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## TEST REPORT

NUMBER: BKKH23019378

APPLICANT: ROYAL ELECTRONIC FACTORY (THAILAND) CO., LTD. DATE: MAR 06, 2023  
20/1-2 MOO 2, KLONG-NA, MUANG,  
CHACHOENGSAO 24000  
ATTN: K.KANOKORN

### SAMPLE DESCRIPTION:

ONE (1) BAG OF SUBMITTED SAMPLE SAID TO BE CHIP & CHIP ARRAY RESISTOR SERIES  
(OVER COAT Pb FREE)

ITEM NAME : CHIP & CHIP ARRAY RESISTOR SERIES  
(OVER COAT Pb FREE)

DATE SAMPLE RECEIVED : FEBRUARY 26, 2023

DATE TEST STARTED : FEBRUARY 26, 2023 TO MARCH 06, 2023

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### TEST CONDUCTED :

AS REQUESTED BY THE APPLICANT, FOR DETAILS PLEASE REFER TO ATTACHED PAGE(S)  
TYPE OF TEST: ROHS WET CHEMICAL ANALYSIS

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### SUMMARY :

TESTED SAMPLES	STANDARD	RESULT
SUBMITTED SAMPLES	WITH REFERENCE TO TEST METHOD OF IEC 62321 - 111/95/CDV AND MAXIMUM CONCENTRATION LIMITS QUOTED FROM ROHS DIRECTIVES 2002/95/EC AND AMENDMENT 2005/618/EC	PASS

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AUTHORIZED BY :  
FOR INTERTEK TESTING SERVICES (THAILAND)

*Phanith*

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PHANIT HITAPONG  
DIVISION MANAGER  
TOYS & HARDLINES DIVISION

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### (A) TEST RESULT SUMMARY:

TESTING ITEM	RESULT
	SUBMITTED SAMPLES
CADMIUM (Cd) CONTENT (mg/kg)	ND
LEAD (Pb) CONTENT (mg/kg)	22
MERCURY (Hg) CONTENT (mg/kg)	ND
CHROMIUM VI (Cr <sup>6+</sup> ) CONTENT (BY SPOT TEST ON METAL)	NEGATIVE
CHROMIUM VI (Cr <sup>6+</sup> ) CONTENT (BY BOILING WATER EXTRACTION ON METAL) (mg/kg WITH 50cm <sup>2</sup> )#	NEGATIVE (<0.02 mg/kg)
POLYBROMINATED BIPHENYLS (PBB)	
MONOBROMOBIPHENYL (MonoBB)	ND
DIBROMOBIPHENYL (DiBB)	ND
TRIBROMOBIPHENYL (TriBB)	ND
TETRABROMOBIPHENYL (TetraBB)	ND
PENTABROMOBIPHENYL (PentaBB)	ND
HEXABROMOBIPHENYL (HexaBB)	ND
HEPTABROMOBIPHENYL (HeptaBB)	ND
OCTABROMOBIPHENYL (OctaBB)	ND
NONABROMOBIPHENYL (NonaBB)	ND
DECABROMOBIPHENYL (DecaBB)	ND
POLYBROMINATED DIPHENYL ETHERS (PBDE)	
MONOBROMODIPHENYL ETHER (MonoBDE)	ND
DIBROMODIPHENYL ETHER (DiBDE)	ND
TRIBROMODIPHENYL ETHER (TriBDE)	ND
TETRABROMODIPHENYL ETHER (TetraBDE)	ND
PENTABROMODIPHENYL ETHER (PentaBDE)	ND
HEXABROMODIPHENYL ETHER (HexaBDE)	ND
HEPTABROMODIPHENYL ETHER (HeptaBDE)	ND
OCTABROMODIPHENYL ETHER (OctaBDE)	ND
NONABROMODIPHENYL ETHER (NonaBDE)	ND
DECABROMODIPHENYL ETHER (DecaBDE)	ND
HALOGEN CONTENT (mg/kg)	
BROMINE (Br)	ND
CHLORINE (Cl)	ND

NAME OF OPERATION : THITIRAT K.

mg/kg = MILLIGRAM PER KILOGRAM BASED ON WEIGHT OF SAMPLE = ppm  
mg/kg WITH 50cm<sup>2</sup> = MILLIGRAM PER KILOGRAM WITH 50 SQUARE CENTIMETER  
< = LESS THAN

ND = NOT DETECTED

POSITIVE = A POSITIVE TEST RESULT INDICATES THE PRESENCE OF Cr(VI), EQUAL TO OR GREATER THAN THRESHOLD OF 1 mg/kg FOR SPOT TEST PROCEDURES OR 0.02 mg/kg FOR BOILING-WATER-EXTRACTION PROCEDURES WITH A SAMPLE SURFACE AREA OF 50cm<sup>2</sup> USED. HOWEVER, IT SHALL NOT BE INTERPRETED AS THE Cr(VI) CONCENTRATION IN THE COATING LAYER OF THE SAMPLE AND SHOULD NOT BE USED AS A METHOD DETECTION LIMIT FOR THIS QUALITATIVE TEST.

