

Approved date: Dec. 24, 2020 Report No. AL2012922501ENR

Page 1 / 12

Client TONGFU MICROELECTRONICS CO.,LTD.

**Address** NO.288, CHONGCHUAN ROAD, CHONGCHUAN ECONOMIC DEVELOPMENT

AREA, NANTONG, JIANGSU, P.R. CHINA.

The following submitted sample(s) was/were identified by/on behalf of the client as

LQFP48 **Sample Name** 

**Test Part** 1. Silvery metal 2. Black body

**Date Received** Dec. 14, 2020

**Test Period** Dec. 14, 2020 to Dec. 22, 2020

**Test Request** 1.Silvery metal:

To determiner the contents of Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent

Chromium (Cr(VI)), Perfluorooctane Sulfonates (PFOS), Perfluorooctanoic

Acid(PFOA), Beryllium oxide, Beryllium copper, Antimony (Sb) in the received sample(s).

2.Black body:

To determine the contents of Pb,Cd,Hg,Hexavalent Chromium (Cr(VI)),PBBs,PBDEs,Sb, F,Cl,Br,I,PCBs,PCNs,PCTs,SCCP,TBT,TPT,DBT, DOT,Asbestos,Specific azo compounds,

Formaldehyde, PVC and PVC compound, Beryllium oxide, Beryllium copper,

DEHP, DBP, BBP, DINP, DIDP, DNOP, DNHP, DIHP, DHNUP, DMEP, HFC, PFC, UV320 (Specific benzotriazole), PFOS, PFOA, Cobalt dichloride, Ozonosp here destroy substance, DMF, Tris (2-chloroethyl) phosphate (T CEP), Hexabromocyclododecane (HBCDD), Diarsenic trioxide, D iarsenic pentaoxide, Boric acid, specific sodium borates, Diisobu tyl

phthalate (DIBP), 4-(1,1,3,3-tetramethylbutyl)phenol, Bis(2-met hoxyethyl)ether-d14,

DMAC, EGDME in the received sample(s).

For more information about the test, please refer to the following pages.

Compiled

By

Checked Zhu Zheng feng By

igned for and on behalf of

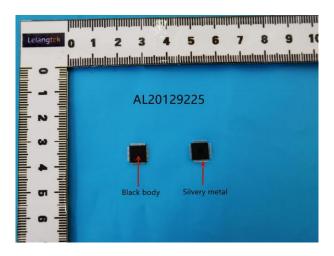
Shanghai Lelangtek Testing Technology Co., Ltd.(2nd Floor, Building 4, No.158, Jintong khari hat before before Shanghai)



Report No. AL2012922501ENR Approved date: Dec. 24, 2020

Page 2 / 12

## Sample Photo(s)



Lelangtek authenticated the photo on original report only

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Report No. AL2012922501ENR Approved date: Dec. 24, 2020

Page 3 / 12

## **Test Result**

Test Item	Result(ı	mg/kg)	MDL
rest item	Silvery metal	Black body	(mg/kg)
Lead (Pb)	ND	ND	2
Cadmium (Cd)	ND	ND	2
Mercury (Hg)	ND	ND	2
Hexavalent Chromium (Cr(VI))	/	ND	8
nexavalent Cironilum (Cr(vi))	Negative#	/	See note 5
Polybrominated Biphenyls (PBBs)			
Monobromobiphenyls	/	ND	5
Dibromobiphenyls	/	ND	5
Tribromobiphenyls	/	ND	5
Tetrabromobiphenyls	/	ND	5
Pentabromobiphenyls	/	ND	5
Hexabromobiphenyls	/	ND	5
Heptabromobiphenyls	/	ND	5
Octabromobiphenyls	/	ND	5
Nonabromobiphenyls	/	ND	5
Decabromobiphenyls	/	ND	5
Polybrominated Biphenyls (PBBs) total	/	ND	
Polybrominated Diphenyl Ethers (PBDEs)			
Monobromodiphenyl ethers	/	ND	5
Dibromodiphenyl ethers	/	ND	5
Tribromodiphenyl ethers	/	ND	5
Tetrabromodiphenyl ethers	/	ND	5
Pentabromodiphenyl ethers	/	ND	5
Hexabromodiphenyl ethers	/	ND	5
Heptabromodiphenyl ethers	/	ND	5
Octabromodiphenyl ethers	/	ND	5
Nonabromodiphenyl ethers	/	ND	5
Decabromodiphenyl ethers	/	ND	5
Polybrominated Diphenyl ethers (PBDEs) total	/	ND	

