

Test Report

No. SHAEC2004705605

Date: 13 Apr 2020

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Topdiode Manufacturing Company Limited

Rooms 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, HK

The following sample(s) was/were submitted and identified on behalf of the clients as : DIODE BRIDGE

SGS Job No. : SP20-008000 - SUZ
Client Ref. Information : Please see the attachment
Date of Sample Received : 02 Apr 2020
Testing Period : 02 Apr 2020 - 13 Apr 2020
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) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

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

Helen Liu
Approved Signatory



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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA20-047056.001	Copper metal
SN2	SHA20-047056.002	Silver metal
SN3	SHA20-047056.003	Gray solid
SN4	SHA20-047056.004	Gray solid

Remarks :

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

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	003	004
Cadmium (Cd)	100	mg/kg	2	ND	ND
Lead (Pb)	1000	mg/kg	2	ND	ND
Mercury (Hg)	1000	mg/kg	2	ND	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	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
Decabromobiphenyl	-	mg/kg	5	ND	ND
Sum of PBDEs	1000	mg/kg	-	ND	ND
Monobromodiphenyl ether	-	mg/kg	5	ND	ND



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Test Item(s)	Limit	Unit	MDL	003	004
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
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND	ND

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
- (3) The restriction of DEHP, BBP, DBP and DIBP shall not apply to toys which are already subject to the restriction of DEHP, BBP, DBP and DIBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to Titration method, IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013 and IEC62321-7-1:2015, analyzed by ICP-OES and UV-Vis .

Test Item(s)	Limit	Unit	MDL	001	002
Cadmium (Cd)	100	mg/kg	2	ND	ND
Lead (Pb)	1000	mg/kg	2	110	
Mercury (Hg)	1000	mg/kg	2	ND	ND
Hexavalent Chromium (Cr(VI))▼	-	µg/cm ²	0.10	ND	ND
Lead (Pb)	0.1	%	-		92.93▲

Notes :

- (1)The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.



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https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25

(2) ▼ = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm².

The sample coating is considered to contain CrVI

b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 µg/cm²). The coating is considered a non-CrVI based coating

c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination

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.

(3) ▲ 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).



ATTACHMENT

R1	A-405	ABS	DO-34	DO-35
DO-201AE	R5	R6	R6M	HVM
FV5M	FV20M	FH	DO-214AC	DO-214AA
SMBF	MBF	SOD-123FL	SOD-110	SOD-123
SOD-523	SOT-23	SOT-323	SOT-363	SOT-523
DBS	RC-2WOM	WOG	2WOG	BR
RS	DF	DFS	KBP	KBPC
KBU	RBU	GBC	GBU	TO-220AB
TO-3P	TO-92	TO-247	TO-277	TO-252(DPAK)
DB-1SD	B-1	RB-15	RS-1	RS-2
BR-25L	KBK	HBL	MBR-25	MBR-25W
MMB-25W	MSBL	SM-1	SM-2	
DO-41	DO-15	DO-27	DO-201AD	
HVO3	HVO7	MTO3	HT5M	
DO-214AB	MINI-MELF(DO-213AA)	MELF(DO-213AB)	SMAF	
BTS	DL-41	SOD-80	SOD-323	
MB	MBS	MDB	DB	
BR3	BR6	BR8	BR10	
GBPC	KBPM	KBL	KBJ	
ITO-220AB	TO-220F	TO-220AC	ITO-220AC	
TO-263(D2PAK)	0805(2012)	1206(3216)	DB-IMS	
RS-5	TBL	BR-25W	BR-6	
MP-6	MP-8/10	MB-25W	MMB-25	



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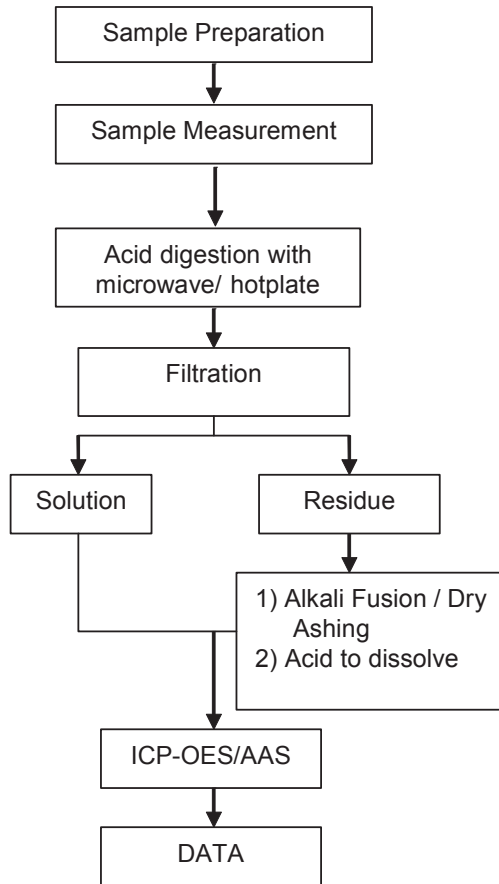
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Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.

