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TEST REPORT

KOTITI NO. : 1414001985
APPLICANT : Samsung Electro-mechanics Co., Ltd.
ADDRESS : 314, Metan3-Dong, Yeongtong-Gu, Suwon-Si, Gyunggi-Do 443-743

DATE IN : December 08, 2014
DATE OUT : December 24, 2014

Sample Description	**MLCC COG Ni TYPE**
Style Number	**CLxxCxxxxxxxxx**
Buyer	**N/S**
Test Result	**For further details, please refer to the following page(s).**
Test Method	**For further details, please refer to the following page(s).**

*** N/S : Not Submitted**

PREPARED and CHECKED by :

Sang Rag Lee

Dr. SANG RAG LEE
VICE PRESIDENT – KOTITI

AUTHORIZED by :

Young R. Kim

Dr. YOUNG RYUL KIM
PRESIDENT – KOTITI

REMARK: SEE ENCLOSED WORKSHEET(S) RESULT

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KOTITI No. : 1414001985
Sample Description : MLCC COG Ni TYPE / CLxxCxxxxxxxxx

Test Item	Unit	Test Method	Reporting Limit	Result
Pb (Lead)	mg/kg	IEC 62321-5:2013 (Acid digestion and determined by ICP-OES)	50	N.D.
Cd (Cadmium)	mg/kg		2	N.D.
Hg (Mercury)	mg/kg	IEC 62321-4:2013 (Acid digestion and determined by ICP-OES)	2	N.D.
Cr^{6+} (Hexavalent Chromium)	mg/kg	IEC 62321:2008 Annex C (Alkaline digestion and determined by UV-VIS)	1	N.D.
Sum of PBBs/PBDEs	mg/kg	IEC 62321:2008 Annex A (Solvent extraction and determined by GC-MS)	-	N.D.
Bromobiphenyls	mg/kg		5	N.D.
Dibromobiphenyls			5	N.D.
Tribromobiphenyls			5	N.D.
Tetrabromobiphenyls			5	N.D.
Pentabromobiphenyls			5	N.D.
Hexabromobiphenyls			5	N.D.
Heptabromobiphenyls			5	N.D.
Octabromobiphenyls			5	N.D.
Nonabromobiphenyls			5	N.D.
Decabromobiphenyl			5	N.D.
Bromodiphenyl ethers			5	N.D.
Dibromodiphenyl ethers			5	N.D.
Tribromodiphenyl ethers			5	N.D.
Tetrabromodiphenyl ethers			5	N.D.
Pentabromodiphenyl ethers			5	N.D.
Hexabromodiphenyl ethers			5	N.D.
Heptabromodiphenyl ethers			5	N.D.
Octabromodiphenyl ethers			5	N.D.
Nonabromodiphenyl ethers			5	N.D.
Decabromodiphenyl ether			5	N.D.

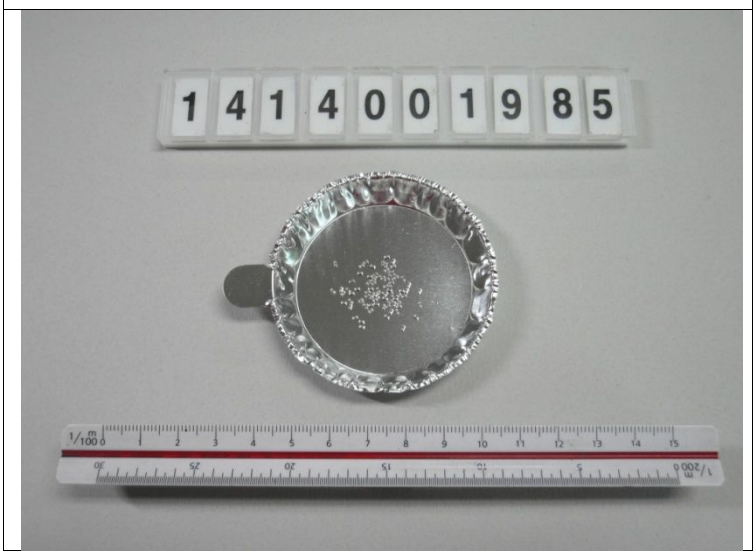
Remark
- N.D. = not detected (concentration of analyte lower than the laboratory reporting limit)
- N.A. = not applicable

