

Test Report

No.: EG210423029C02MVer.1

Date: Apr. 28, 2021

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Applicant : TONGFU MICROELECTRONICS CO.,LTD.
Address : No.288,Chongchuan Road, Nantong, Jiangsu, China

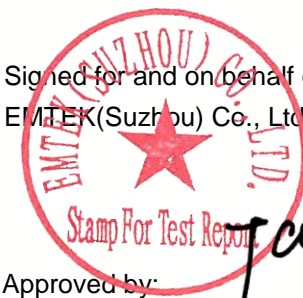
The sample and sample information tested below are provided and confirmed by the applicant

Sample Name : LQFP32
Model : Metal pin, Black body
Received Date : Apr. 23, 2021
Test Period : Apr. 23, 2021~Apr. 28, 2021
Test Summary :

Test Item	Conclusion
Directive 2011/65/EU (RoHS) and its Amendments	Pass
PFOS, PFOA	Pass
Fluorine(F),Chlorine(Cl), Bromine(Br), Iodine(I)	Pass
Antimony(Sb)	N/A
Phthalates	Pass
Hexabromocyclododecan (HBCDD)	Pass

Remark: Pass: Meet the requirement; Fail: Doesn't meet the requirement; N/A: Without conclusions or provide test results only.

Signed for and on behalf of
 EMTEK(Suzhou) Co., Ltd.



Prepared by: Coral
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 Assistant engineer

Reviewed by: Hunter
 Yang Xiao, Hunter
 Technical supervisor

Approved by: Jason
 Jiang Yufeng, Jason
 Authorized signatory
 Apr. 28, 2021

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Sample Description

(The sample and sample information tested below are provided and confirmed by the applicant)

Sample No.	Sample Number	Model	Quantity
2	EG21042302902	Metal pin, Black body	1pc
2.1		Metal pin	1pc
2.2		Black body	1pc

Summary of Test Results

1. RoHS

1.1 Test Method

Test Item	Test Method
Cadmium (Cd), Lead (Pb)	IEC 62321-5:2013
<u>Mercury (Hg)</u>	IEC 62321-4:2013+A1:2017
Hexavalent Chromium (Cr ⁶⁺)	IEC 62321-7-2:2017, IEC 62321-7-1:2015
PBBs & PBDEs	IEC 62321-6:2015
DEHP, BBP, DBP, DIBP	IEC 62321-8:2017

1.2 Test Instrument

Instrument Name	Manufacturer	Model
ICP-OES	Agilent	720
UV-Vis	SHIMADZU	UV-1800
GC-MS	Agilent	7890B-5977A
GC-MS	SHIMADZU	QP2010 Ultra

1.3 Test Result: Limit according to Directive 2011/65/EU (RoHS) and its Amendments

Test Item	Result (mg/kg)		MDL (mg/kg)	Limit (mg/kg)
	2.1	2.2		
Lead (Pb)	N.D.	N.D.	2	1000
Cadmium (Cd)	N.D.	N.D.	2	100

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Test Item	Result (mg/kg)		MDL (mg/kg)	Limit (mg/kg)
	2.1	2.2		
Mercury (Hg)	N.D.	N.D.	2	1000
Hexavalent Chromium (Cr ⁶⁺)	N.D.	N.D.	Non-metal: 8	1000
			Metal: 0.10µg/cm ²	--

Test Item	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
	2.2		
Polybrominated Biphenyls (Mono – Deca) (PBBs)	N.D.	--	1000
Monobromobiphenyl	N.D.	5	--
Dibromobiphenyl	N.D.	5	--
Tribromobiphenyl	N.D.	5	--
Tetrabromobiphenyl	N.D.	5	--
Pentabromobiphenyl	N.D.	5	--
Hexabromobiphenyl	N.D.	5	--
Heptabromobiphenyl	N.D.	5	--
Octabromobiphenyl	N.D.	5	--
Nonabromobiphenyl	N.D.	5	--
Decabromobiphenyl	N.D.	5	--
Polybrominated Diphenylethers (Mono – Deca) (PBDEs)	N.D.	--	1000
Monobromodiphenyl ether	N.D.	5	--
Dibromodiphenyl ether	N.D.	5	--
Tribromodiphenyl ether	N.D.	5	--
Tetrabromodiphenyl ether	N.D.	5	--
Pentabromodiphenyl ether	N.D.	5	--
Hexabromodiphenyl ether	N.D.	5	--