NEGATIVE = A NEGATIVE TEST RESULT INDICATES NO ABOVE POSITIVE APPEARANCE HAS BEEN FOUND. WHEN THE SPOT-TEST SHOWS A NEGATIVE RESULT, THE BOILING-WATER-EXTRACTION PROCEDURE SHALL BE USED TO VERIFY THE RESULT. WHEN THE BOILING-WATER-EXTRACTION PROCEDURE CANNOT INDICATE THE POSITIVE RESULT, THE RESULT IS NEGATIVE.

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# = ACCORDING TO IEC 62321, A POSITIVE RESULT INDICATES THE PRESENCE OF Cr(VI) COATING. IT IS THE Cr(VI) CONCENTRATION DETECTED IN THE BOILING-WATER-EXTRACTION SOLUTION AND SHOULD NOT BE INTERPRETED AS THE Cr(VI) CONCENTRATION IN THE COATING LAYER OF THE SAMPLE.

REMARK : AS REQUESTED BY THE APPLICANT, DIFFERENT MATERIALS OF TESTED COMPONENTS METAL PART/BLACK COATING WITH WHITE SILKSCREEN WERE TESTED TOGETHER.

TESTED COMPONENT: METAL PART/BLACK COATING WITH WHITE SILKSCREEN (CHIP & CHIP ARRAY RESISTOR SERIES)

### (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 2002/95/EC AND AMENDMENT 2005/618/EC FOR HOMOGENEOUS MATERIAL.

### (C) TEST METHOD:

TESTING ITEM	TESTING METHOD	LIMIT OF QUANTIFICATION
CADMIUM (Cd) CONTENT	WITH REFERENCE TO IEC 62321 EDITION 1.0 : 2008, BY ACID DIGESTION AND DETERMINED BY ICP-OES	2 mg/kg
LEAD (Pb) CONTENT	WITH REFERENCE TO IEC 62321 EDITION 1.0 : 2008, BY ACID DIGESTION AND DETERMINED BY ICP-OES	2 mg/kg
MERCURY (Hg) CONTENT	WITH REFERENCE TO IEC 62321 EDITION 1.0 : 2008, BY ACID DIGESTION AND DETERMINED BY ICP-OES	2 mg/kg
CHROMIUM VI (Cr <sup>6+</sup> ) CONTENT	WITH REFERENCE TO IEC 62321 EDITION 1.0 : 2008, BY ALKALINE DIGESTION AND DETERMINED BY UV-VIS SPECTROPHOTOMETER	1 mg/kg
POLYBROMINATED BIPHENYLS (PBBs) & POLYBROMINATED DIPHENYL ETHERS (PBDEs)	WITH REFERENCE TO IEC 62321 EDITION 1.0 : 2008, BY SOLVENT EXTRACTION AND DETERMINED BY GC/MS AND FURTHER HPLC CONFIRMATION WHEN NECESSARY	5 mg/kg
HALOGEN CONTENT	WITH REFERENCE TO EN 50267-2-2:1999 BY TUBE FURNACE COMBUSTION AND EN 14582:2007 DETERMINED BY ION CHROMATOGRAPHY	30 mg/kg

NOTE : TESTS WERE CONDUCTED WITH REFERENCE TO 111/95/CDV VERSION 2007-10-12 WHICH IS STILL A DRAFT METHOD AND SUBJECT TO FUTURE CHANGES PRIOR TO PUBLICATION.

