



SPECIFICATION

Surface Acoustic Wave Filter

USER

USER PART No.

WISOL PART No. **SFX806CYH02**

DOC. No. SMS-51-L-SFT-FS-213

DATE April 11, 2019

REVISION 001

WISOL					
ISSUED BY	Jang, Kyeong-Jin 	APPROVED BY (R&D)	Ha, Sang-Ki 	APPROVED BY (QC)	Hong, Sang-Dea 
User					
ISSUED BY		CHECKED BY		APPROVED BY	

WISOL CO., LTD.
531-7, Gajang-ro, Osan-si,
Gyeonggi-do, KOREA, 18103
<http://www.wisol.co.kr>

► A TABLE OF CONTENTS

1. REVISION HISTORY	3
2. DEFINITION	4
3. PRECAUTIONS	4
5. MARKING	6
6. PERFORMANCE	7
6-1. MAXIMUM RATINGS	7
6-2. ELECTRICAL CHARACTERISTICS	8
7. RELIABILITY	13
7-1. ENGINEERING SAMPLE FLOW CHART	13
7-2. TEST ITEM & CONDITION	14
8. REFLOW CONDITION	15
9. RECOMMENDED PCB DIMENSIONS	15
10. CAUTION	16
11. PACKING	17
11-1. DIMENSIONS	17
11-2. REELING QUANTITY	18
11-3. TAPING STRUCTURE	18
11-4. INNER BOX(Reel Packing) STRUCTURE	19
11-5. OUTER BOX STRUCTURE	20
12. TAPE SPECIFICATIONS	21
13. RoHS DATA	22
13-1. RAW MATERIAL(EPOXY)	22
13-2. RAW MATERIAL(PACKAGE)	30
13-3. RAW MATERIAL(LN WAFER)	34
13-4. RAW MATERIAL(GOLD WIRE)	43

1. REVISION HISTORY

000	December 6, 2018	All Page	Make specification
001	April 11, 2019	All Page	RoHS DATA Update

2. DEFINITION

2-1. PART No.

S F X 806 C YH 0 2

① ② ③ ④ ⑤ ⑥

No.	EXPLANATION
①	SAW Filter
②	Design Type
③	Center Frequency :806MHz (791 ~ 821MHz)
④	Input / Output: 50 ohm / 50 ohm
⑤	Package size: 1.8×1.4mm ²
⑥	Design Revision (02: Molding Type)

2-2. APPLICATION: LTE BAND20 Unbalanced DPX

2-3. SPEC

ESD Level HBM=300V

3. PRECAUTIONS

3-1. This device should not be used in any type of fluid such as water, oil, organic solvent, etc.

3-2. This is a hermetic device.

MSL (Moisture Sensitive Level) is the '2a' level.

3-3. Ultrasonic cleaning shall be avoided.

3-4. Isopropyl Alcohol and Ethyl Alcohol can be used for cleaning. Contact us before using other cleaning solvents than above

3-5. This is an electrostatic sensitive device.

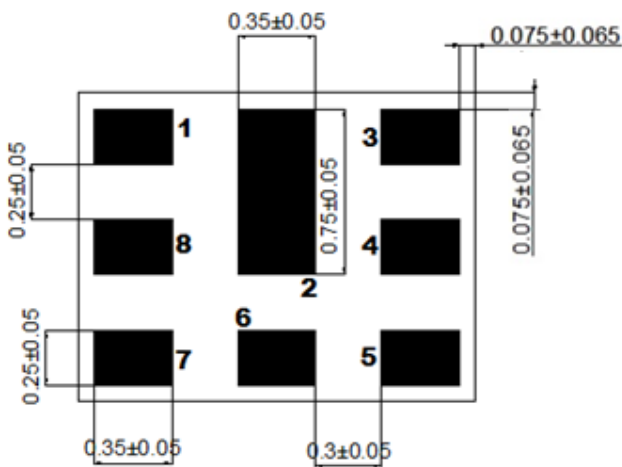
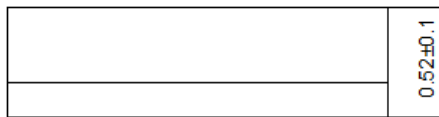
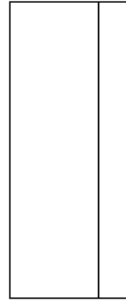
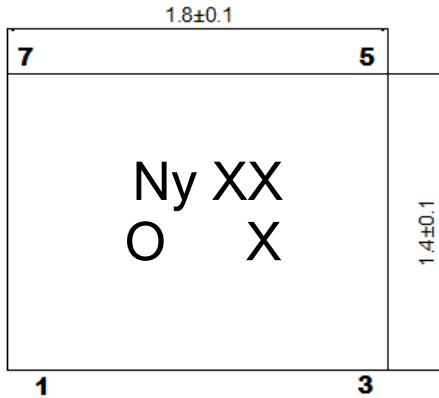
Please avoid static voltage during operation and storage.

3-6. Sudden change of temperature shall be avoided, deterioration of the characteristics can occur.

3-7. If any malfunction due to designing or manufacturing which is out of specification occurs within one year after the products have been delivered, the maker should exchange the defective products.

4. OUTLINE DRAWING & DIMENSIONS

[Unit: mm]



No.	Function
1	Rx Output
3	Tx Input
6	Antenna
2, 4, 5, 7, 8	GND

5. MARKING

Ny	XX
O	X

5-1. Ny XX X

- The 1st 2nd character 'Ny' indicates the model name of SAW Filter "SFX806CYH02".
- The 3rd character 'X' indicates the year and the month of manufacture.

Year	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
2017	1	2	3	4	5	6	7	8	9	A	B	C
2018	D	E	F	G	H	I	J	K	L	M	N	O
2019	P	Q	R	S	T	U	V	W	X	Y	Z	a
2020	1	2	3	4	5	6	7	8	9	A	B	C

※ This rotates by the 3 years.

- The 4th, 5th character 'X' indicates Lot No.

5-2. ○

- This symbol indicates input pin 1.
- This indicates the producing center
 - : China

5-3. Marking: Laser Marking

6. PERFORMANCE

6-1. MAXIMUM RATINGS

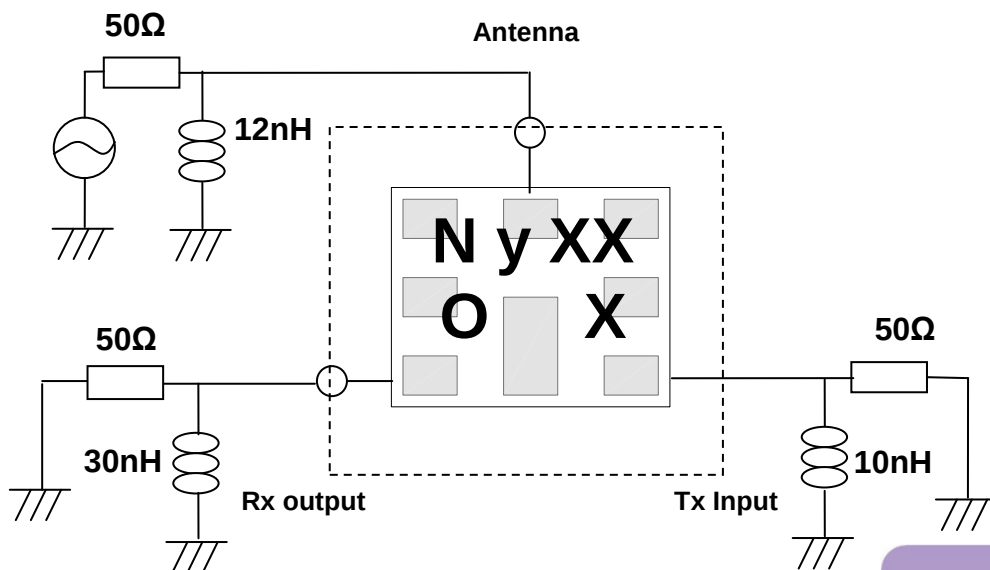
CHARACTERISTICS	RATINGS	UNITS	NOTES
DC Permissive Voltage	5	V	
Input Power	30	dBm	55 °C , 5000 h
Operating Temperature Range	− 20 ~ +85	°C	
Storage Temperature Range	− 40 ~ +85	°C	