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Test Item	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
	2.2		
Heptabromodiphenyl ether	N.D.	5	--
Octabromodiphenyl ether	N.D.	5	--
Nonabromodiphenyl ether	N.D.	5	--
Decabromodiphenyl ether	N.D.	5	--

Test Item	CAS No.	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
		2.2		
Bis(2-ethylhexyl) phthalate(DEHP)	117-81-7	N.D.	50	1000
Butyl benzyl phthalate (BBP)	85-68-7	N.D.	50	1000
Dibutyl phthalate (DBP)	84-74-2	N.D.	50	1000
Diisobutyl phthalate (DIBP)	84-69-5	N.D.	50	1000

Note:

1) N.D. = Not Detected (Less than Detection Limit).

2) MDL= Method Detection Limit.

3) Because it is difficult to measure the weight of the anticorrosion in plating accurately, the content of hexavalent chromium in plating shows in its quality of unit area.

Unit: $\mu\text{g}/\text{cm}^2$. Because the storage conditions and production date of the test samples are unknown, the test results of Cr(VI) are only represent its state during test period.

a. When Sample Cr(VI) concentration is Less than $0,10 \mu\text{g}/\text{cm}^2$,The sample is negative for Cr(VI),
The sample not contain Cr(VI) , The test result is Pass.

b. When Sample Cr(VI) concentration Between $0,10 \mu\text{g}/\text{cm}^2$ and $0,13 \mu\text{g}/\text{cm}^2$, The result need to reconfirm. The test result is not judge.

c. When Sample Cr(VI) concentration greater than $0,13 \mu\text{g}/\text{cm}^2$, The sample is positive for Cr(VI), The sample contain Cr(VI) , The test result is Fail.

4) Specimens, which requested to determine Lead, Cadmium and Mercury content, have been dissolved completely.

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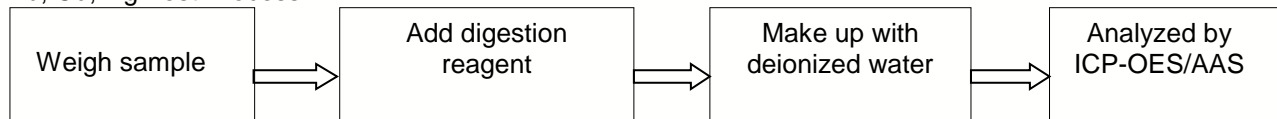
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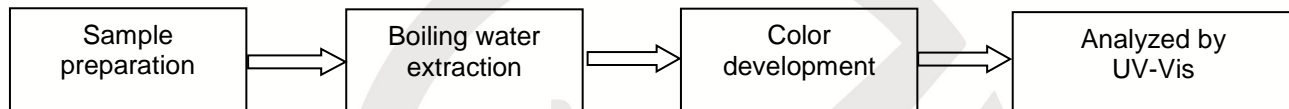
1.4 Test Flowchart

Pb, Cd, Hg Test Process:

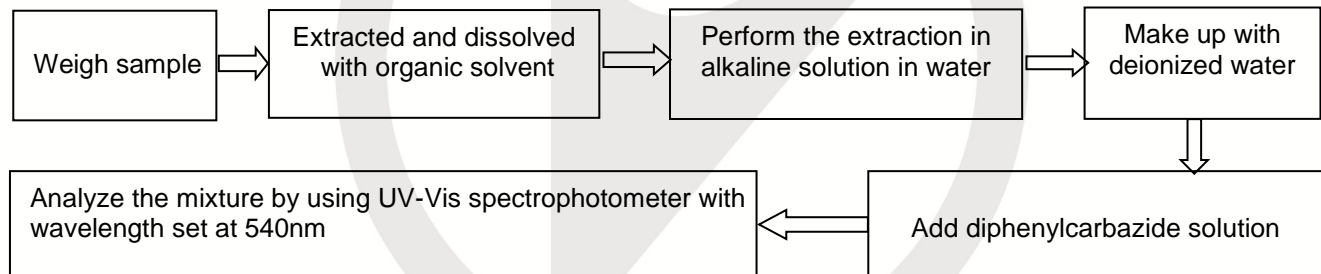


Cr⁶⁺ Test Process:

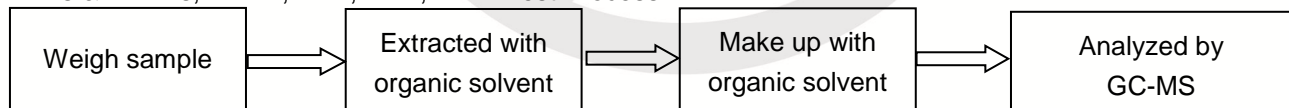
Metal:



Non-metal :



PBBs & PBDEs, DEHP, BBP, DBP, DIBP Test Process



2. PFOS, PFOA

2.1 Test Method

Test Item	Test Method
PFOS, PFOA	US EPA 3550C:2007&US EPA 8321B:2007

2.2 Test Instrument

Instrument Name	Manufacturer	Model
LC-MS	SHIMADZU	LCMS-2020

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2.3 Test Result

Test Item	Result (mg/kg)		MDL (mg/kg)	Client Limit (mg/kg)
	2.1	2.2		
Perfluorooctane sulfonic acid and its derivatives (PFOS)	N.D.	N.D.	0.01	0.025
Perfluorooctanoic Acid (PFOA)	N.D.	N.D.	0.01	0.025

Note

- 1) N.D. = Not Detected (Less than Detection Limit)
- 2) MDL= Method Detection Limit.

3. Fluorine(F), Chlorine(Cl), Bromine(Br), Iodine(I)

3.1 Test Method

Test Item	Test Method
Fluorine(F), Chlorine(Cl), Bromine(Br), Iodine(I)	BS EN 14582:2016

3.2 Test Instrument

Instrument Name	Manufacturer	Model
IC	Thermo Fisher	ICS-900

3.3 Test Result: Limit value reference to Halogen-free requirements IEC 61249-2-21: 2003.

Test Item	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
	2.2		
Fluorine(F)	N.D.	50	----
Chlorine(Cl)	N.D.	50	900
Bromine(Br)	N.D.	50	900
Iodine(I)	N.D.	50	----
Chlorine(Cl)+ Bromine(Br)	N.D.	/	1500

Note

- 1) N.D. = Not Detected (Less than Detection Limit)
- 2) MDL= Method Detection Limit.
- 3) "----": IEC 61249-2-21: 2003 isn't Regulated Limit Requirement.

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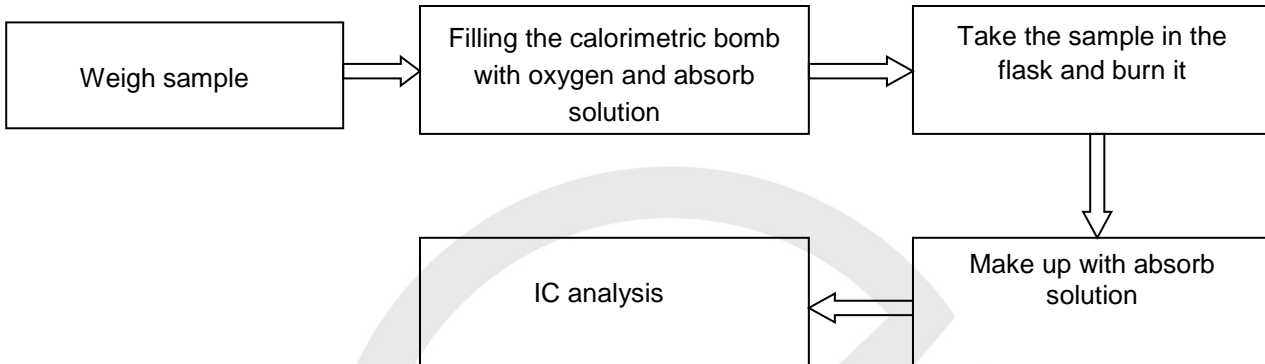
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3.4 Test Flowchart



4. Antimony (Sb)

4.1 Test Method

Test Item	Test Method
Antimony (Sb)	US EPA 3052:1996 & US EPA 6010D:2018

4.2 Test Instrument

Instrument Name	Manufacturer	Model
ICP-OES	Agilent	720

4.3 Test Result

Test Item	Result (mg/kg)		MDL (mg/kg)
	2.1	2.2	
Antimony (Sb)	N.D.	N.D.	2

Note

- 1) N.D. = Not Detected (Less than Detection Limit)
- 2) MDL= Method Detection Limit.

