



**THE INDUSTRIAL ANALYSIS SERVICE LTD.**

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**TEST REPORT**

Request No. 0124749

Report No. ES21000000138-01

Date of issue: 26 January 2021

To. NGK Electronics Devices, Inc.

Address: 2701-1 Higashibun, Ohmine-cho, Mine-Shi, Yamaguchi. 759-2212, Japan

Name of sample: Pd Plating

Date of receipt of sample: 18 January 2021

Measurement days: 18 January 2021 ~ 26 January 2021

The following is the report on the requested test of the sample

Test Items	Unit	Test result	D.L.	Test Method
Cd	ppm	N.D.	2.0	With reference to IEC62321-5(2013) ICP/MS
Pb	ppm	8.0	2.0	With reference to IEC62321-5(2013) ICP/MS
Cr6+	ppm	N.D.	0.1	With reference to IEC62321-7-1(2015) Boiling water extraction/UV-VIS
Hg	ppm	N.D.	2.0	With reference to IEC62321-4(2013)/AMD1(2017) ICP/MS
PBBs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
PBDEs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
Bis(2-ethylhexyl) phthalate (DEHP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Butylbenzyl phthalate (BBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Dibutyl phthalate (DBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
Diisobutyl phthalate (DIBP)	ppm	N.D.	50	With reference to IEC62321-8(2017) GC/MS
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Note: The results shown in this test report refer only to the sample(s) tested.  
Plating part

N.D. means the analysis result is less than fixed quality lower limit level calculated according to our established precision management condition.  
mg/kg=ppm

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TAKANORI YOSHIDA

Test Items	Unit	Test result	D.L.	Test Method
Monobromobiphenyl (MonoBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Dibromobiphenyl (DiBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tribromobiphenyl (TriBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tetrabromobiphenyl (TetraBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Pentabromobiphenyl (PentaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Hexabromobiphenyl (HexaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Heptabromobiphenyl (HeptaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Octabromobiphenyl (OctaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Nonabromobiphenyl (NonaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Decabromobiphenyl (DecaBB)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
SUM PBBs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
Monobromodiphenylether (MonoBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Dibromodiphenylether (DiBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tribromodiphenylether (TriBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Tetrabromodiphenylether (TetraBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Pentabromodiphenylether (PentaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Hexabromodiphenylether (HexaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Heptabromodiphenylether (HeptaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Octabromodiphenylether (OctaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Nonabromodiphenylether (NonaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
Decabromodiphenylether (DecaBDE)	ppm	N.D.	-	With reference to IEC62321-6(2015) GC/MS
SUM PBDEs	ppm	N.D.	5.0	With reference to IEC62321-6(2015) GC/MS
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Note: The results shown in this test report refer only to the sample(s) tested.

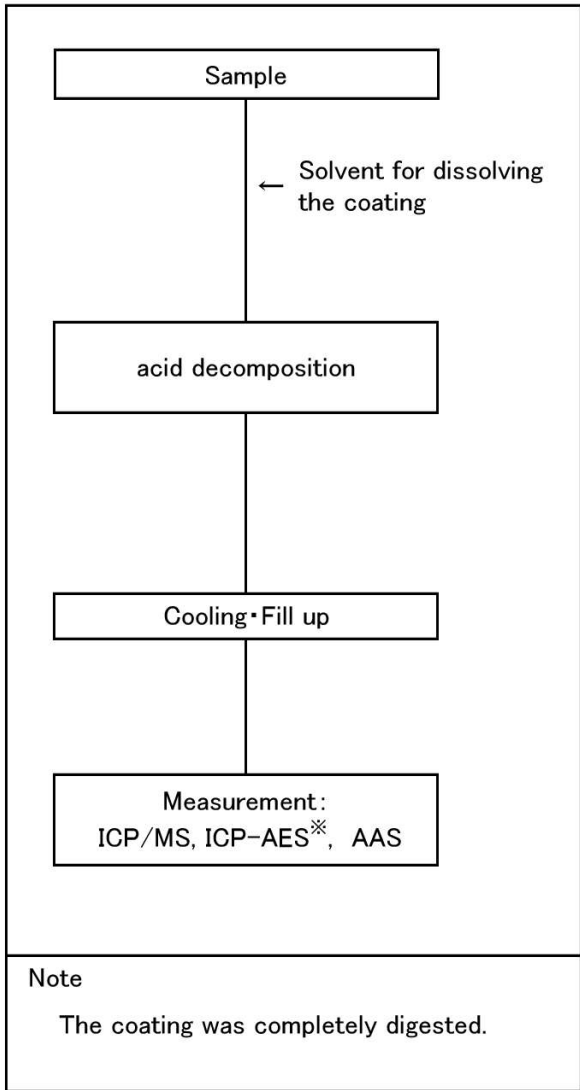
N.D. means the analysis result is less than fixed quality lower limit level calculated according to our established precision management condition.  
mg/kg=ppm