REMARK : REPORTING LIMIT = QUANTITATION LIMIT OF ANALYTE IN SAMPLE

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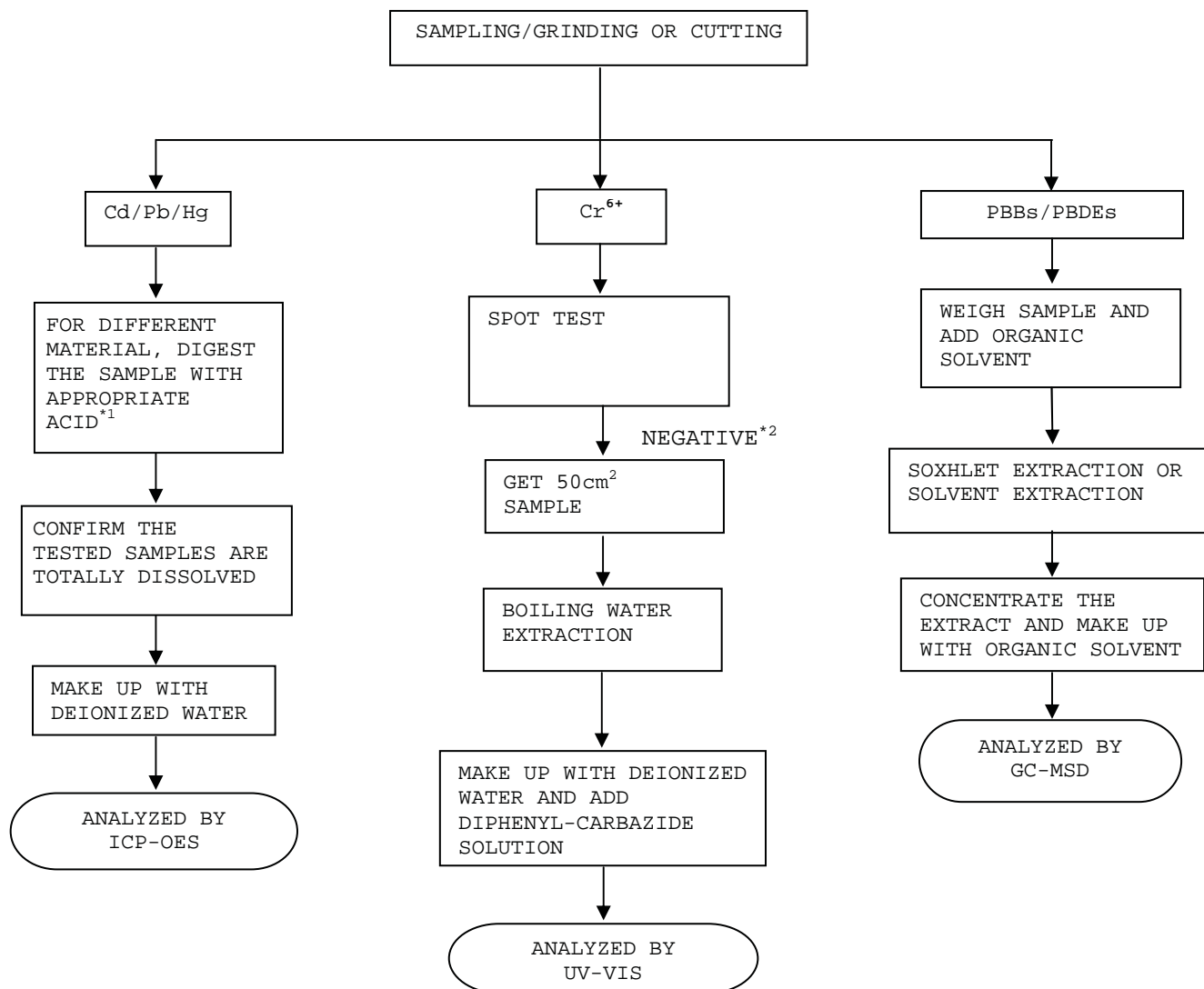
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### (D) MEASUREMENT FLOWCHART

TEST FOR Cd/Pb/Hg/CHROMIUM (VI)/PBBS/PBDES CONTENTS

REFERENCE STANDARD : IEC 62321 (111/95/CDV)



#### REMARKS:

\*1: LIST OF APPROPRIATE ACID :

MATERIAL	ACID ADDED FOR DIGESTION
ELECTRONICS	HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub>

\*2: IF THE RESULT OF SPOT TEST IS POSITIVE, CHROMIUM VI WOULD BE DETERMINED AS DETECTED.  
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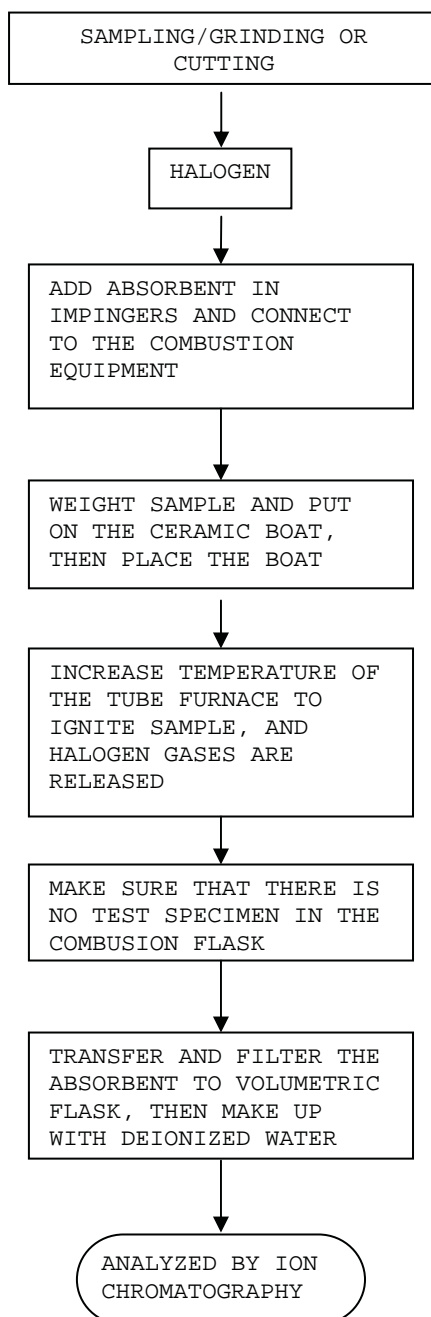
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(D) MEASUREMENT FLOWCHART

TEST FOR HALOGEN CONTENT

REFERENCE METHOD: EN 50267-2-2:1999



\*\*\*\*\* E N D \*\*\*\*\*/DE/PPA/SAN