5. Phthalates

5.1 Test Method

Test Item	Test Method
Phthalates	US EPA 3550C:2007&US EPA 8270E:2018

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5.2 Test Instrument

Instrument Name	Manufacturer	Model
GC-MS	SHIMADZU	QP2010 Ultra

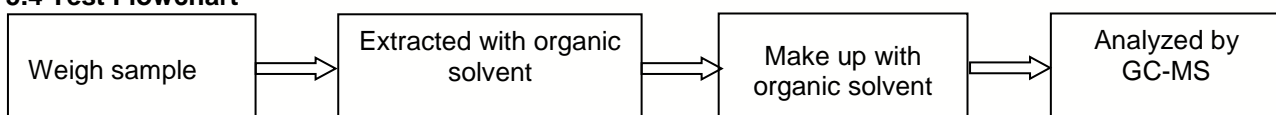
5.3 Test Result: Limit according to the REACH Regulation (EC) NO.1907/2006 Annex XVII

Test Item	CAS No.	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
		2.2		
Diisononyl phthalate(DINP)	28553-12-0 68515-48-0	N.D.	50	--
Diisoheptyl phthalate(DIDP)	68515-49-1 26761-40-0	N.D.	50	--
Di-n-octyl phthalate(DNOP)	117-84-0	N.D.	50	--
Total(DINP+DIDP+DNOP)	--	N.D.	--	1000
Dihexyl phthalate(DNHP&DHxP)	84-75-3	N.D.	50	--
Dimethyl ortho-phthalate(DMP)	131-11-3	N.D.	50	--
Dichthyl ortho-phthalate(DEP)	84-66-2	N.D.	50	--
Dihexyl phthalate (DHP)	3648-21-3	N.D.	50	--
Dipentyl phthalate(DPP)	131-18-0	N.D.	50	--
Dipropyl phthalate(DPrP)	131-16- 8	N.D.	50	--
Diisooctyl ortho-phthalate(DIOP)	27554-26-3	N.D.	50	--
Dicyclohexyl ortho-phthalate(DCHP)	84-61-7	N.D.	50	--
Diisonoyl adipate(DNP)	84-76-4	N.D.	50	--

Note

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- 2) MDL= Method Detection Limit.

5.4 Test Flowchart



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6.Hexabromocyclododecan (HBCDD)

6.1 Test Method

Test Item	Test Method
Hexabromocyclododecan (HBCDD)	US EPA 3540C:2007&US EPA 8270E:2018

6.2 Test Instrument

Instrument Name	Manufacturer	Model
GC-MS	Agilent	7890B-5977A

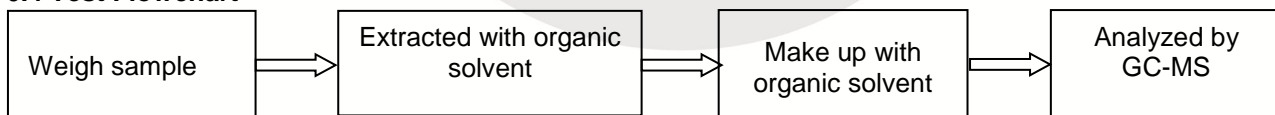
6.3 Test Result:Limit according to the REACH Regulation (EC) NO.1907/2006

Test Item	Result (mg/kg)	MDL (mg/kg)	Limit (mg/kg)
	2.2		
Hexabromocyclododecan (HBCDD)	N.D.	5	1000

Note

- 1) N.D. = Not Detected (Less than Detection Limit)
- 2) MDL= Method Detection Limit.

