

## Test Report

No. SHAEC1526506703

Date: 05 Jan 2016

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WUHU RECTECH ELECTRONIC TECHNOLOGY CO.,LTD.

HENGSHAN ROAD, WUHU ECONOMIC & TECHNOLOGICAL DEVELOPMENT ZONE, AUTOMOTIVE ELECTRONICS & KEY COMPONENTS INCUBATE ZONE.

The following sample(s) was/were submitted and identified on behalf of the clients as : PLASTIC PACKAGE RECTIFIERS/DIODES

SGS Job No. : SP15-041050 - SH

Composition : METAL LEAD,SOLDER,EPOXY MOLDING,DICE

Model No. : TO-220

Client Ref. Information : R-1/3/6,A-405,  
DO-41/15/201AD/AE,DB/DF,DBS/DFS,GBP,GBPC,KBU,GBU,KBP,MBM/S,RS2/  
4/6/8,KBPC,TO-220AB/AC&C&ITO-SERIES,KBL,GBL,BR,WOB,RB,TS4B,TO-3  
P,TS6P,M/92S/92L,TO-247,TO-251/2,SMA/B/C,SERIES INCLUDING  
DO-214AA/B/C, TO-92/94/L/S,TO-126/C/B  
SOT-23/143/223/323/343/353/563/363/523,SOT-23-5L/6L,SOT-89-3L/5L/6L,SO  
D-123/123FL/323/523/723/923,TO-252-2L/3L/5L,TO-263-2L/3L/5L,MELF,MINIM  
ELF,0201,0402.0603

Date of Sample Received : 23 Dec 2015

Testing Period : 23 Dec 2015 - 31 Dec 2015

Test Requested : Selected test(s) as requested by client.

Test Method : Please refer to next page(s).

Test Results : Please refer to next page(s).

Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.



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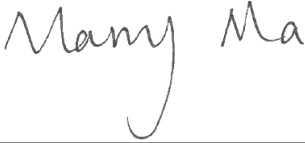
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Signed for and on behalf of  
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.



Marry Ma  
Approved Signatory



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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA15-265067.001	Golden/black solid dice
SN2	SHA15-265067.002	Silvery metal
SN3	SHA15-265067.003	Silvery metal pin
SN4	SHA15-265067.004	Black solid block

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

**RoHS Directive 2011/65/EU**

- Test Method :
- (1) With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES.
  - (2) With reference to IEC 62321-5:2013, determination of Lead by ICP-OES.
  - (3) With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES.
  - (4) With reference to IEC 62321:2008, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis.
  - (5) With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS.

Test Item(s)	Limit	Unit	MDL	001	004
Cadmium (Cd)	100	mg/kg	2	ND	ND
Lead (Pb)	1000	mg/kg	2	11241▲	ND
Mercury (Hg)	1000	mg/kg	2	ND	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	2	ND	ND
Sum of PBBs	1000	mg/kg	-	ND	ND
Monobromobiphenyl	-	mg/kg	5	ND	ND
Dibromobiphenyl	-	mg/kg	5	ND	ND
Tribromobiphenyl	-	mg/kg	5	ND	ND
Tetrabromobiphenyl	-	mg/kg	5	ND	ND
Pentabromobiphenyl	-	mg/kg	5	ND	ND
Hexabromobiphenyl	-	mg/kg	5	ND	ND
Heptabromobiphenyl	-	mg/kg	5	ND	ND
Octabromobiphenyl	-	mg/kg	5	ND	ND
Nonabromobiphenyl	-	mg/kg	5	ND	ND



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<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>	<u>004</u>
Decabromobiphenyl	-	mg/kg	5	ND	ND
Sum of PBDEs	1000	mg/kg	-	ND	ND
Monobromodiphenyl ether	-	mg/kg	5	ND	ND
Dibromodiphenyl ether	-	mg/kg	5	ND	ND
Tribromodiphenyl ether	-	mg/kg	5	ND	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND	ND
Octabromodiphenyl ether	-	mg/kg	5	ND	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND	ND
Decabromodiphenyl ether	-	mg/kg	5	ND	ND

Notes :

- (1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II
- (2) ▲According to the declaration from the client, Lead (Pb) in No.001 is exempted by EU RoHS directive 2011/65/EU based on [ANNEX III 7(c)-I]: Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