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Note: All test results are only valid for the samples being tested. This rest report shall not be reproduced except in full, without the written approval of the testing laboratory The Dates for internal quality control data reference only

Address: 2nd Floor, Building 4, No.158, Jinfeng Road, Pudong District, Shanghai, China (201201) Tel: +86 21 5838-0071 Fax: +86 21 5838-0083



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020 Page 4 / 12

Total Maria	Result(mg/kg)		MDL
Test Item	Silvery metal	Black body	(mg/kg)
PCBs		ND	10
PCNs		ND	10
PCTs		ND	10
SCCP		ND	10
ТВТ	/	ND	10
ТРТ		ND	10
DBT		ND	10
DOT		ND	10

<b>-</b>	Result(	Result(mg/kg)	
Test Item	Silvery metal	Black body	(%)
Asbestos			
Anthrophyllite		ND	1
Crocodolite		ND	1
Amosite	,	ND	1
Tremolite	/	ND	1
Chrysotile		ND	1
Actinolite		ND	1

Took Ida wa	Result	(mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Azo compounds			
4-Aminodiphenyl		ND	5
Benzidine		ND	5
4-Chloro-o-toluidine		ND	5
2-Naphthylamine	,	ND	5
O-Aminoazotoluene	/	ND	5
P-Chloroaniline		ND	5
2,4-Diaminoanisole		ND	5
4,4'-Diaminodiphenylmethane		ND	5

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020

Page 5 / 12

	Result(	mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Azo compounds			
3,3'-Dichlorobenzidine		ND	5
3,3'-Dimethoxybenzidine		ND	5
3,3'-Dimethylbenzidine		ND	5
3,3'-Dimethyl-4,4'-diaminodi phenylmetha		ND	5
P-Cresidine(2-methoxy-5-m ethylaniline)		ND	5
4,4'-Methylene-bis-(2-chloc oaniline)		ND	5
4,4¹-Oxydianiline		ND	5
4,4'-Thiodianiline		ND	5
O-Toluidine		ND	5
2,4-Toluylenediamine		ND	5
2,4,5-Trimethylaniline		ND	5
O-Anisidine		ND	5
5-Nitro-o-toluidine		ND	5
4-Aminoazobenzene		ND	5
2,4-Dimethylaniline		ND	5
2,6-Dimethylaniline		ND	5

Taskikana	Result	(mg/kg)	MDL	
Test Item	Silvery metal	Black body	(mg/kg)	
Formaldehyde		ND	5	
PVC and PVC compound	/	Not contain	/	
Beryllium oxide	ND	ND	2	
Beryllium copper	ND	ND	2	
Fluorine(F)		ND	50	
Chlorine(Cl)	,	ND	50	
Bromine(Br)	7	ND	50	
lodine(I)	1	ND	50	
Antimony (Sb)	ND	ND	2	

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Note: All test results are only valid for the samples being tested. This rest report shall not be reproduced except in full, without the written approval of the testing laboratory The Dates for internal quality control data reference only

Address: 2nd Floor, Building 4, No.158, Jinfeng Road, Pudong District, Shanghai, China (201201) Tel: +86 21 5838-0071 Fax: +86 21 5838-0083