KOTITI No. : 1414001985
Sample Description : MLCC COG Ni TYPE / CLxxCxxxxxxxxx

Test Item	Unit	Test Method	Reporting Limit	Result
Heavy metal				
Sb (Antimony)	mg/kg	Reference to EPA 3052 (Determined by ICP-OES)	5	N.D.
Halogen				
Br (Bromine)	mg/kg	IEC 62321-3-2:2013, KS M 0180:2009 (Determined by C-IC)	50	N.D.
Cl (Chlorine)	mg/kg		50	N.D.
Phthalates				
DBP(Dibutyl phthalate)	mg/kg	Reference to KOTITI In-house method (Determined by LC-MS-MS)	50	N.D.
BBP(Butyl benzyl phthalate)	mg/kg		50	N.D.
DEHP (Di-2-ethylhexyl phthalate)	mg/kg		50	N.D.
DNOP(Di-n-octyl phthalate)	mg/kg		50	N.D.
DINP(Di-iso-nonyl phthalate)	mg/kg		50	N.D.
DIDP (Diisodecyl phthalate)	mg/kg		50	N.D.
DIBP (Diisobutyl phthalate)	mg/kg		50	N.D.
DEP (Diethyl phthalate)	mg/kg		50	N.D.
DMP (Dimethyl phthalate)	mg/kg		50	N.D.

Remark
- N.D. = not detected (concentration of analyte lower than the laboratory reporting limit)
- N.A. = not applicable