Flow chart

Report No.	: ES210000000138-01
Measurement days	: 18 January 2021 ~ 26 January 2021
Operator	: Kensho Nakajima      Wataru Imaoka

Cd, Pb, Hg



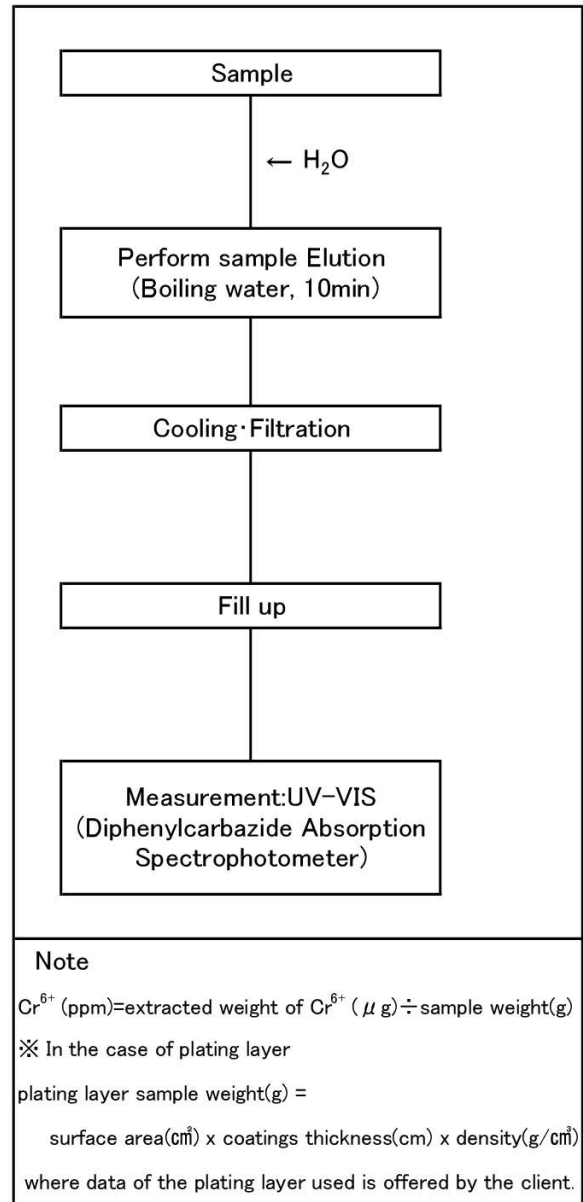
Note

The coating was completely digested.

ICP/MS : Agilent Technologies 7700X  
 ICP-AES : Rigaku CIROS CCD  
 AAS : HIRANUMA MERCURY ANALYZER HG-200

※It is also called ICP-OES.

Cr6+



Note

$$Cr^{6+} \text{ (ppm)} = \text{extracted weight of } Cr^{6+} \text{ (}\mu\text{g)} \div \text{sample weight(g)}$$

※ In the case of plating layer

$$\text{plating layer sample weight(g)} =$$

$$\text{surface area(cm}^2\text{)} \times \text{coatings thickness(cm)} \times \text{density(g/cm}^3\text{)}$$

where data of the plating layer used is offered by the client.