### RoHS Directive 2011/65/EU

- Test Method :
- (1) With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES.
  - (2) With reference to IEC 62321-5:2013, determination of Lead by AAS.
  - (3) With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES.
  - (4) With reference to IEC 62321:2008, determination of Hexavalent Chromium by spot test / Colorimetric Method using UV-Vis.
  - (5) With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>002</u>	<u>003</u>
Cadmium (Cd)	100	mg/kg	2	ND	ND
Lead (Pb)	1000	mg/kg	2		ND
Mercury (Hg)	1000	mg/kg	2	ND	ND
Hexavalent Chromium (Cr(VI))	-	-	◇	Negative	Negative
Sum of PBBs	1000	mg/kg	-	ND	ND
Monobromobiphenyl	-	mg/kg	5	ND	ND
Dibromobiphenyl	-	mg/kg	5	ND	ND
Tribromobiphenyl	-	mg/kg	5	ND	ND
Tetrabromobiphenyl	-	mg/kg	5	ND	ND



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<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>002</u>	<u>003</u>
Pentabromobiphenyl	-	mg/kg	5	ND	ND
Hexabromobiphenyl	-	mg/kg	5	ND	ND
Heptabromobiphenyl	-	mg/kg	5	ND	ND
Octabromobiphenyl	-	mg/kg	5	ND	ND
Nonabromobiphenyl	-	mg/kg	5	ND	ND
Decabromobiphenyl	-	mg/kg	5	ND	ND
Sum of PBDEs	1000	mg/kg	-	ND	ND
Monobromodiphenyl ether	-	mg/kg	5	ND	ND
Dibromodiphenyl ether	-	mg/kg	5	ND	ND
Tribromodiphenyl ether	-	mg/kg	5	ND	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND	ND
Octabromodiphenyl ether	-	mg/kg	5	ND	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND	ND
Decabromodiphenyl ether	-	mg/kg	5	ND	ND

Notes :

(1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II

(2) ◊Spot-test:

Negative = Absence of Cr(VI) coating, Positive = Presence of Cr(VI) coating;

(The tested sample should be further verified by boiling-water-extraction method if the spot test result is Negative or cannot be confirmed.)

◊Boiling-water-extraction:

Negative = Absence of Cr(VI) coating

Positive = Presence of Cr(VI) coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

## Halogen

Test Method : With reference to EN 14582: 2007, analysis was performed by Ion Chromatograph (IC).

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>	<u>004</u>
Fluorine (F)	mg/kg	50	ND	ND
Chlorine (Cl)	mg/kg	50	ND	117
Bromine (Br)	mg/kg	50	ND	ND
Iodine (I)	mg/kg	50	ND	ND



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**Element(s)**

Test Method : With reference to US EPA 3052:1996, analysis was performed by ICP-OES.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Arsenic (As)	mg/kg	10	ND
Antimony (Sb)	mg/kg	10	ND
Beryllium (Be)	mg/kg	5	ND

**Lead**

Test Method : Titration method

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>002</u>
Lead (Pb)	0.1	%	-	91.92▲

Notes :

- (1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II
- (2) ▲According to the declaration from the client, Lead (Pb) in No.002 is exempted by EU RoHS directive 2011/65/EU based on [ANNEX III 7(a)]: Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).

**Phthalates**

Test Method : With reference to EN 14372:2004, analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Bis-(2-ethylhexyl) Phthalate (DEHP)	117-81-7	%	0.003	ND
Dibutyl Phthalate (DBP)	84-74-2	%	0.003	ND
Benzylbutyl Phthalate (BBP)	85-68-7	%	0.003	ND
Diisobutyl Phthalate (DIBP)	84-69-5	%	0.003	ND



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Notes :

- (1) DBP,BBP,DEHP Reference information: Entry 51 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC):
    - i) Shall not be used as substances or in mixtures, in concentrations greater than 0,1 % by weight of the plasticised material, in toys and childcare articles.
    - ii) Toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.
- Please refer to Regulation (EC) No 552/2009 to get more detail information

**Hexabromocyclododecane (HBCDD)**

Test Method : With reference to IEC 62321:2008, analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Hexabromocyclododecane (HBCDD)	mg/kg	10	ND