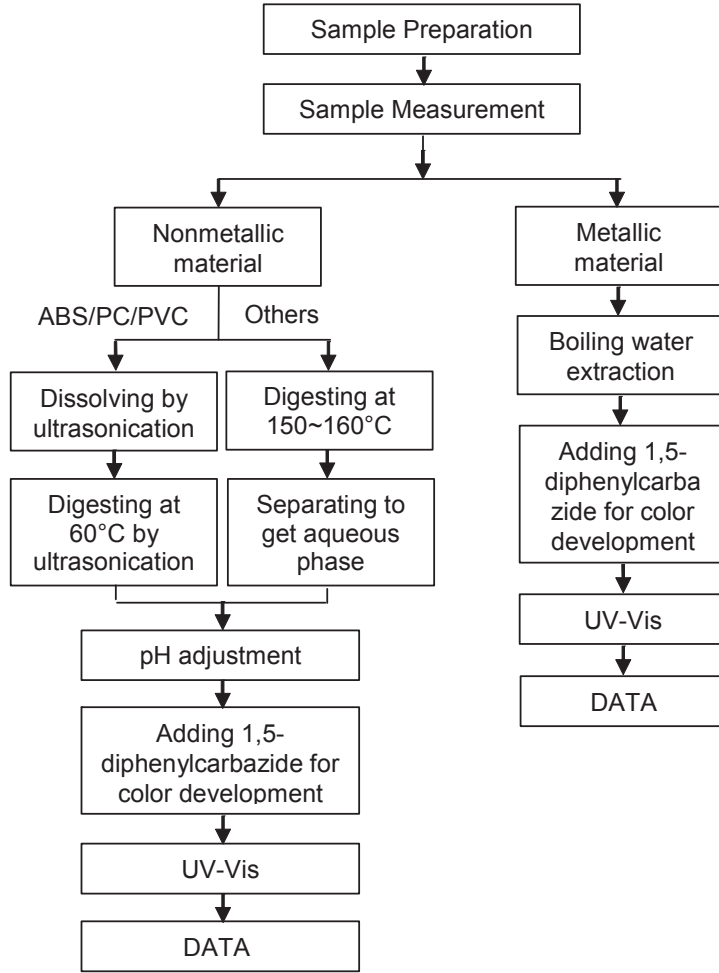


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Hexavalent Chromium (Cr(VI)) Testing Flow Chart

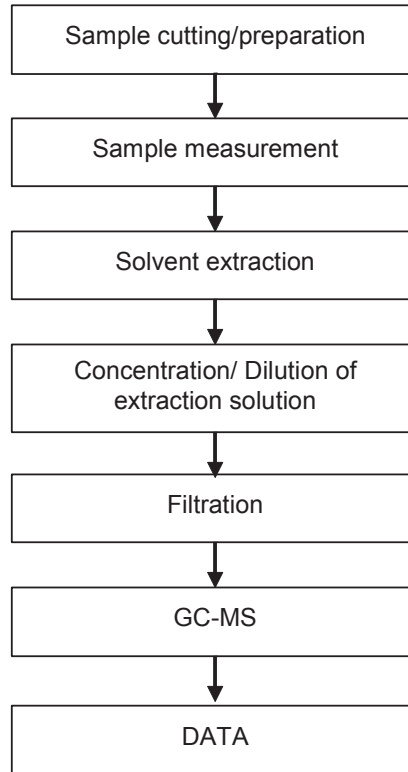


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PBBs/PBDEs Testing Flow Chart

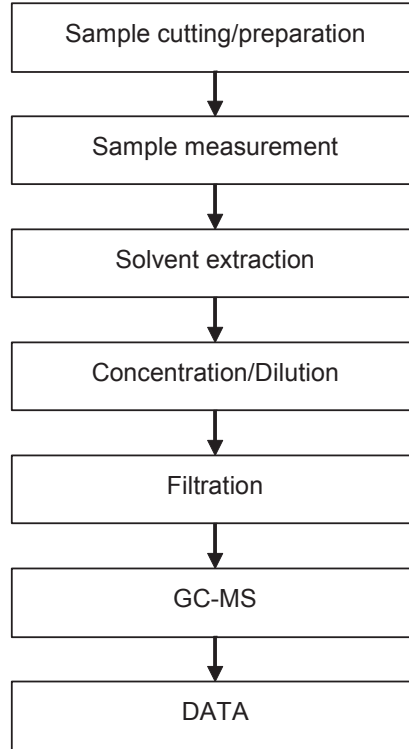


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Phthalates Testing Flow Chart