6-2. ELECTRICAL CHARACTERISTICS
6-2-1. TABLE

Ta = - 20 ~ +85℃

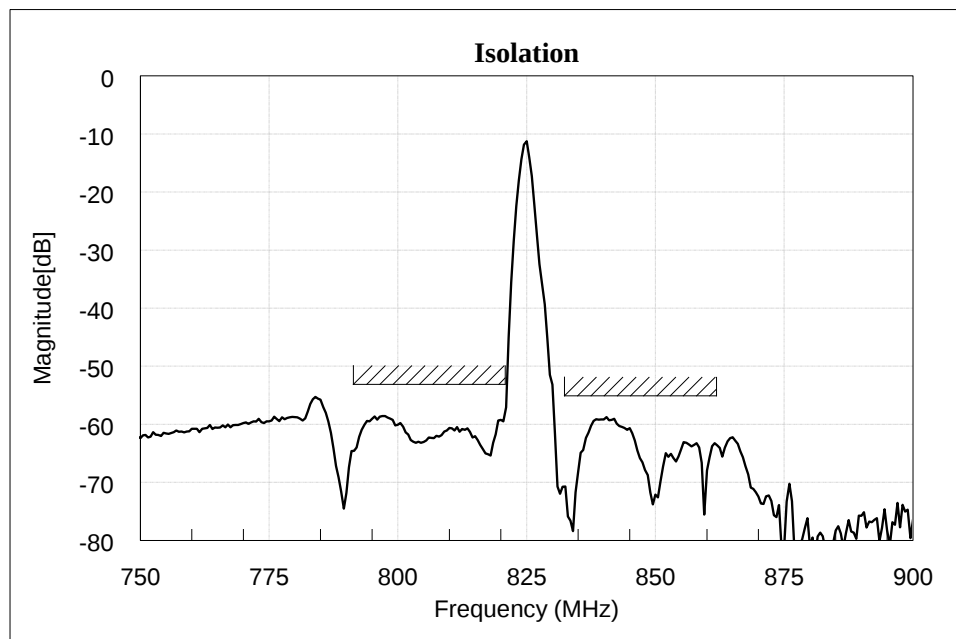
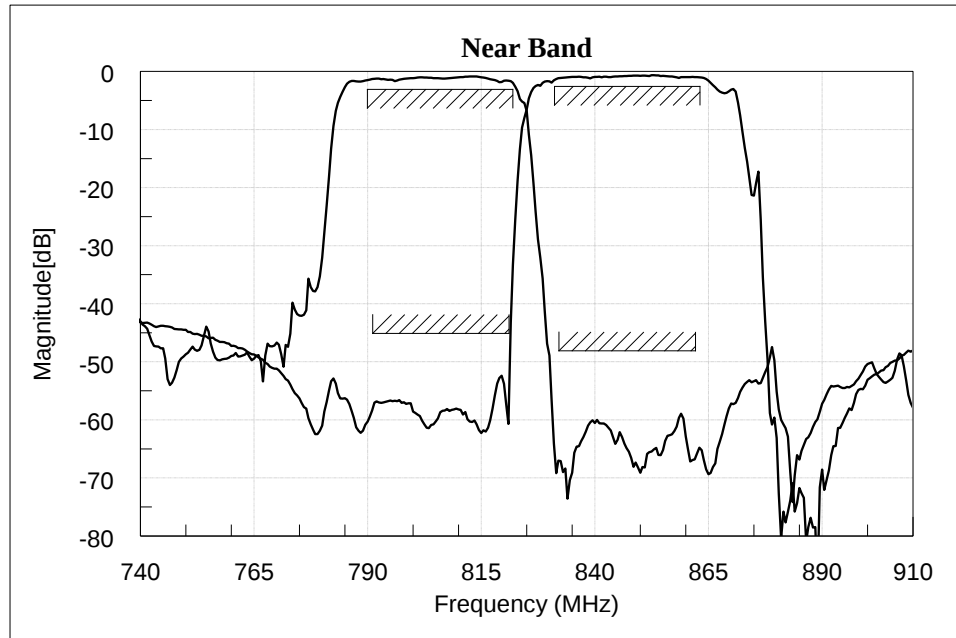
Item	CONDITION [MHz]	UNIT	RATING			NOTES
			Min.	Typ.(25℃)	Max.	
TX → ANTENNA						
Insertion Loss	832.25~ 861.75	dB	-	1.6	2.2	+23 ~ +27deg.C
			-	-	2.5	Over Temp.
Inband Ripple	832~ 862	dB	-	0.9	1.8	
VSWR	832~ 862	-	-	1.5	1.9	Tx Port
			-	1.5	1.9	Ant Port
Absolute Attenuation	10~771	dB	31	38	-	
	771~791	dB	40	51	-	
	791~821	dB	48	56	-	-20 ~ +27deg.C
			45	-	-	Over Temp.
	821~827	dB	2	6	-	
	925~960	dB	35	43	-	
	1559~1606	dB	41	48	-	
	1664~2170	dB	40	52	-	
	2400~2690	dB	40	50	-	
	3328~3448	dB	30	45	-	
	4000~5950	dB	10	41	-	
Termination Impedance: INPUT / ANTENNA			50Ω // 10[nH] 50Ω // 12[nH]			

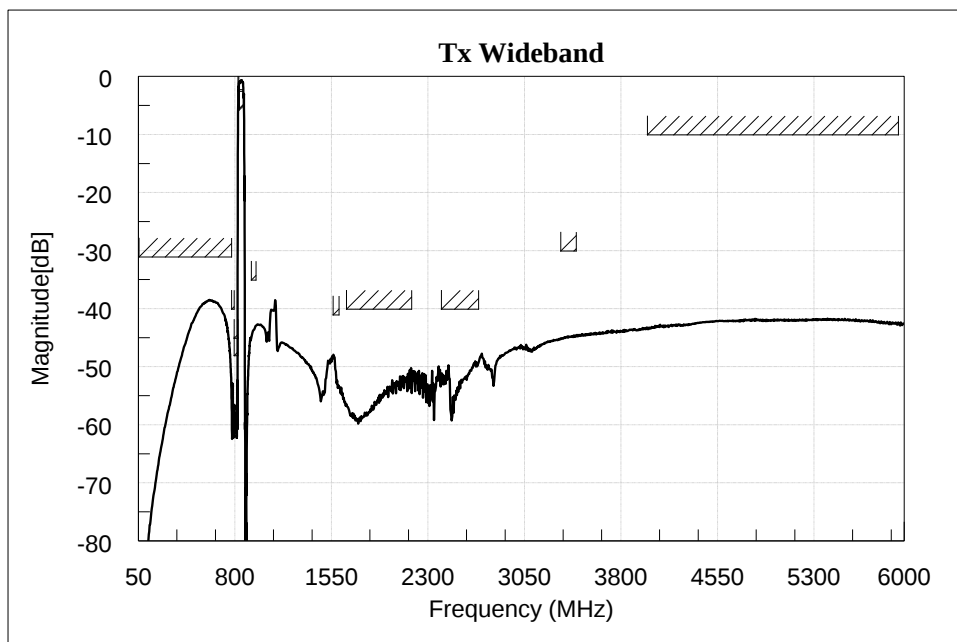
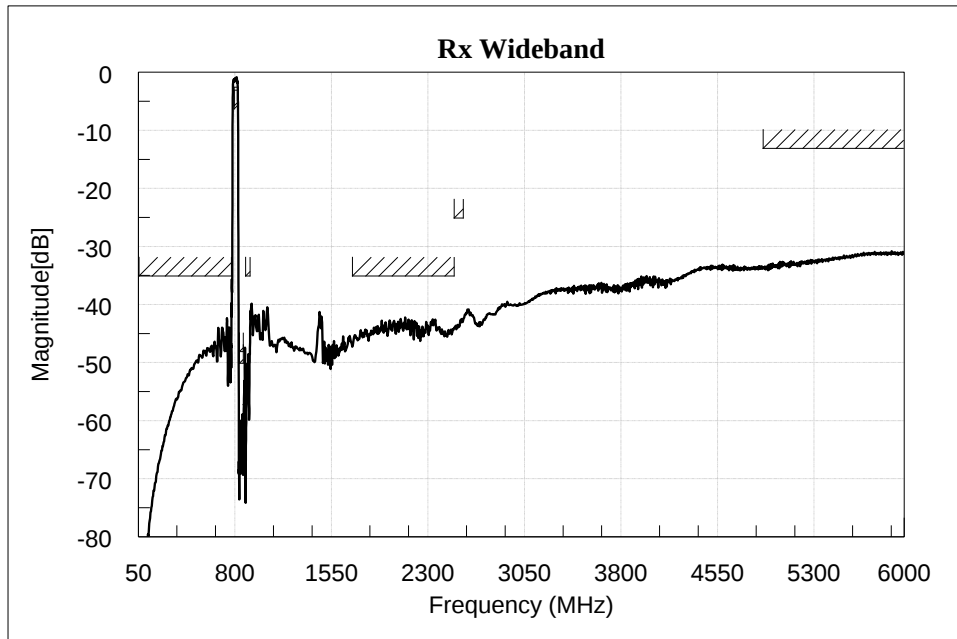
Item	CONDITION [MHz]	UNIT	RATING			NOTES
			Min.	Typ.(25℃)	Max.	
ANTENNA → RX						
Insertion Loss	791.25 ~ 820.75	dB	-	1.9	2.5	+23 ~ +27deg.C
				-	3.0	Over Temp.
Inband Ripple	791 ~ 821	dB	-	0.8	2.2	
VSWR	791.25 ~ 820.75	-	-	1.7	2.2	Rx Port
			-	1.7	2.2	Ant Port
Absolute Attenuation	10~770	dB	35	43	-	
	832~862	dB	50	55	-	+23~ +85deg.C
		dB	48	-		Over Temp.
	880~915	dB	35	51	-	
	1710~2500	dB	35	45	-	
	2500~2570	dB	25	44	-	
	4900~5950	dB	13	33	-	
Termination Impedance: ANT / OUTPUT			50Ω // 12[nH] 50Ω // 30[nH]			
TX → RX						
Isolation between Tx and Rx	832.25~861.75	dB	55	59	-	+23~ +85deg.C
			54	-	-	Over Temp.
	791.25~820.75	dB	53	58	-	-20 ~ +27deg.C
			52	-	-	Over Temp.