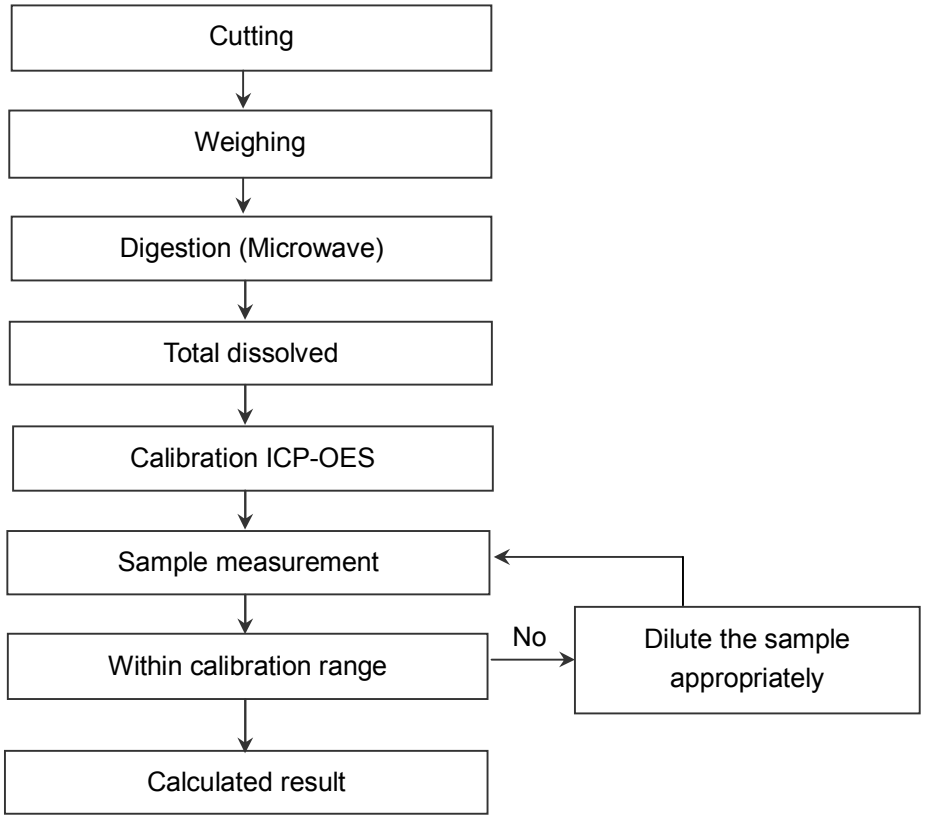
SAMPLE PICTURE

MLCC COG Ni TYPE / CLxxCxxxxxxxxx


※ **Due to the client's request, the sample which was mixed has been analyzed.**

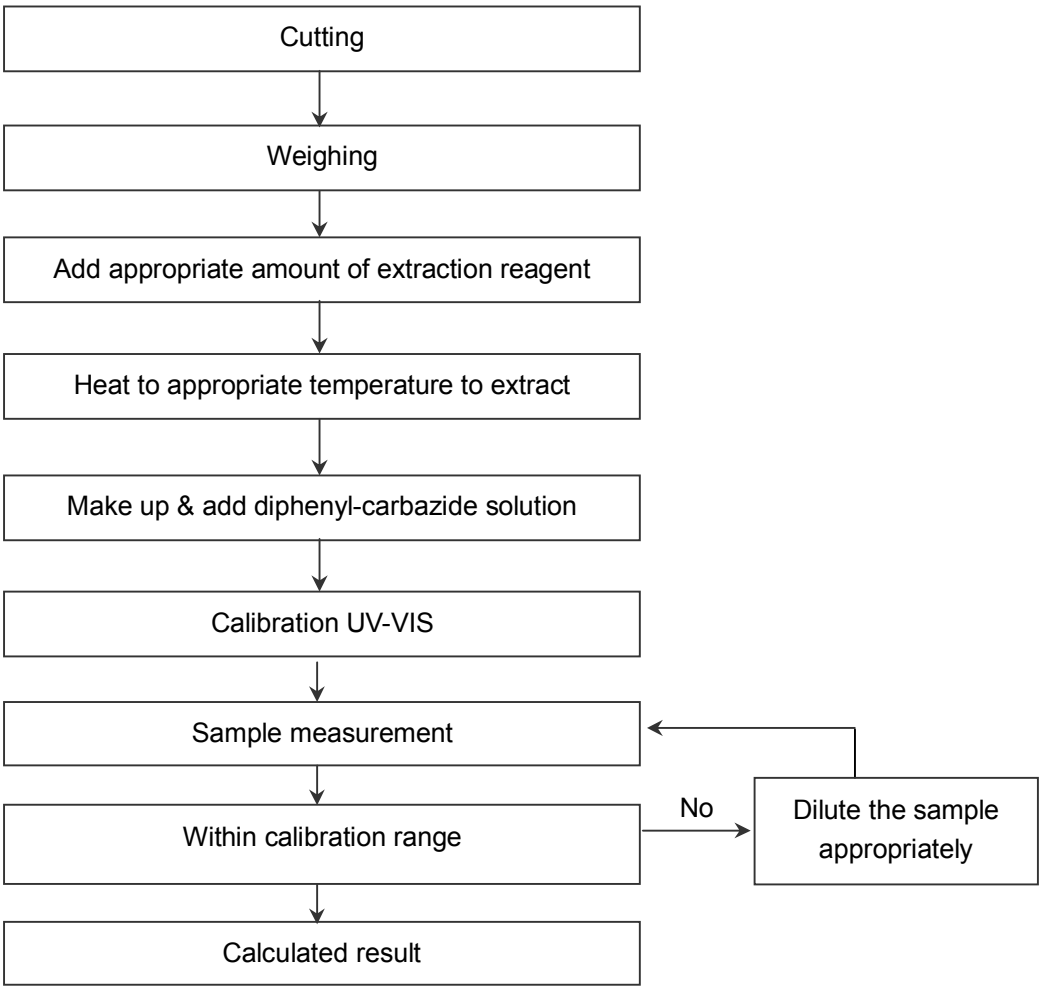
FLOW CHART

1. Heavy metal (Lead, Cadmium, Mercury)

