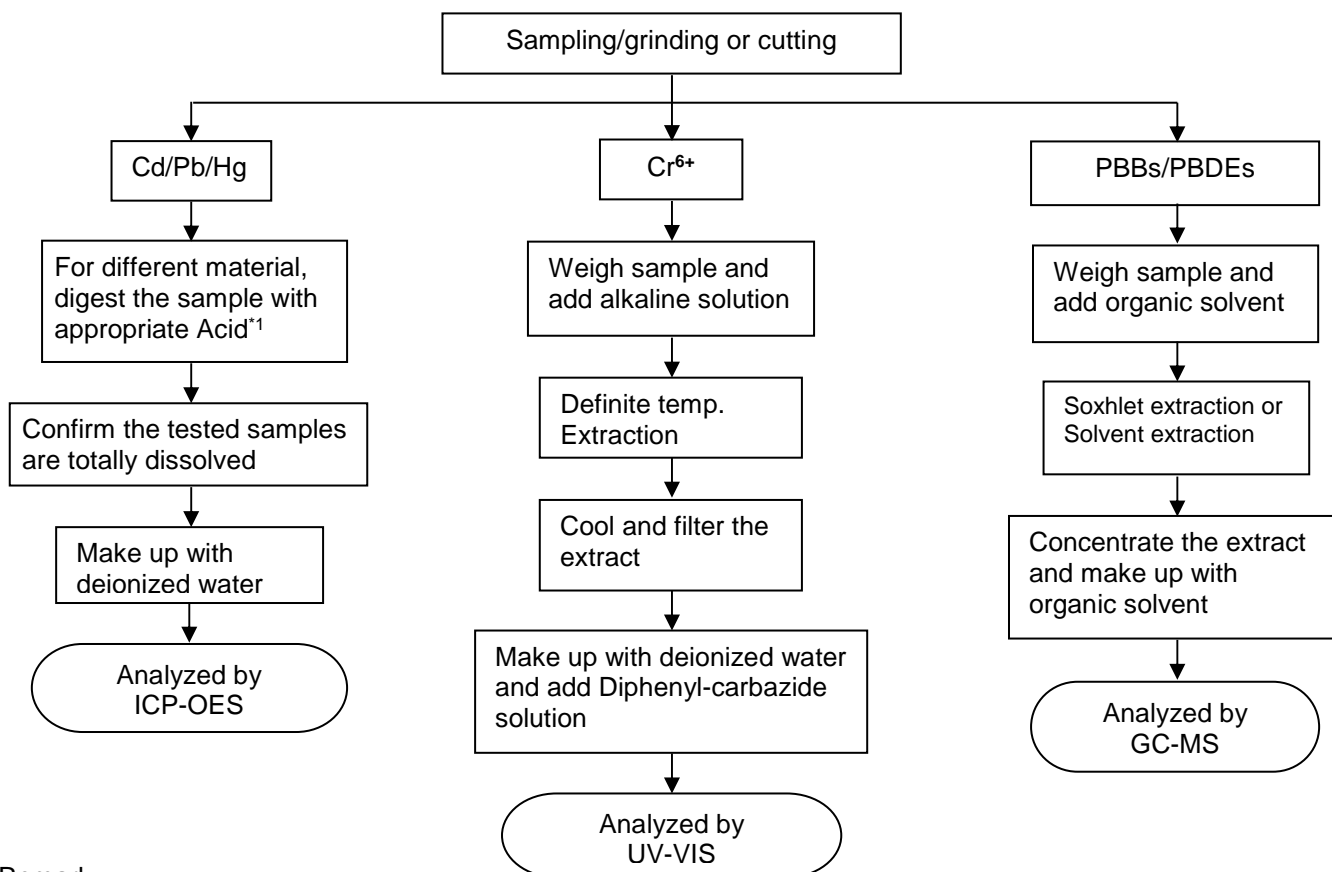
## TEST REPORT

Number: BKKH16002170

Test conducted:

(C) Measurement Flowchart

Test for Cd/Pb/Hg/Chromium VI/PBBs/PBDEs Contents



Remark:

\*1: List of appropriate Acid:

Material	Acid added for digestion
Polymers	HNO <sub>3</sub> , HCl

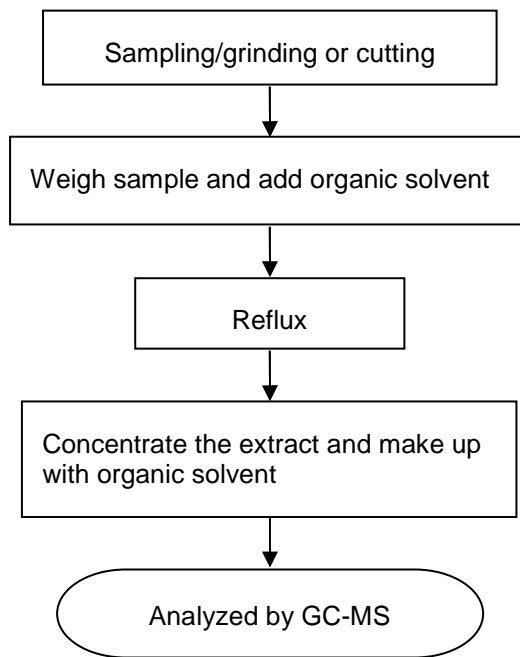
\*\*\*\*\*

## TEST REPORT

Number: BKKH16002170

Test conducted:

Test for Phthalate Content



\*\*\*\*\* E N D \*\*\*\*\*/NS/ST

*Except where explicitly agreed in writing, all work and services performed by Intertek is subject to our standard Terms and Conditions which can be obtained at our website: <http://www.intertek.com/terms/>. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. This report is made solely on the basis of your instructions and / or information and materials supplied by you and provide no warranty on the tested sample(s) be truly representative of the sample source. The report is not intended to be a recommendation for any particular course of action, you are responsible for acting as you see fit on the basis of the report results. Intertek is under no obligation to refer to or report upon any facts or circumstances which are outside the specific instructions received and accepts no responsibility to any parties whatsoever, following the issue of the report, for any matters arising outside the agreed scope of the works. This report does not discharge or release you from your legal obligations and duties to any other person. You are the only one authorized to permit copying or distribution of this report (and then only in its entirety). Any such third parties to whom this report may be circulated rely on the content of the report solely at their own risk. This report shall not be reproduced, except in full.*