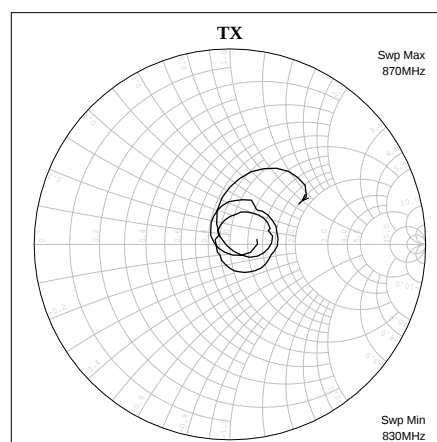
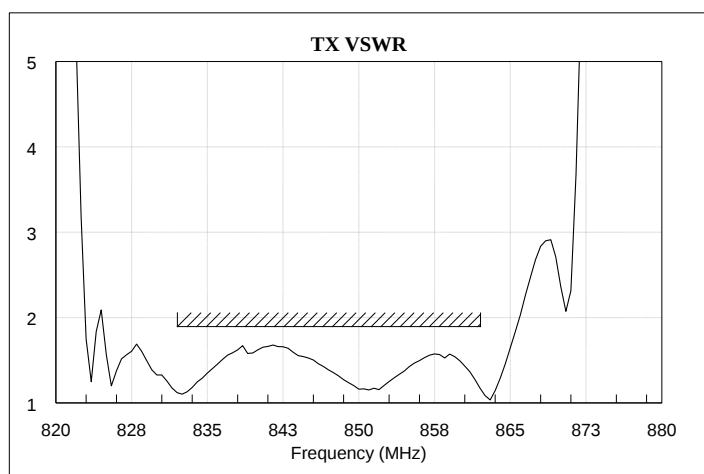
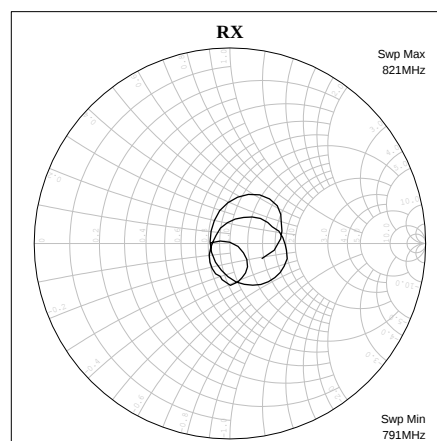
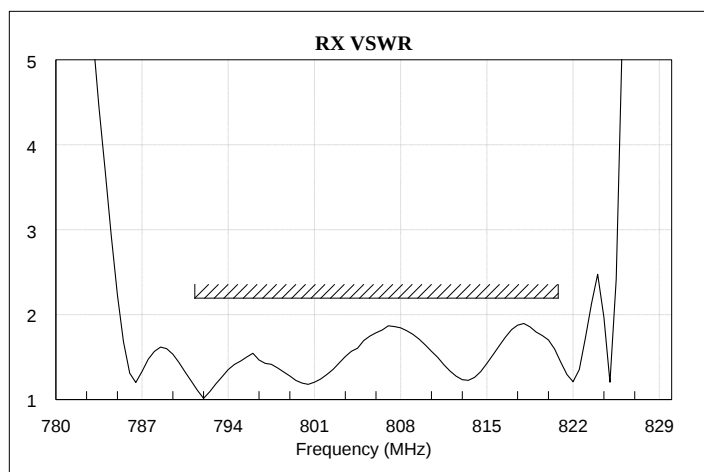
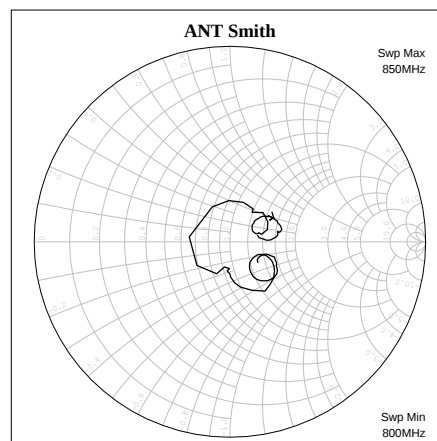
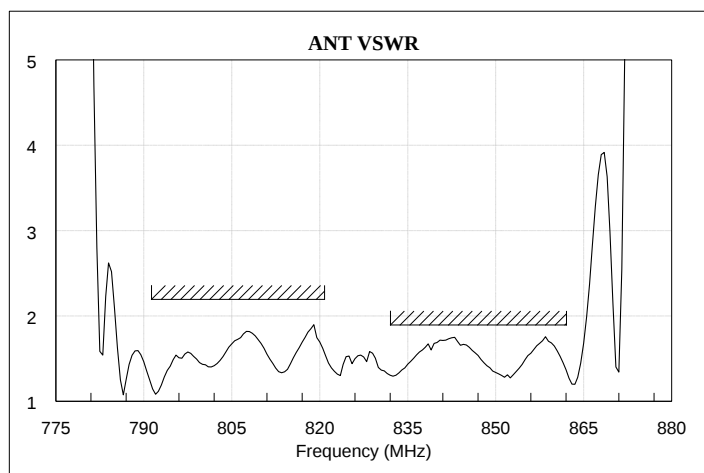
6-2-2. TEST FIXTURE


[X-Ray Top View]