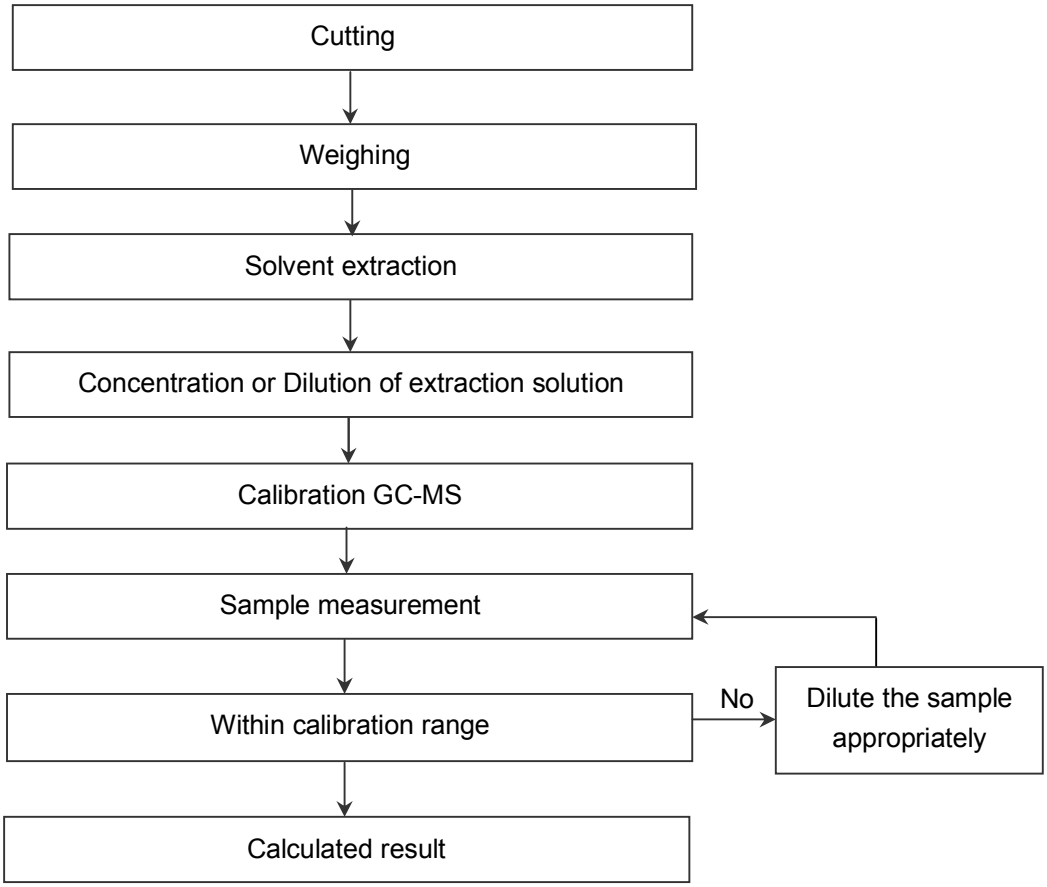


Material	Digestion Acid
Polymers	HNO_3, HCl, HF, H_2O_2, H_2SO_4, etc.
Metals	HNO_3, HCl
Electronics	HNO_3, HCl, HF, H_2O_2, H_2SO_4, etc.

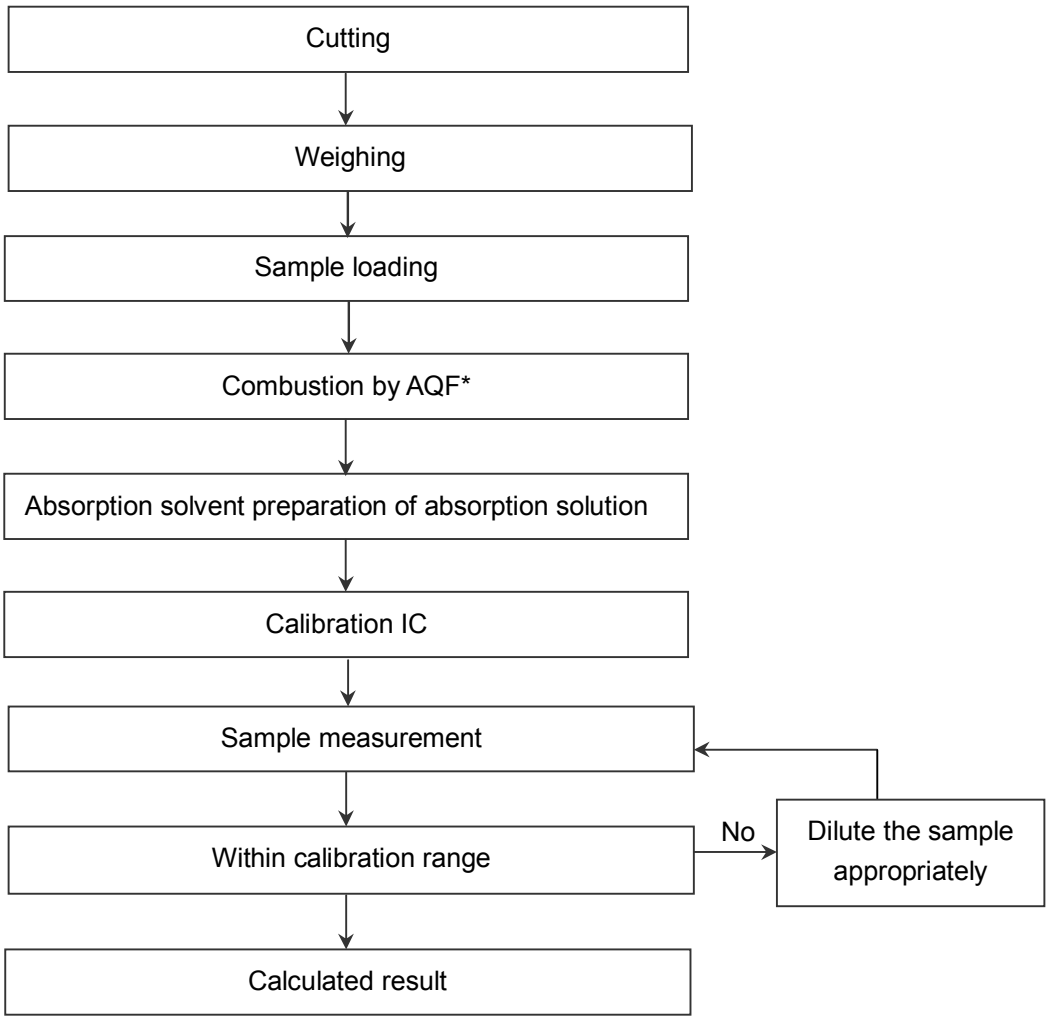
2. Heavy metal (Hexavalent chromium)