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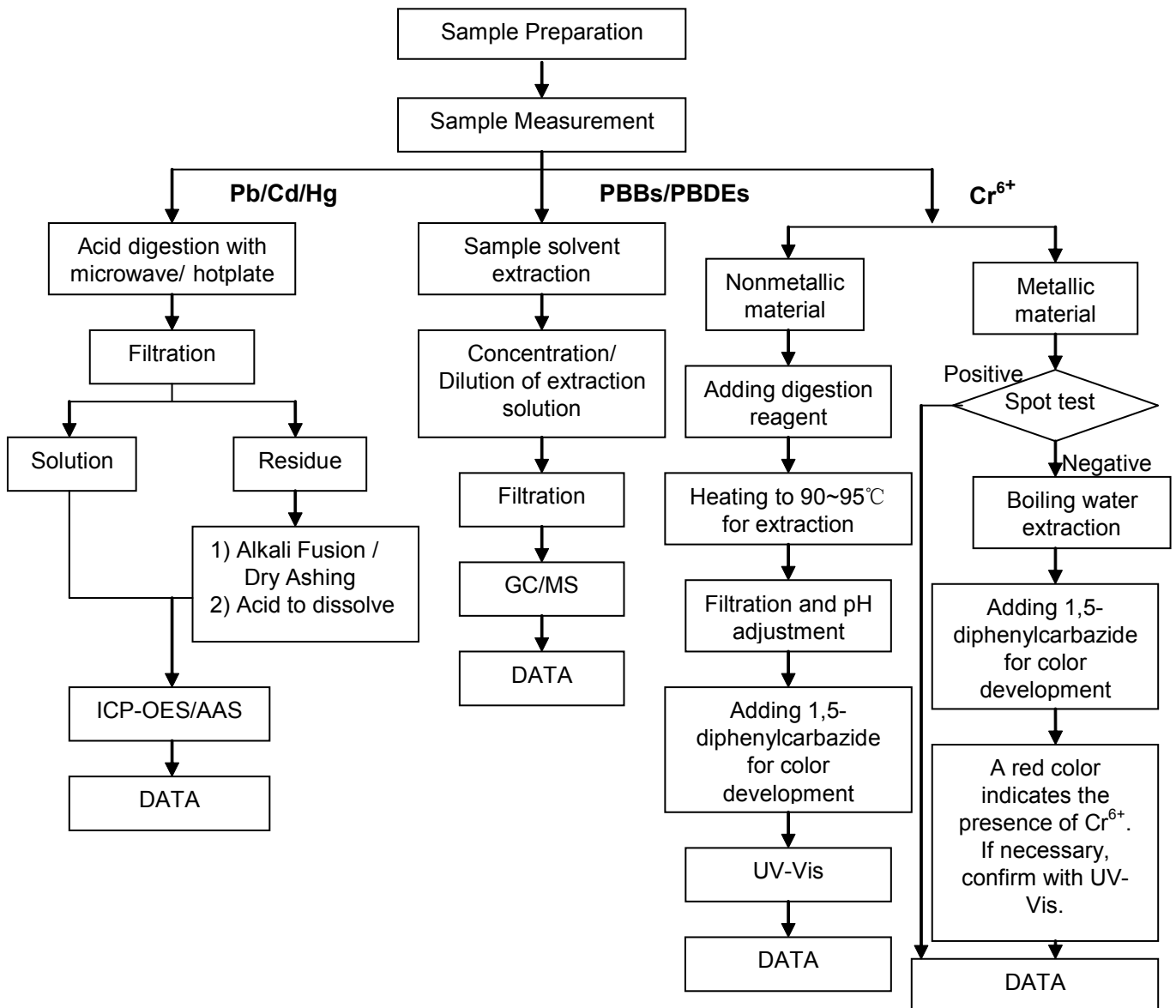
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RoHS Testing Flow Chart

- 1) Name of the person who made testing: David Lee/Gary Xu/Zengzhen Zhu/Sunny Qin
- 2) Name of the person in charge of testing: Jan Shi/Summer Jin/Jessy Huang/Stone Chen
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded)



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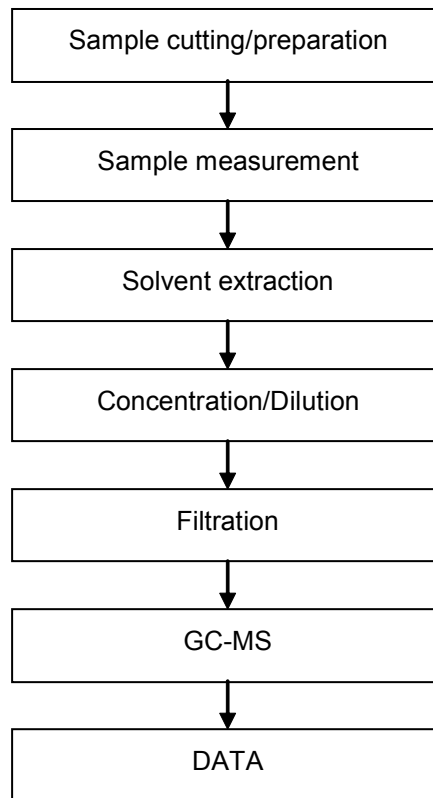
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### Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Sherlock Gao
- 2) Name of the person in charge of testing: Myra Ma