6-2-3. GRAPH

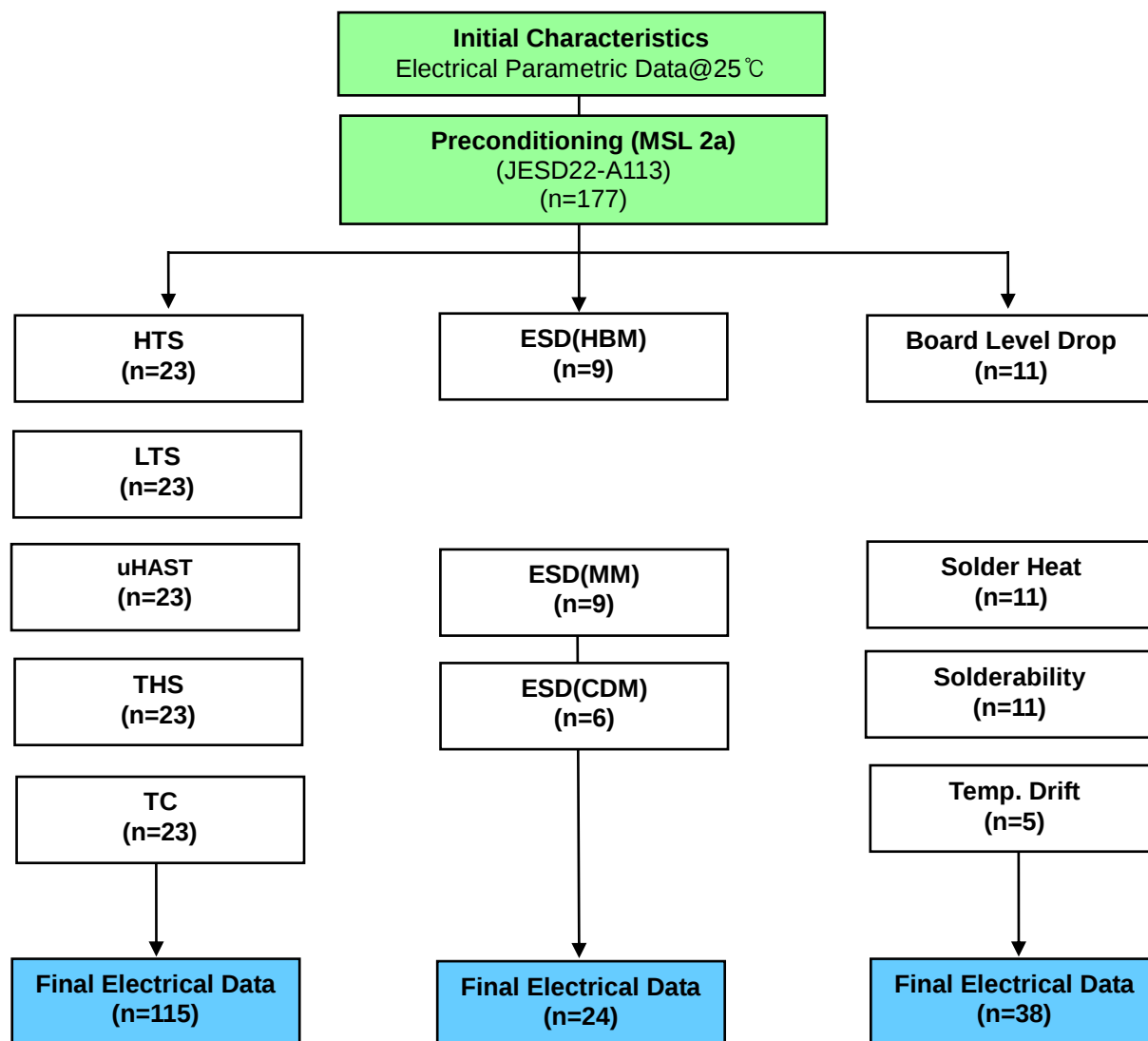






7. RELIABILITY

7-1. ENGINEERING SAMPLE FLOW CHART



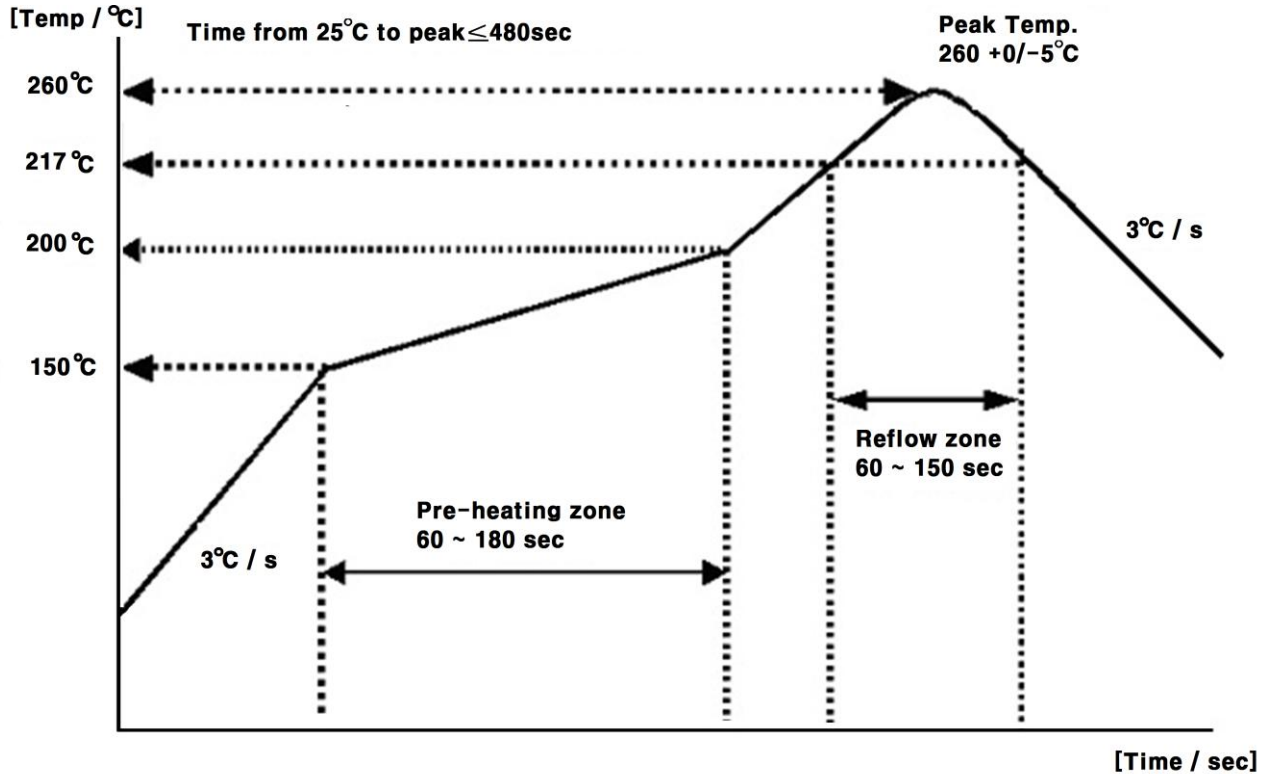
7-2. TEST ITEM & CONDITION

CATEGORY	TEST ITEM	TEST CONDITION	REMARK
	Preconditioning	Bake + Soak (MSL or above) + 3X Reflow duration (Soak 60℃ 60% 120HR)	JESD22-A113



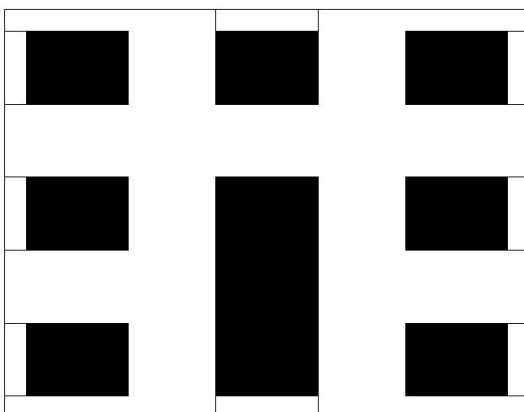
TEST ITEM	REMARK	TEST CONDITION	Duration
HTS (High Temperature Storage)	JESD22-A103	condition A +125(-10/+0)℃	1000hr
LTS (Low Temperature Storage)	JESD22-A119	condition A -40(-10/+0)℃	1000hr
uHAST (Unbiased HAST)	JESD22-A118	condition A 130±2℃, 85±5%, 33.3psi	96hr
THS (Temperature Humidity Storage)	JESD22-A101	85±2℃, 85±5% RH	1000hr
TC (Temperature Cycle)	JESD22-A104	condition B (-55℃⇔ +125℃) Soak mode 4 (30min)	500cycle
ESD(HBM)	JESD22-A114	200V, 250V, 300V	All pin 1sec 1time
ESD(MM)	JESD22-A115	100V 150V 200V	All pin 1sec 1time
ESD(CDM)	JESD22-C101	1.0KV, 1.2KV	All pin 1sec 1time
Board Level Drop Test	-	120 cm, 152 cm	12times 19times
Solder Heat Resistance	JESD22-B106C	260℃ Solder Pore Dipping	10sec
Solderability	JESD22-B102E	235℃Solder Pore Dipping	3sec
Temp Drift		-40℃ => 25℃ => 125℃	조건당 2HR

8. REFLOW CONDITION

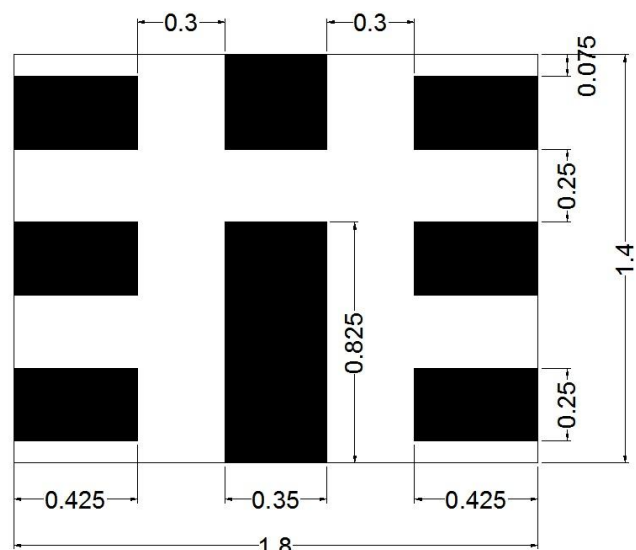


9. RECOMMENDED PCB DIMENSIONS

[unit : mm]



[SAW, X-ray Top view]



[PCB, X-ray Top view]

10. CAUTION

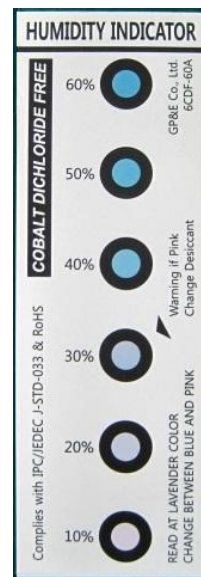
Moisture Sensitivity Device Caution (MSL LEVEL=2a)

1. Calculated shelf life in sealed bag : 12 month at <40℃ and <90% relative Humidity(RH)
 2. Peak package body temperature: **260℃**
 3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be
 - (a) Mounted within: 672 hours of factory conditions ≤30℃/60% RH, or
 - (b) Stored per J-STD-033
 4. Device require bake, before mounting, if:
 - (a) Humidity Indicator Card reads > 60% when read at 23±5℃
 - (b) 3(a) or 3(b) are not met
 5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure
- Note: Level and body temperature defined by IPC/JEDEC J-STD-020

Aluminum Pack (310mmX370mm)



HIC(Humidity Indication Card)

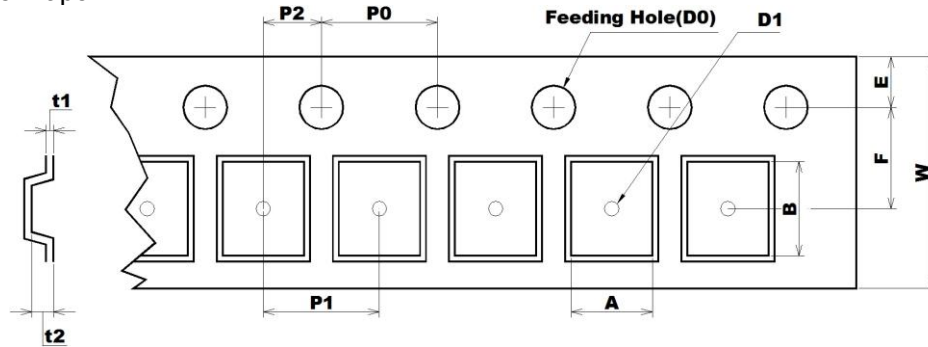


10 to 60% RH

11. PACKING

11-1. DIMENSIONS

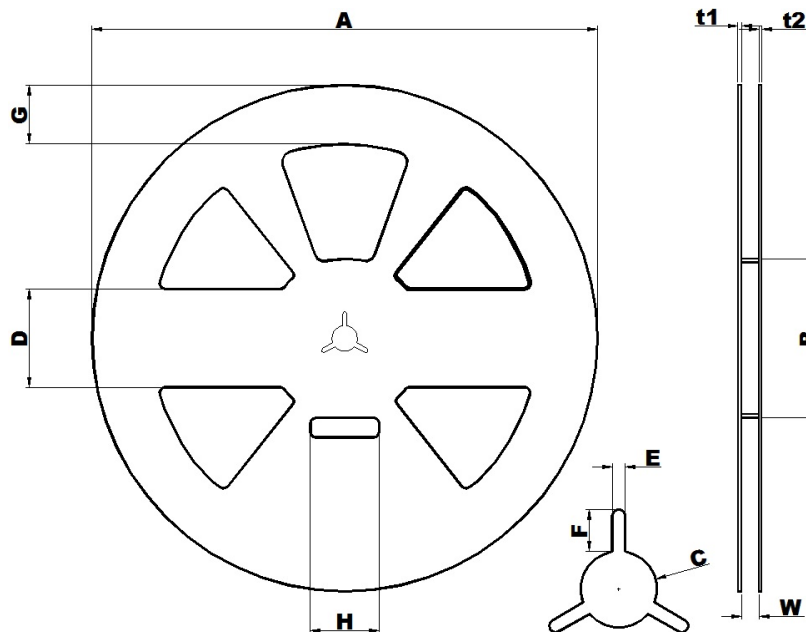
- Carrier Tape



[Unit: mm]

A	B	D0	D1	E	F	P0	P1	P2	t1	t2	W
1.60	2.00	Ø1.55	Ø1.00	1.75	3.50	4.00	4.00	2.00	0.25	0.80	8.00
0.05	0.05	0.05	MIN	0.10	0.05	0.10	0.10	0.05	0.05	0.05	0.10
-0.05	-0.05	-0.05	-	-0.10	-0.05	-0.10	-0.10	-0.05	-0.05	-0.05	-0.10

- Reel



[Unit: mm]

A	B	C	D	E	F	G	H	t1	t2	W
Ø258.0	Ø81.0	Ø13.0	50.0	2.2	7.0	30.0	35.0	1.8	1.5	9.0
+1.0	+1.0	+0.5	+0.8	+0.3	+0.5	+0.8	+1.0	+0.5	+0.5	+1.0
-0.5	-1.0	-0.5	-0.8	-0.3	-0.5	-0.8	-1.0	-0.5	-0.5	-0.5

- The product shall be packed properly not to damaged during transportation and storage.