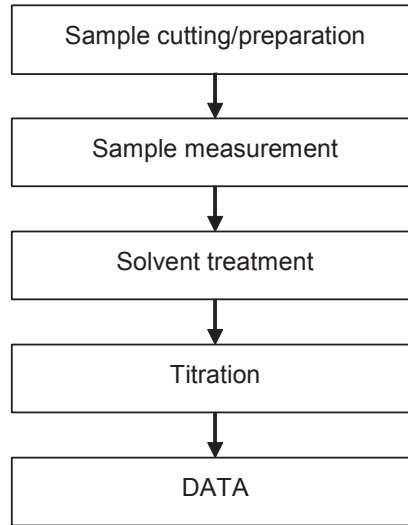
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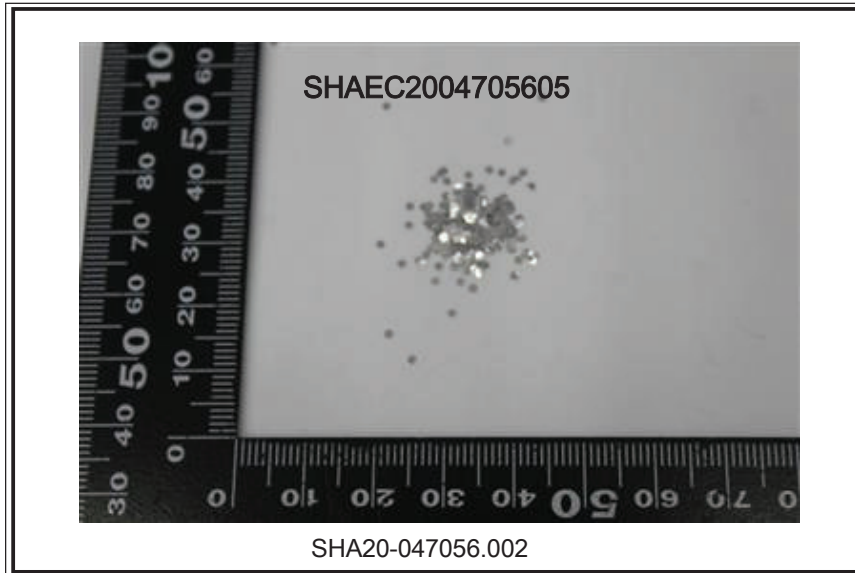
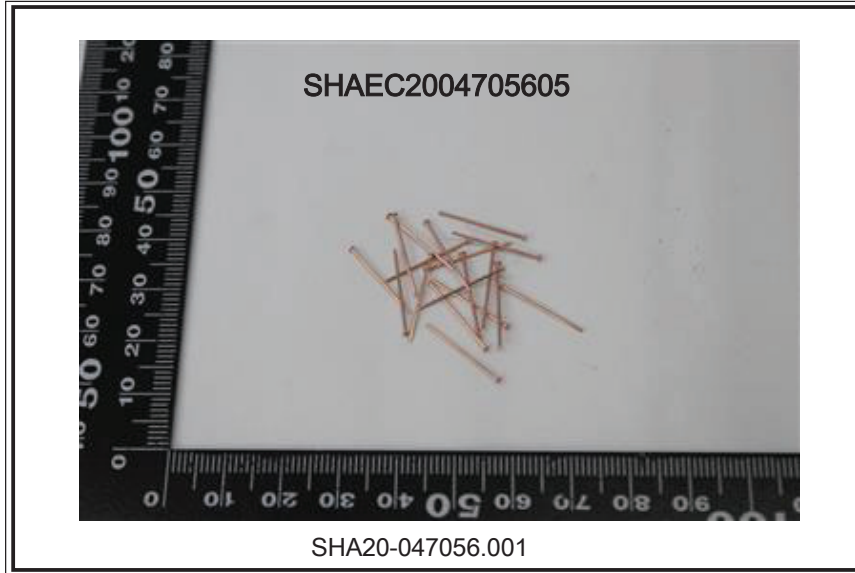
Titration Testing Flow Chart



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