3. BFRs (PBBs, PBDEs)

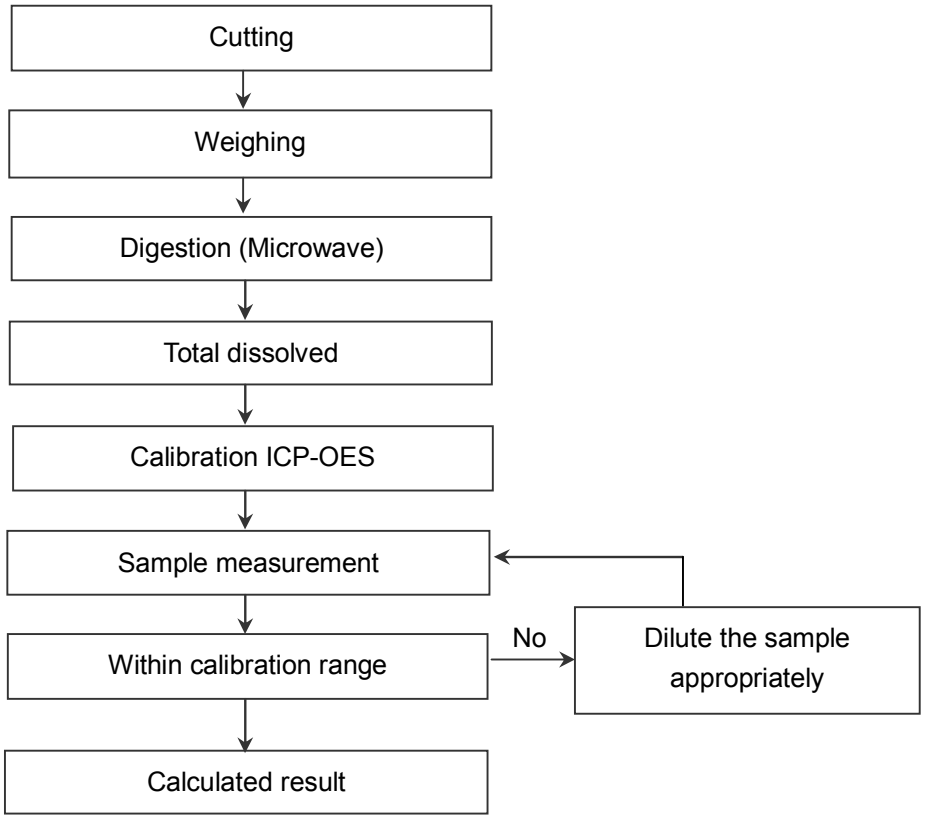


4. Halogen (Bromine, Chlorine)



*AQF : Automated Quick Furnace

5. Heavy metal (Antimony)



Material	Digestion Acid
Polymers	HNO_3, HCl, HF, H_2O_2, H_2SO_4, etc.
Metals	HNO_3, HCl
Electronics	HNO_3, HCl, HF, H_2O_2, H_2SO_4, etc.

6. Phthalates