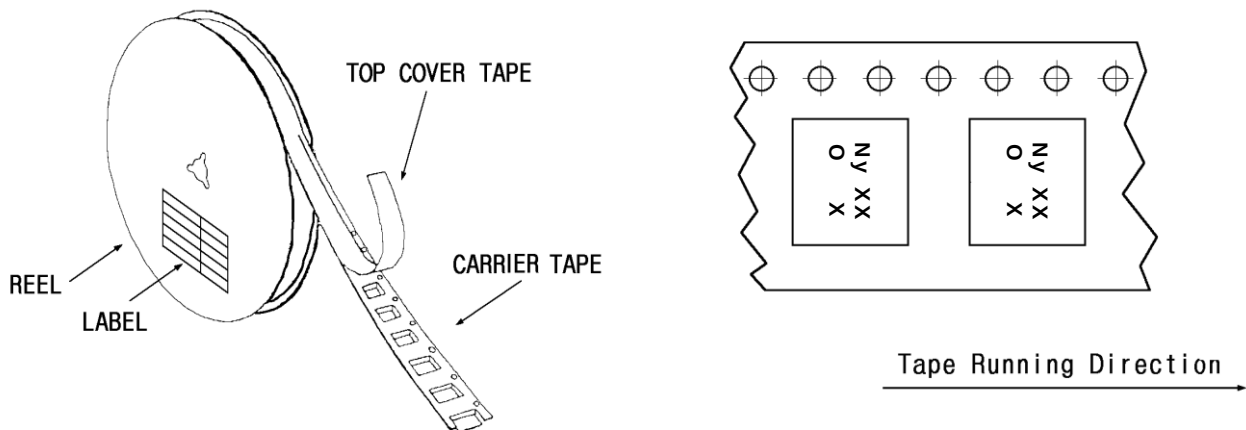
购买原装正品请认准-德方电子
免费服务热线: 400-655-8700
深圳总部电话: 0755-28187877
网址: www.denovocn.com

11-2. REELING QUANTITY

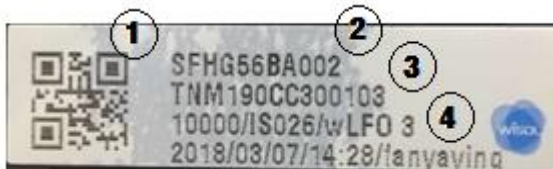
10 inch reel: 8,000 pcs/reel

11-3. TAPING STRUCTURE

11-3-1. The tape shall be wound around the reel in direction shown below.

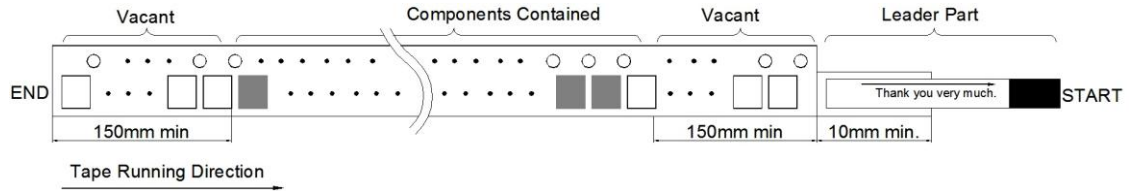


11-3-2. BARCODE LABEL



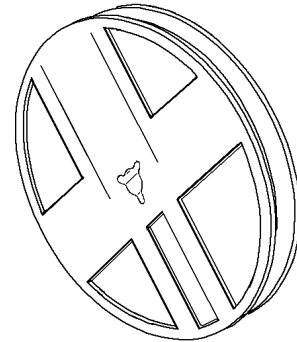
①	MODEL NAME BARCODE
②	Model Name
③	Reel number
④	Quantity / Marking

1-3-3. Leader part and vacant position specifications.

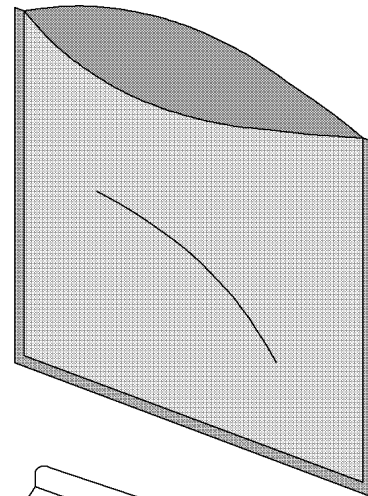


11-4. INNER BOX(Reel Packing) STRUCTURE

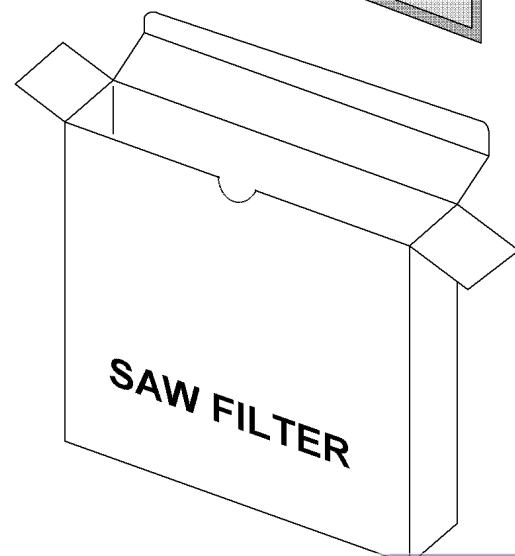
Material: Polycarbonate



Material: Polyethylene + Aluminum
Size: 310×370mm²



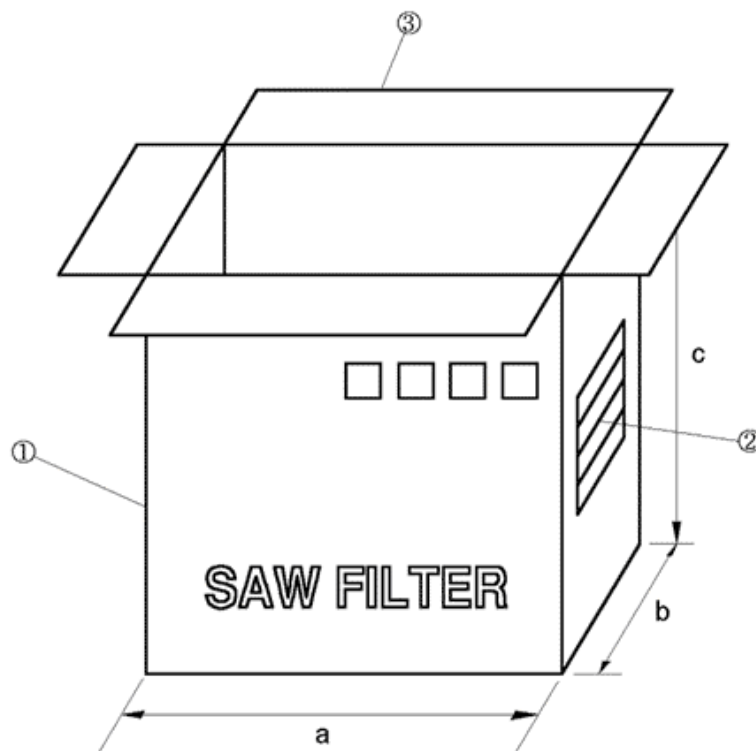
Material: Paper
Size: (D)260×(W)37×(H)265mm³



11-5. OUTER BOX STRUCTURE

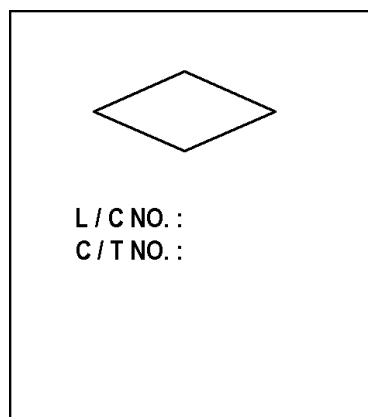
Material: Paper

TYPE	SIZE (mm)			Inner Box #
	a	b	c	
A	270	240	275	6 boxes



SIDE ①

SIDE ②



MODEL	
Q'TY	EA
USER	
DATE	. .

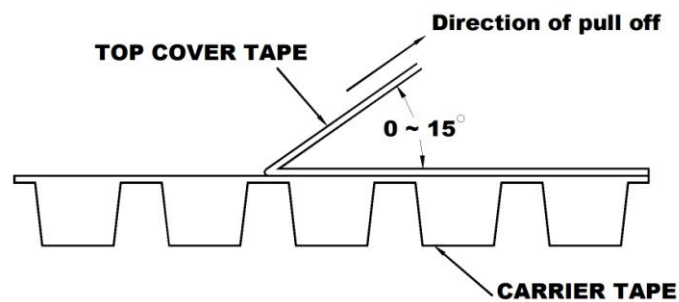
- SIDE is the same as front side.

12. TAPE SPECIFICATIONS

12-1. Tensile Strength of Carrier Tape: 4.4N/mm width

12-2. Top Cover Tape Adhesion (See the below figure)

- pull of angle: 0~15 degree
- speed: 300mm/min.
- force: 20~70g



13. RoHS DATA

13-1. RAW MATERIAL(EPOXY)



Test Report

No. TSNEC1700799901

Date: 12 May 2017

Page 1 of 8

TIANJIN WISOL ELECTRONICS CO.,LTD

D1-1/3 INTERNATIONAL INDUSTRIAL CITY XEDA TIANJIN CHINA

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

SGS Job No. : TP17-003447 - TJ

Date of Sample Received : 08 May 2017

Testing Period : 08 May 2017 - 12 May 2017

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 (Tianjin) Co., Ltd.



Reabeca Zhou
Approved Signatory



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com.