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020

Page 6 / 12

T	Result(	mg/kg)	MDL
Test Item	Silvery metal		(mg/kg)
Phthalates(PAEs)			
Di(2-ethylhexyl) phthalate (DEHP)		ND	50
Dibutyl phthalate(DBP)		ND	50
Butyl benzyl phthalate (BBP)		ND	50
Di-isononyl phthalate(DINP)		ND	50
Di-iso-decyl phthalate(DIDP)		ND	50
Di-n-octyl phthalate(DNOP)		ND	50
Di-n-hexyl phthalate (DNHP)	7 ,	ND	50
Di-isobutyl Phthalate(DIBP)	/	ND	50
Diphenyliodonium hexafluorophosphate (DIHP)		ND	50
1,2-Benzenedicarboxylic acid,di-C7-11- branched and linear alkyl esters(DHNUP)		ND	50
1,2-Benzenedicarboxylic acid,butyl methyl ester(DMEP)		ND	50

T	Result(	mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
HFC			
HFC-23		ND	1
HFC-32		ND	1
HFC-41		ND	1
HFC-43-10mee		ND	1
HFC-125	/	ND	1
HFC-134		ND	1
HFC-134a		ND	1
HFC-143		ND	1
HFC-143a		ND	1

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020

Page 7 / 12

Test Item			MDL
	Silvery metal	Black body	(mg/kg)
HFC-152a		ND	1
HFC-227ea		ND	1
HFC-236fa		ND	1
HFC-236ea		ND	1
HFC-245ea		ND	1
HFC-245fa		ND	1
HFC-365mfc		ND	1
PFC		ND	1
F14		ND	1
Fluorocarbon 116		ND	1
Freon 218		ND	1
Decafluorobutane		ND	1
Freon C318		ND	1
Perfluor-1-butane		ND	1
Perfluorisobutane		ND	1
1,4-Dihydroctafluorobutane		ND	1
Nonafluor-2-(trifluorpmethyl)butane		ND	1
Perfluoro-n-pentane		ND	1
2-Perfluoromethylpentane		ND	1
Perfluorohexane		ND	1
UV320(Specific benzotriazole)		ND	1
Cobalt dichloride		ND	2
Ozonosphere destroy substance			
CFCs		ND	10
Carbon Tetrachloride		ND	10
1,1,1-Trichloroethane		ND	10
Halons	/	ND	10
HCFCs		ND	10
Bromomethane		ND	10
HBFCs		ND	10

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020 Page 8 / 12

Took Itaan	Result	(mg/kg)	MDL
Test Item	Silvery metal	Black body	(mg/kg)
Perfluorooctane sulphonate (PFOS)	ND	ND	0.01
Perfluorooctanoic Acid(PFOA)	ND	ND	0.01
DMF		ND	10
TCEP		ND	10
Hexabromocyclododecane (HBCDD)		ND	10
Diarsenic trioxide, Diarsenic pentaoxide		ND	2
Boric acid, specific sodium borates	/	ND	2
4-(1,1,3,3-tetramethylbutyl)phenol		ND	50
Bis(2-methoxyethyl)ether-d14		ND	50
DMAC		ND	50
EGDME		ND	50

#### Note:

- (1) The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.
- (2) ND=Not detected (Below the detection limit);
- (3) mg/kg = ppm=parts per million.
- (4) When Cr(VI) in a sample is detected below the  $0.10~\mu$  g/cm², the sample is negative for Cr(VI). When Cr(VI) is detected above  $0.13~\mu$  g/cm², the sample is positive for the presence of Cr(VI) in the coating layer. A"grey zone" between  $0.10~\mu$  g/cm² and  $0.13~\mu$  g/cm² has been established as "inconclusive" to reduce inconsistent results due to unavoidable coating variations. In this case, additional testing may be necessary to confirm the presence of Cr(VI).
- (5) # = Testing Cr6+ by IEC 62321:2008 Annex B and the result is showed as Positive/Negative Negative = Absence of Cr6+, which means that the Cr6+ concentration in extraction solution is less than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area Positive = Presence of Cr6+, which means that the Cr6+ concentration in extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.
- (6) Letter R, which is added at the end of the report number, shows this report is a revised document for Report No. AL2012922501EN. Report No. AL2012922501EN is replaced and invalidated automatically from the approval date of this report. As specified by client/The revised content is as follows:
  - a. On the page 10~12 of the report, Test Flow Chart was added.