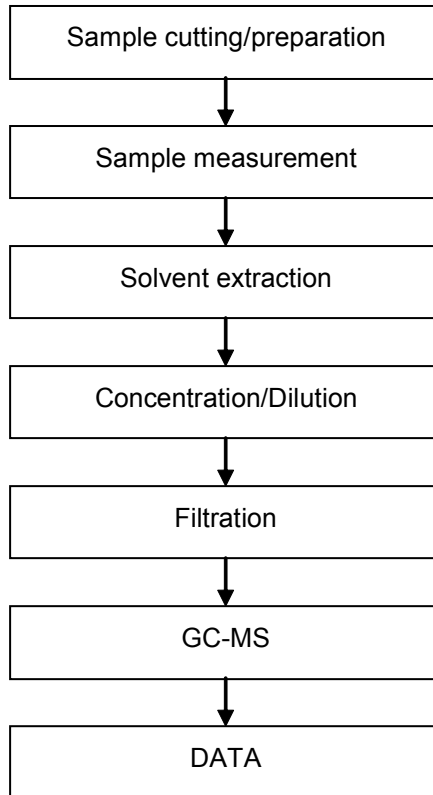
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HBCDD Testing Flow Chart

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Jessy Huang



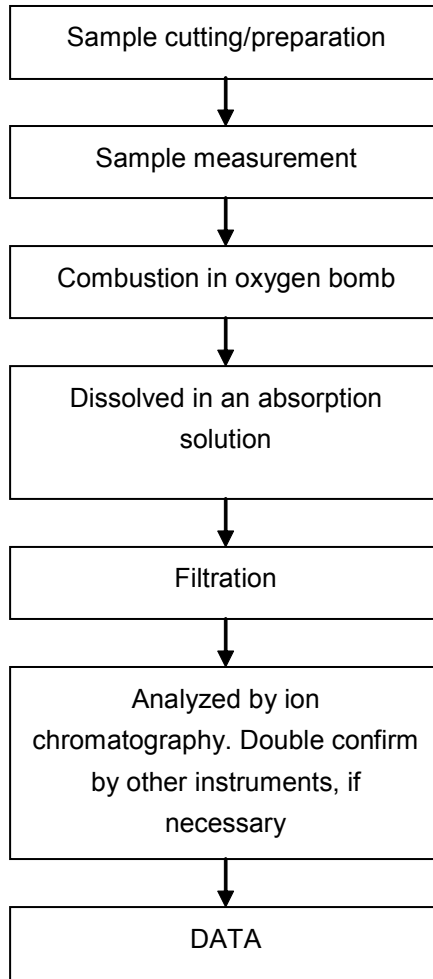
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**Halogen Testing (oxygen bomb) Flow Chart**

- 1) Name of the person who made testing: Sisily Yin
- 2) Name of the person in charge of testing: Linda Li



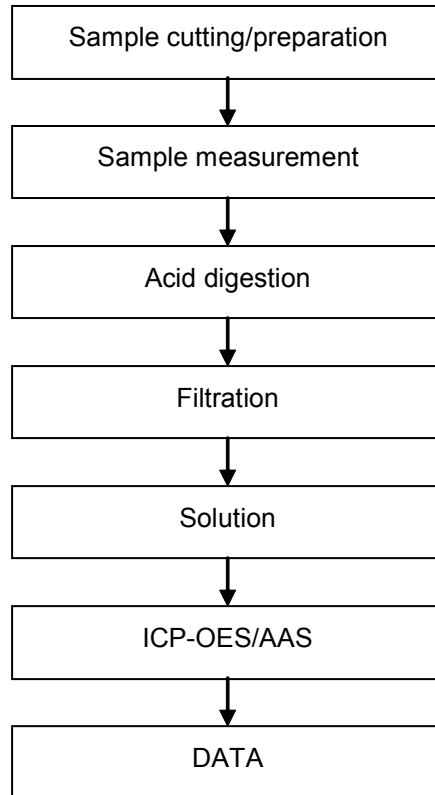
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**Elements Testing Flow Chart**

- 1) Name of the person who made testing: David Lee/Sunny Qin
- 2) Name of the person in charge of testing: Summer Jin/Jan Shi