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65289000 f (86-22) 25295252 www.sgschina.com.cn
中国·天津市经济技术开发区第五大街41号SGS大厦 邮编: 300457 t (86-22) 65289000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

Date: 12 May 2017

Page 2 of 8

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	TSN17-007999.001	black film

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 :
- (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 62321-7-2:2017, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis and/or with reference to IEC 62321-5:2013, determination of Chromium by ICP-OES.
 - (5) With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS.
 - (6) With reference to IEC 62321-8:2017, determination of phthalates by GC-MS.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Cocochen@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25295252 www.sgs.com.cn
中国·天津市经济技术开发区第五大街41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

Date: 12 May 2017

Page 3 of 8

Test Item(s)	Limit	Unit	MDL	001
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Dibutyl phthalate (DBP)	1000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND
Bis (2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series
http://www.cenelec.eu/dyn/www/?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (2) The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required .
- (3) If the Chromium (Cr) content is greater than the MDL of Hexavalent Chromium (Cr(VI)), confirmation test of Hexavalent Chromium (Cr(VI)) is required.
- (4) On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.
- (5) 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.
- (6) The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.
- (7) The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.

Halogen



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25295252 www.sgs.com.cn
中国·天津市经济技术开发区第五大道41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

Date: 12 May 2017

Page 4 of 8

Test Method : With reference to EN 14582: 2016, analysis was performed by Ion Chromatograph (IC).

Test Item(s)	Unit	MDL	Q01
Chlorine (Cl)	mg/kg	50	99
Bromine (Br)	mg/kg	50	ND

Element(s)

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

Test Item(s)	Unit	MDL	Q01
Antimony (Sb)	mg/kg	10	ND
Tin (Sn)	mg/kg	5	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25295252 www.sgs.com.cn
中国·天津市经济技术开发区第五大街41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

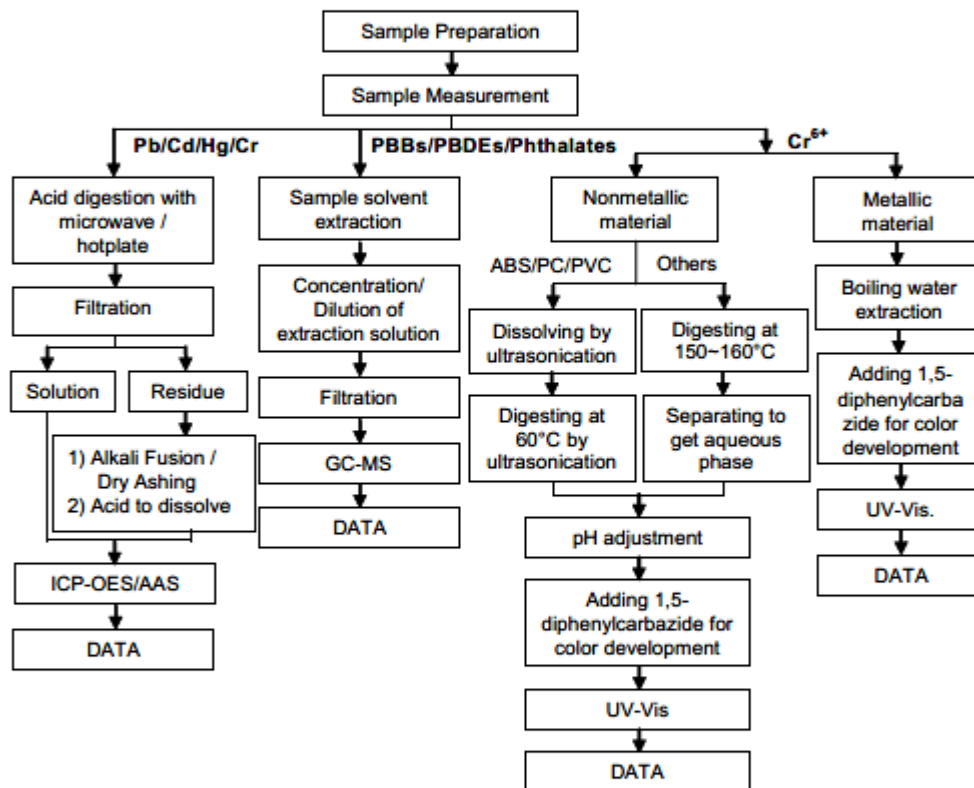
Date: 12 May 2017

Page 5 of 8

ATTACHMENTS

Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs/Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Cathy Zhang/Zhanwen Liu/Ann Wang/Cyhan Chen
- 2) Name of the person in charge of testing: Aaron Wang/Rex Zhu
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ and PBBs/PBDEs /Phthalates test method excluded)



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.cn/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.cn/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25295252 www.sgs.com.cn
中国·天津市经济技术开发区第五大道41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

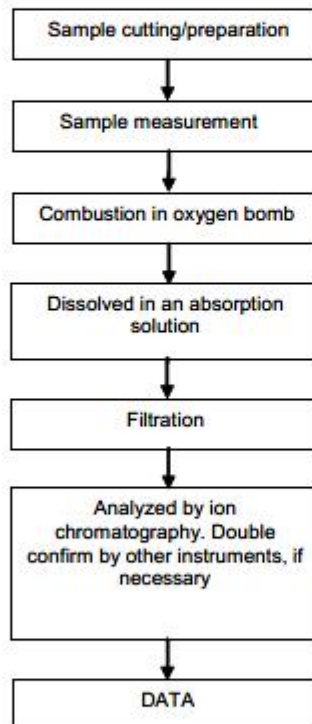
Date: 12 May 2017

Page 6 of 8

ATTACHMENTS

Halogen Testing Flow Chart

- 1) Name of the person who made testing: Jin Wang
- 2) Name of the person in charge of testing: Rex Zhu



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/term-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/term-and-conditions/term-e-document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention! To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Disccheck@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25295252 www.sgs.com
 中国·天津市经济技术开发区第五大道41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25295252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. TSNEC1700799901

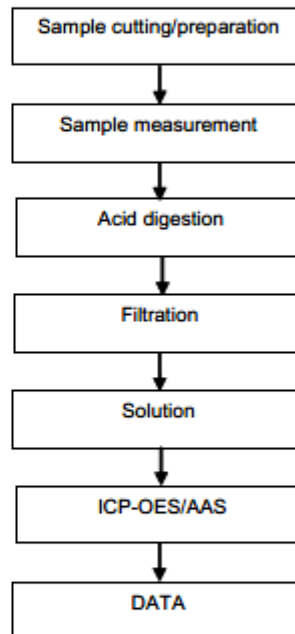
Date: 12 May 2017

Page 7 of 8

ATTACHMENTS

Elementary Testing Flow Chart

- 1) Name of the person who made testing: Cathy Zhang
- 2) Name of the person in charge of testing: Aaron Wang



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Descheck@sgs.com

SGS-CTC (Shanghai) Inspection & Testing Services Co., Ltd.
Chemical Laboratory

SGS Manshon, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 25396252 www.sgs.com.cn
中国·天津市经济技术开发区第五大街41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 25396252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



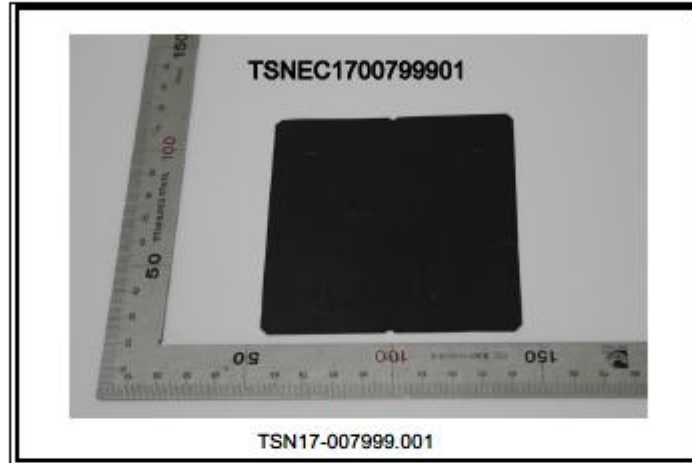
Test Report

No. TSNEC1700799901

Date: 12 May 2017

Page 8 of 8

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/eng/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/eng/Terms-and-Conditions/Terms-a-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Csccheck@sgs.com

SGS Mansion, No.41, The 5th Avenue TEDA, Tianjin, China 300457 t (86-22) 65288000 f (86-22) 2526252 www.sgs.com.cn
中国·天津市经济技术开发区第五大道41号SGS大厦 邮编: 300457 t (86-22) 65288000 f (86-22) 2526252 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)

13-2. RAW MATERIAL(PACKAGE)



TEST REPORT

REPORT NO. JP/2017/111101

DATE: January 12, 2018

PAGE: 1 OF 4

KYOCERA CORPORATION

1810 TAKI-CHO SATSUMASENDAI-SHI KAGOSHIMA JAPAN

THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CLIENT AS:

以下のサンプルは顧客により提供され、顧客に代わって確認を行いました:

SAMPLE DESCRIPTION : 1-01-4-18 KYOCERA-CERAMIC A440

CLIENT REF.NO :

SAMPLE RECEIVED : 2017/11/24

TESTING DATE : 2017/11/24 TO 2018/01/12

TEST REQUESTED : SELECTED TEST(S) AS REQUESTED BY CLIENT.
分析項目は顧客の要求によります。

TEST METHOD(S) : WITH REFERENCE TO LATEST EDITION OF IEC62321 FOR RoHS 6 SUBSTANCES.
分析方法 OTHER CHEMICALS WERE TESTED BY EACH APPROPRIATE METHOD.
RoHS6物質の分析は最新版のIEC62321を参照しました。
それ以外の化学物質についてはそれぞれに最適な方法で分析を行いました。