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



Report No. AL2012922501ENR

Approved date: Dec. 24, 2020

Page 9 / 12

### **Test Method**

Test Item	Test Method	Measured Equipment
Lood (Db.) Codesium (Cd.)	IEC 62321-3-1:2013 & IEC	VDE 8 I CD OF C
Lead (Pb), Cadmium (Cd)	62321-5:2013	XRF&ICP-OES
Maria (1112)	IEC 62321-3-1:2013 & IEC	VDE 0.100, OF 0
Mercury (Hg)	62321-4:2018	XRF&ICP-OES
Hovevelent Chromium (Cr/VII)	IEC62321 Edition 1.0:2008	UV-Vis
Hexavalent Chromium (Cr(VI))	IEC 62321-7-2:2017	UV-Vis
Polybrominated biphenyls (PBBs)	IEC (2224 C.204E	GC-MS
Polybrominated diphenyl ethers (PBDEs)	IEC 62321-6:2015	GC-MS
PCBs	EPA 8082A	GC-MS
PCNs	EPA 8082A	GC-MS
PCTs	EPA 8082A	GC-MS
SCCP	EPA 3540C	GC-MS
ТВТ	DIN 38407-13	GC
TPT	DIN 38407-13	GC
DBT	DIN 38407-13	GC
DOT	DIN 38407-13	GC
Asbestos	Niosh Method 9000,issue 2	X-ray Diffraction
Azo compounds	35 LMBG	GC-MS
Formaldehyde	ISO/TS 17226:2003(E)	HPLC
DVC and DVC compound		Fourier ransform
PVC and PVC compound		Infrared Spectra
Beryllium oxide		ICP-OES
Beryllium copper		ICP-OES
Fluorine(F), Chlorine(Cl),	EN 14582:2016	IC
Bromine(Br),Iodine(I)	EN 14382.2010	ic
Antimony (Sb)	GB/T 5121.12-2008	ICP-OES
Phthalates	IEC 62321-8: 2017	GC-MS
HFC	EPA8260B	GC-MS
UV320(Specific benzotriazole)		GC-MS
Cobalt dichloride		ICP-OES

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Note: All test results are only valid for the samples being tested. This rest report shall not be reproduced except in full, without the written approval of the testing laboratory The Dates for internal quality control data reference only

Address: 2nd Floor, Building 4, No.158, Jinfeng Road, Pudong District, Shanghai, China (201201) Tel: +86 21 5838-0071 Fax: +86 21 5838-0083