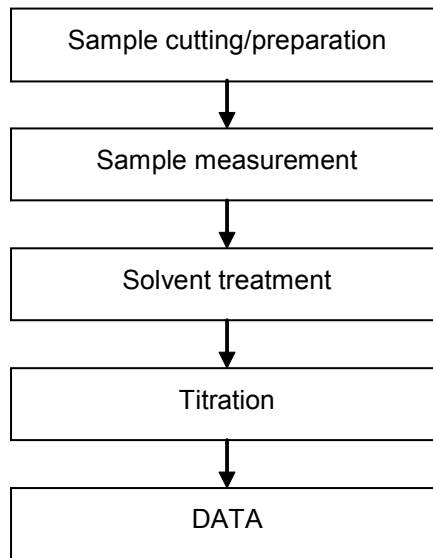
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ATTACHMENTS

**Titration Testing Flow Chart**

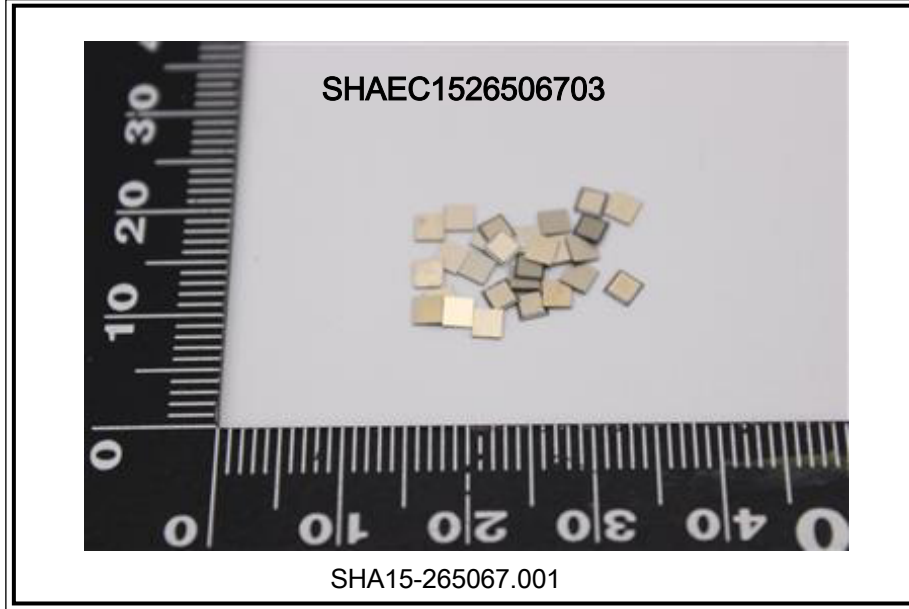
- 1) Name of the person who made testing: Hassan Xu
- 2) Name of the person in charge of testing: Lena Tang



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Sample photo:



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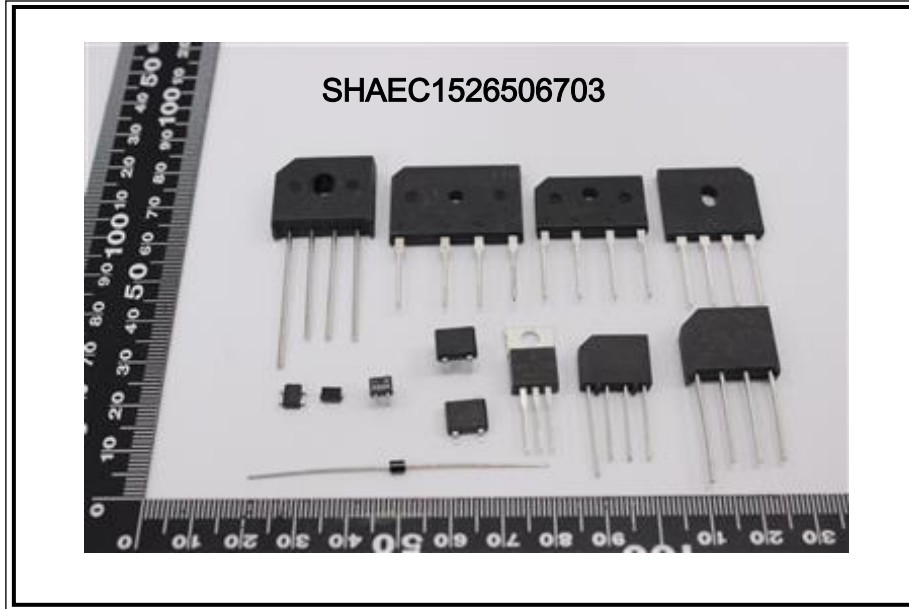


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