TEST RESULT(S) : PLEASE REFER TO THE NEXT PAGE(S).
分析結果 以下のページをご参照願います。

大内 幸弘


Yukihiro Ouchi / Quality Manager
SGS Japan Inc., Chemical Laboratory

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced except, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この検査報告書は裏面に記載された、もしくは<http://www.sgs.com>で入手が可能なサービスに関する一般約条件に則して発行されます。それらに開示されている弊社の負うべき義務・過失の範囲及び司法管轄の項目をご注意ください。他に特に明記のない限り、この検査報告書に記載された結果は、検査した試料のみに着します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で複製、偽造、改ざんすることは違法であり、違反者に対しては法的手段を通じることをとります。

SGS Japan Inc. YBP East Tower 12F, 134 Godo-cho Hodogaya-ku Yokohama 240-0005, Japan
t +81(0) 45 330 1100 f +81(0) 45 330 1108 URL: www.jp.sgs.com

Member of the SGS Group (Société Générale de Surveillance)



TEST REPORT

REPORT NO. JP/2017/111101

DATE: January 12, 2018

PAGE: 2 OF 4

KYOCERA CORPORATION

1810 TAKI-CHO SATSUMASENDAI-SHI KAGOSHIMA JAPAN

TEST RESULT(S)

ITEM(S)	UNIT	RESULT	METHOD	INST./PLACE	MDL
CADMIUM(Cd)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
LEAD(Pb)	mg/kg	N.D.	IEC62321-5: 2013	ICP-OES	2
MERCURY(Hg)	mg/kg	N.D.	IEC62321-4: 2013	ICP-OES	2
CHROMIUM VI(Cr(VI))	mg/kg	N.D.	IEC 62321-7-1: 2015	UV/VIS	2

NOTES: mg/kg = ppm, N.D. = Not Detected, INST. = INSTRUMENT, MDL = Method Detection Limit

REMARK: Test process and/or expression of test result have been specified by client.

The content of Cr(VI) has been calculated with regard to the sample weight as specified by client.

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced except, in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この検査報告書は裏面に記載された、もしくは<http://www.sgs.com>で入手が可能なサービスに関する一般約条件に則して発行されます。それらに記載されている弊社の負うべき義務・補償の範囲及び司法管轄の項目をご確認ください。但し特に明記のない限り、この検査報告書に記載された結果は、検査した試料のみに着します。この書面全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を通じることとなります。

SGS Japan Inc. | YBP East Tower 12F, 134 Godo-cho Hodogaya-ku Yokohama 240-0005, Japan
t +81(0) 45 330 1100 f +81(0) 45 330 1108 URL: www.jp.sgs.com

Member of the SGS Group (Société Générale de Surveillance)



TEST REPORT

REPORT NO. JP/2017/111101

DATE: January 12, 2018

PAGE: 3 OF 4

KYOCERA CORPORATION

1810 TAKI-CHO SATSUMASENDAI-SHI KAGOSHIMA JAPAN

分析フローチャート MEASUREMENT FLOW CHART

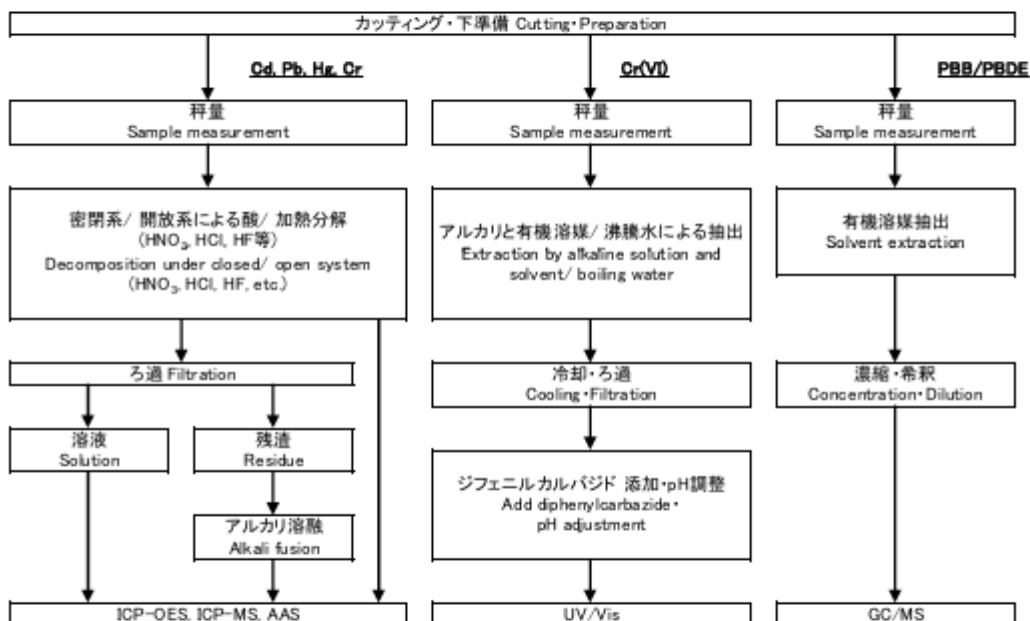
1) 酸分解前処理において試料を完全分解しています。

The sample was dissolved/ decomposed totally by acid pre-conditioning method according to below flow chart.

2) Cd, Pb, Hg, Cr, Cr(VI), PBB/PBDE

分析担当者 Name of the person in charge of measurement: 及川 聡子 Satoko Oikawa

3) 分析責任者 Name of the person responsible for measurement: 大谷 真由美 Mayumi Otani



This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this Test Report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この検査報告書は裏面に記載された、もしくは <http://www.sgs.com> で入手可能なサービスに関する一般約条件に則して発行されます。それらに明記されている弊社の負うべき債務・賠償の範囲及び司法管轄の項目をご確認ください。但し特に明記のない限り、この検査報告書に記載された結果は、検査した試料のみに着します。この報告書全体の複製以外には、弊社からの事前の許可を得ること無く複製することを禁じます。この検査報告書を無断で変更、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講ずることとなります。

SGS Japan Inc. YBP East Tower 12F, 134 Godo-cho Hodogaya-ku Yokohama 240-0005, Japan
t +81(0) 45 330 1100 f +81(0) 45 330 1108 URL: www.jp.sgs.com

Member of the SGS Group (Société Générale de Surveillance)



TEST REPORT

REPORT NO. JP/2017/111101

DATE: January 12, 2018

PAGE: 4 OF 4

KYOCERA CORPORATION

1810 TAKI-CHO SATSUMASENDAI-SHI KAGOSHIMA JAPAN

SAMPLE IMAGE



<END>

This Test Report is issued by the Company under its General Conditions of Service printed overleaf or available on request and accessible at <http://www.sgs.com>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Unless otherwise stated the results shown in this Test Report refer only to the sample(s) tested. This Test Report cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this test report is unlawful and offenders may be prosecuted to the fullest extent of the law.

この検査報告書は表紙に記載された、もしくは<http://www.sgs.com>で入手可能なサービスに関する一般約款条件に準じて発行されます。それらに記載されている弊社の免責、賠償の範囲及び法域管轄の項目をご確認ください。無断に複製・改竄、改ざん、偽造、改ざんすることは違法であり、違反者に対しては法的手段を講ずることとなります。

SGS Japan Inc.

YBP East Tower 12F, 134 Godo-cho Hodogaya-ku Yokohama 240-0005, Japan
t +81(0) 45 330 1100 f +81(0) 45 330 1109 URL: www.jp.sgs.com

Member of the SGS Group (Société Générale de Surveillance)

13-3. RAW MATERIAL(LN WAFER)



유효한지 알 수 없음

For Question Please
Contact with SGS
www.sgs.com.tw

Test Report

No. : CE/2018/B0808

Date : 2018/11/12

Page : 1 of 9

Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



The following samples was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By : Shin-Etsu Chemical Co., Ltd.
Sample Description : BLN
Lot No. : CJ314S
Composition : Lithium Niobate
Sample Receiving Date : 2018/11/08
Testing Period : 2018/11/08 TO 2018/11/12

Test Requested :

- (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
- (2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Troy Chang, Manager, Tech
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/terms-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/terms-and-conditions/electronic-documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | 25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan/臺北中區新莊路七號七樓 25樓
T+886 (02)2299 9999 T+886 (02)2299 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 2 of 9

Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Test Result(s)

PART NAME No.1 : WAFER

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2 (2017) and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg		5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions-for-electronic-documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan / 新北市五股區吳庫路七號五樓七樓五樓
+886 (02) 2299 3939 +886 (02) 2299 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 3 of 9

Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Test Item(s)	Unit	Method	MDL	Result No.1	Limit
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg		50	n.d.	1000
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg		50	n.d.	1000
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3050B (1996). Analysis was performed by ICP-AES.	2	n.d.	-
Beryllium (Be)	mg/kg	With reference to US EPA 3050B (1996). Analysis was performed by ICP-AES.	2	n.d.	-

Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = less than MDL
4. " - " = Not Regulated

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic formal documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions-for-electronic-documents.aspx>. 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 findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan / 新北市五股區新工業區五庫七路25號
T: 886 (0)22299 3030 F: 886 (0)22299 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 4 of 9

Shin-Etsu Chemical Co., Ltd.