6.4 Test Flowchart



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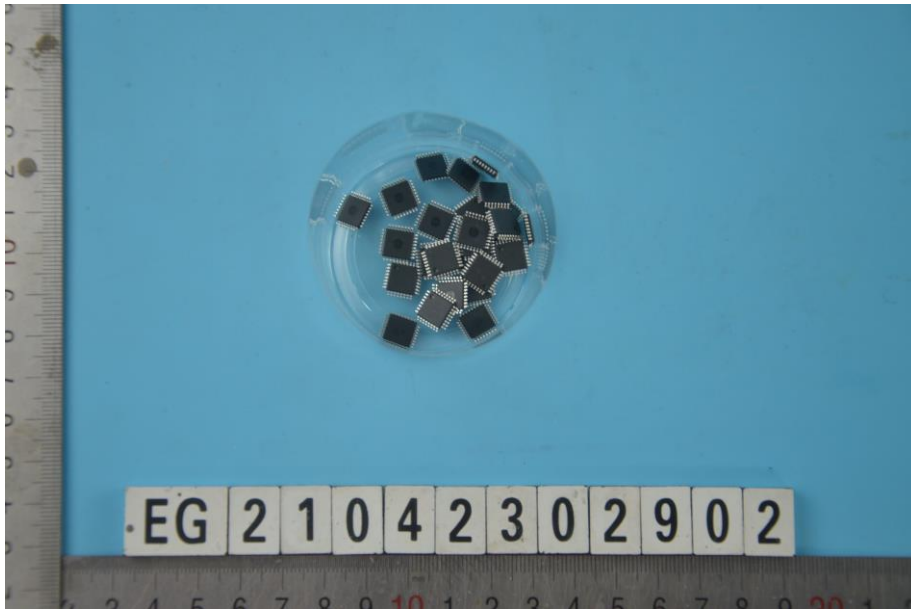
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Product Photo



Sample Photo

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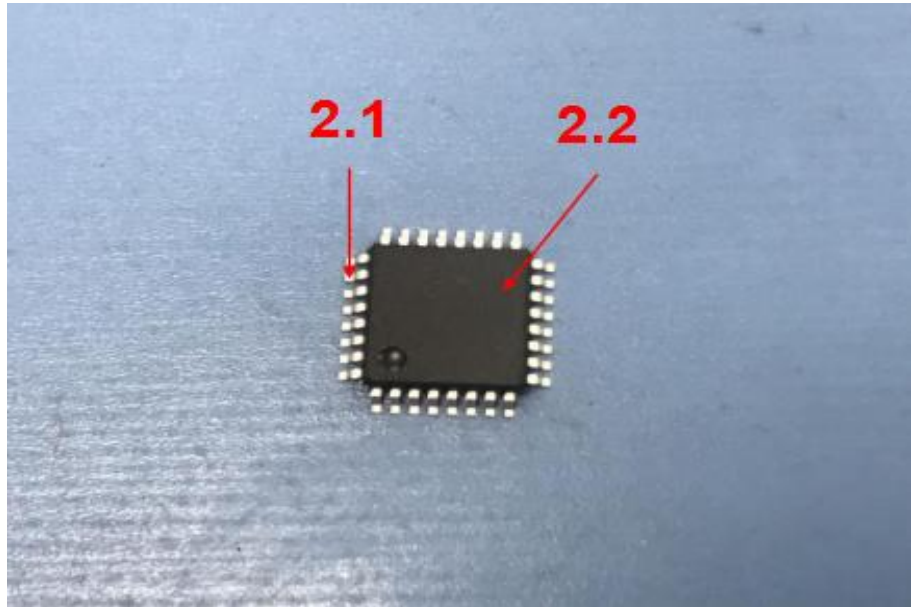


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*** End of Report ***

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7. 若需要在法院审理程序或者仲裁过程中使用测试报告，客户必须在提交测试样品前将该意图告知本公司。
Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. 该测试报告的支持数据和信息本公司保存 10 年。个别评审机构有特别要求的，检测数据和报告的保存期可依情况变动。一旦超过上述提交的保存期限，数据和信息将被处理掉。任何情况下，本公司不必提供任何被处理的过期数据或信息。即使本公司事先被告知可能会发生相关的损害，本公司在任何情况下也不必承担任何损害，包括（但不限于）补偿性赔偿、利润损失、数据遗失、或任何形式的特殊损害、附带损害、间接损害、从属损害或任何违反约定、违反承诺、侵权（包括疏忽）、产品责任或其他原因的惩罚性损害。
Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of ten years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

Test results are only responsible for delivered samples. This test report is issued by the company and is intended for your exclusive use. This test report includes all of the testes requested by you and the results thereof based upon the information that you provided. You have 30 days from data of issuance of this test report to notify us of any error or omission caused by our negligence. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