UV-VIS : HITACHI High-Technologies U-2910

Flow chart

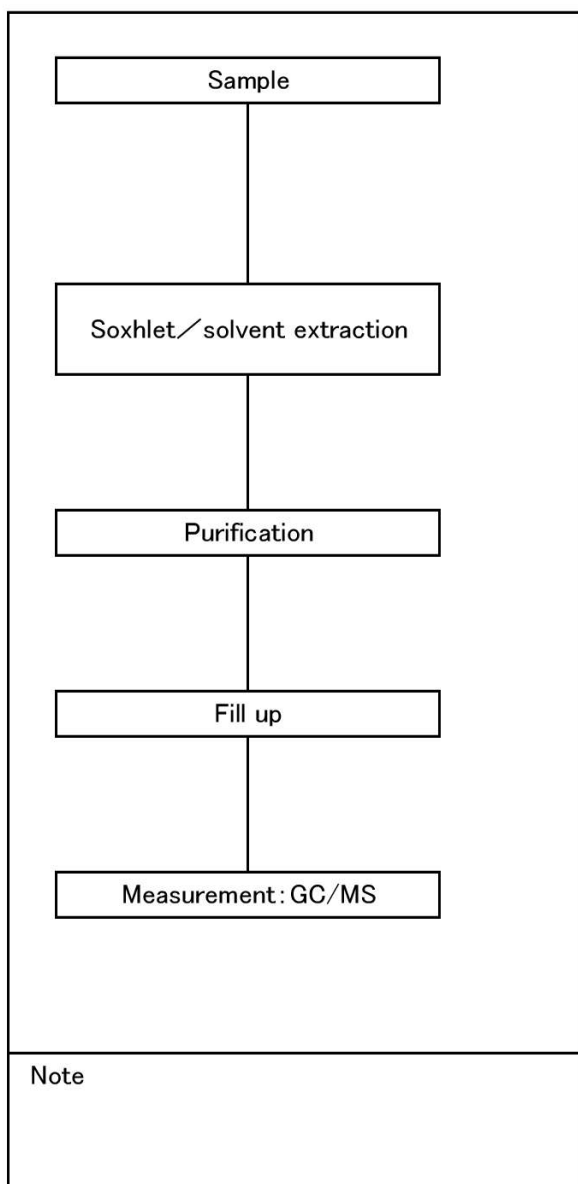
Report No. : ES21000000138-01

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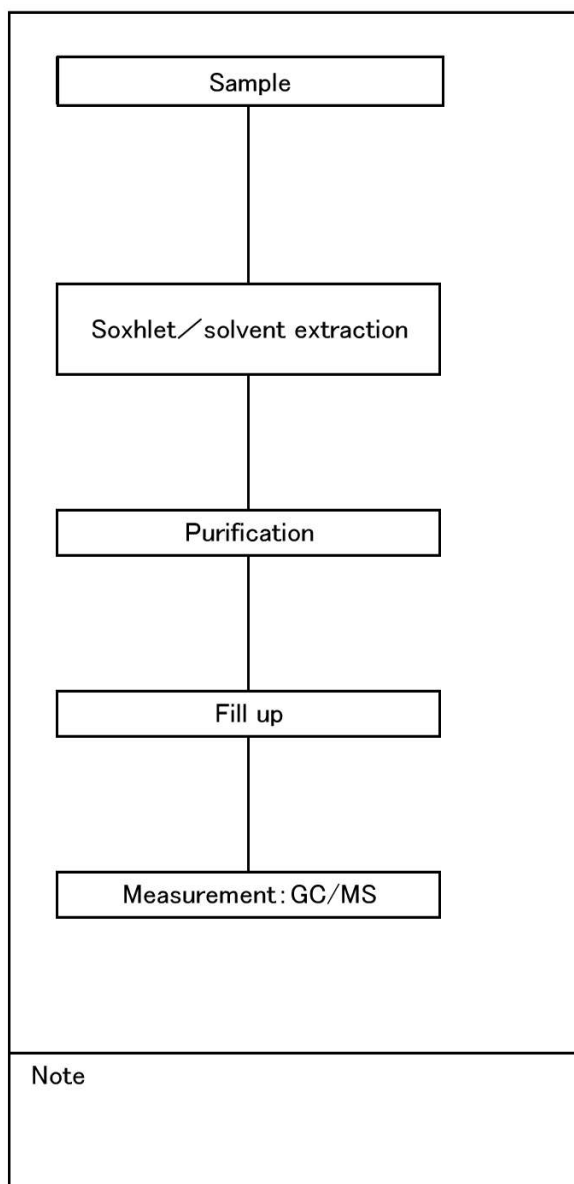
Operator : Yuichi Kuboji

PBBs, PBDEs

phthalates



GC/MS: Agilent Technologies GC 7890B MS 5977A



GC/MS : SHIMADZU GCMS-QP2020

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