Report No. AL2012922501ENR

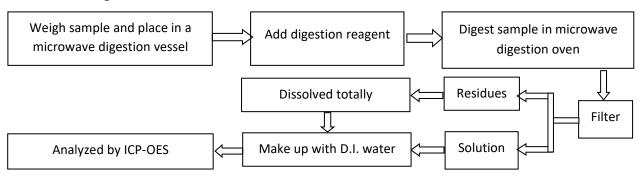
Approved date: Dec. 24, 2020

Page 10 / 12

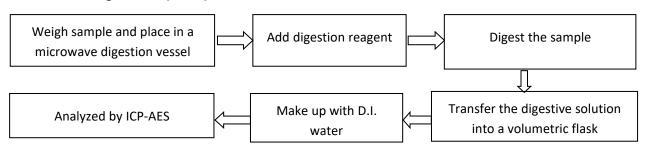
Test Item	Test Method	Measured Equipment
Ozonosphere destroy substance	EPA8260B	GC-MS
Perfluorooctane Sulfonates(PFOS)	CEN/TC 450C0-2040	LC NAC NAC
Perfluorooctanoic Acid(PFOA)	CEN/TS 15968:2010	LC-MS-MS
DMF		GC
TCEP	EPA 3540C	GC-MS
Hexabromocyclododecane (HBCDD)	EPA 3540C	GC-MS
Diarsenic trioxide, Diarsenic pentaoxide	EPA3052	ICP-OES
Boric acid, specific sodium borates	EPA3052	ICP-OES
4-(1,1,3,3-tetramethylbutyl)phenol	EPA 3540C	GC-MS
Bis(2-methoxyethyl)ether-d14	EPA 3540C	GC-MS
DMAC	EPA 3540C	GC-MS
EGDME	EPA 3540C	GC-MS

### **Test Flow Chart**

### **Test for Pb/Cd/Hg Content**



## Test for Pb/Cd/Hg Content (Metal)



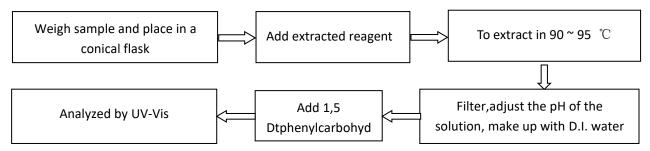
This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



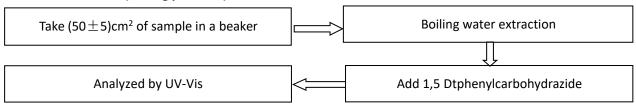
Report No. AL2012922501ENR Approved date: Dec. 24, 2020

Page 11 / 12

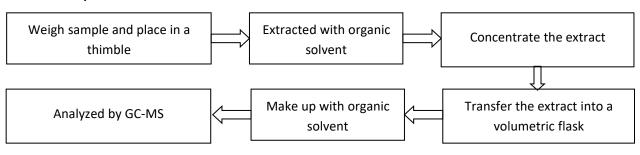
### Test for Cr<sup>6+</sup> Content



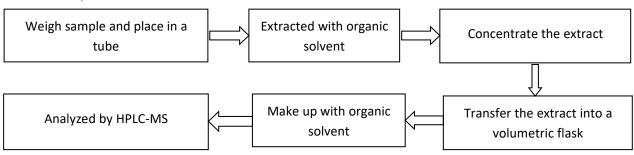
## Test for Cr6+ Content (Plating products)



## **Test for PBBs /PBDEs Content**



## **Test for PFOA, PFOS Content**



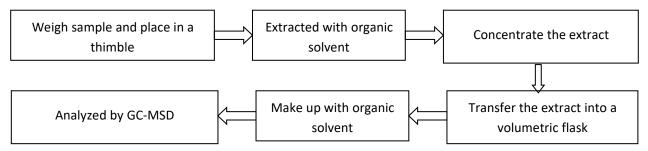
This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.



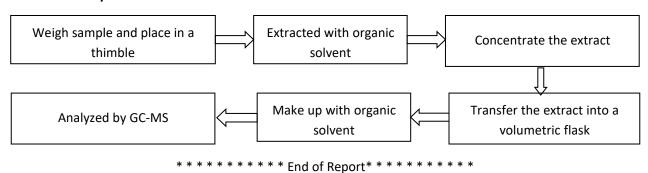
Report No. AL2012922501ENR Approved date: Dec. 24, 2020

Page 12 / 12

### **Test for phthalates Content**



### **Test for Dimethyl fumarate Content**



- (1) This report is not affixed to the special seal invalid.
- (2) This report shall not be modified, increased, deleted, copied or intercepted, without the approval of Lelangtek.
- (3) The results shown in this report refer only to the lab received sample(s).
- (4) If you have any question or concern to this report, please contact us within 10 days, or it will not be accepted out of the time.

This document is issued by the Company subject to its General Conditions of Service printed overleaf. Attention is drawn to the limitation of liability. Indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's finding at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility transaction documents. This documents cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law, Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.