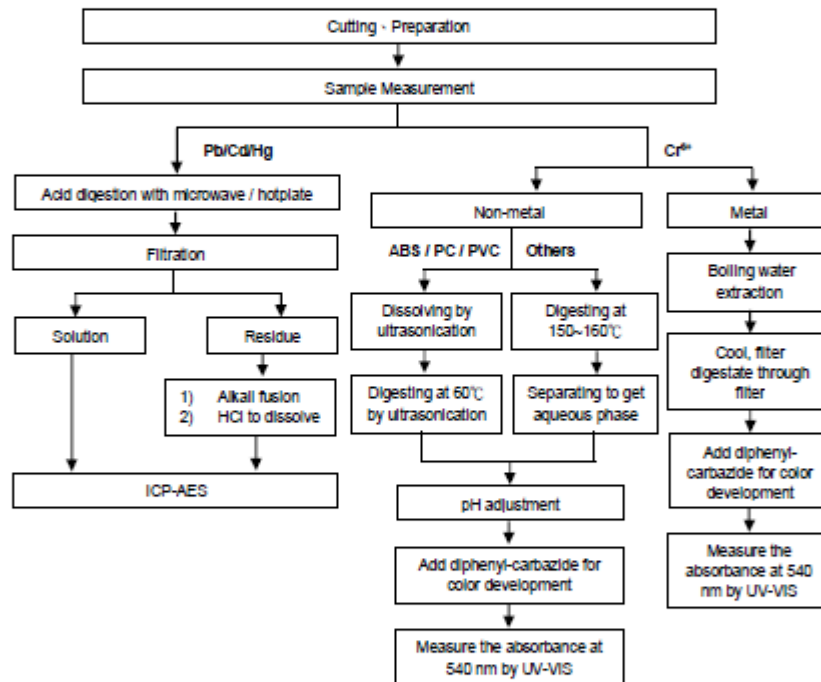
13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician : Rita Chen
- Supervisor: Troy Chang



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/electronic-document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan/新北市五股區五福七路25號
+886 (0)2299 3230 +886 (0)2299 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 5 of 9

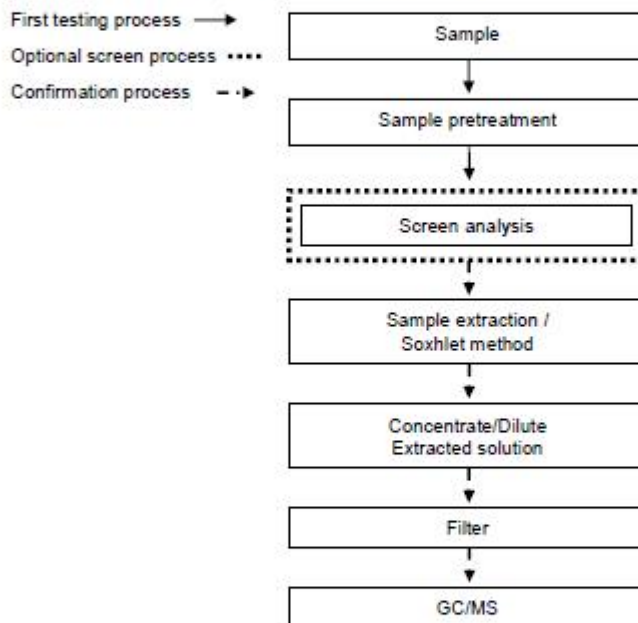
Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Analytical flow chart – PBB / PBDE

- Technician : Yaling Tu
- Supervisor: Troy Chang



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions-for-electronic-documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

25, Wu Chuan 1st Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan / 新北市五股區新台北工業園第一路二五號
T+886 (0)22299 3239 F+886 (0)22299 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 6 of 9

Shin-Etsu Chemical Co., Ltd.

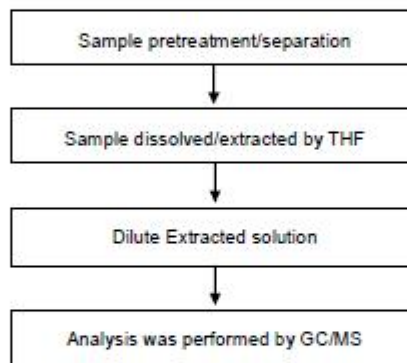
13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

【Test method: IEC 62321-8】



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions-for-electronic-documents.aspx>. ATTENTION IS drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from assessing all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the samples tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan / 新北市五股區新台北工業區五庫七路25號
T+886 (0)22390 3239 F+886 (0)22390 3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 7 of 9

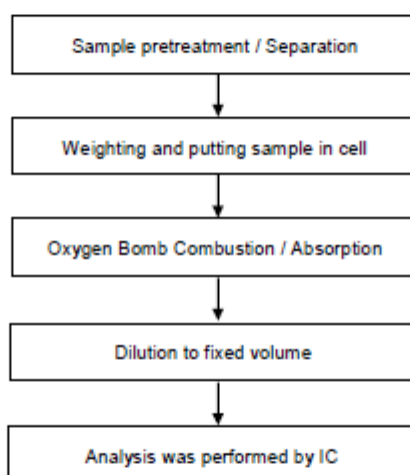
Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/any/terms-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/any/terms-and-conditions/electronic-document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | 25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan/新北市五股區新台北產業園區 五權七路25號
T+886 (02)2299-3939 T+886 (02)2299-3237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 8 of 9

Shin-Etsu Chemical Co., Ltd.

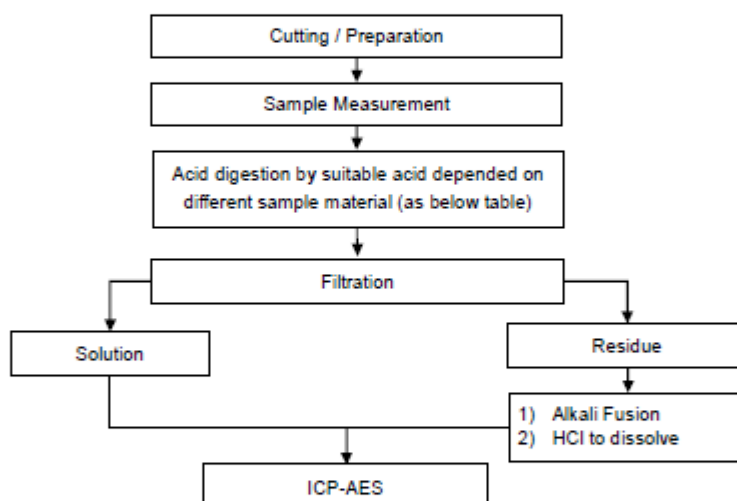
13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan



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

- Technician: Rita Chen
- Supervisor: Troy Chang

Flow Chart of digestion for the elements analysis performed by ICP-AES



Steel, copper, aluminum, solder	Agua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Agua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Added appropriate reagent to total digestion

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/terms-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/terms-and-conditions/taiwan-esd.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | 25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan/新北市五股區新北大業路七號25號
T+886 (02) 2299 9339 T+886 (02) 2299 9237 www.sgs.tw

Member of the SGS Group



Test Report

No. : CE/2018/B0606

Date : 2018/11/12

Page : 9 of 9

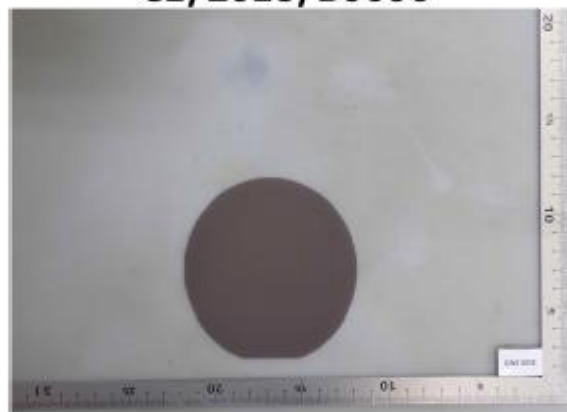
Shin-Etsu Chemical Co., Ltd.

13-1, Isobe 2-chome, Annaka-Shi, Gunma, Japan

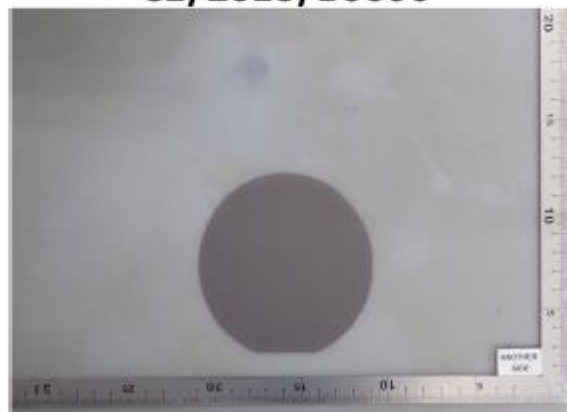


* The tested sample / part is marked by an arrow if it's shown on the photo. *

CE/2018/B0606



CE/2018/B0606



** End of Report **

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions-sgs> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions-sgs-electronic-format-documents>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

25, Wu Chuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan / 新北市五股區新五路七段25號
T+886 (02)2299-9939 T+886 (02)2299-3237 www.sgs.tw

Member of the SGS Group

13-4. RAW MATERIAL(GOLD WIRE)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 1 of 23

TANAKA ELECTRONICS (HANGZHOU) CO.,LTD.

F1 AREA, WEST NO.19 STREET, NORTH NO.10 STREET, HANGZHOU ECONOMIC&TECHNOLOGICAL DEVELOPMENT ZONE,HANGZHOU

The following sample(s) was/were submitted and identified on behalf of the clients as : Au Bonding Wire

SGS Job No. : SP17-030384 - SH

Date of Sample Received : 25 Aug 2017

Testing Period : 25 Aug 2017 - 31 Aug 2017

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

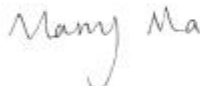
Test Method : Please refer to next page(s).

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.

When tested as specified, Dimethyl fumarate(DMF) content of the submitted sample comply with Commission Regulation (EU) No 412/2012 and Entry 61 of Annex XVII of REACH Regulation (EC) No 1907/2006

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



Mary Ma
Approved Signatory



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

3rd Building, No. 836 Yixian Road, Xuhui District, Shanghai, China 200233 1EAE (86-21) 61402553 1EAE (86-21) 64863679 www.sgs.com.cn
中国·上海·徐汇区宜山路836号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61158899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 2 of 23

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA17-187988.003	Golden metal wire

Remarks :

- (1) 1 mg/kg = 1 ppm = 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, IEC62321-5:2013, IEC 62321-7-1:2015, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES/AAS, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	003
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	-	µg/cm ²	0.10	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8367 1443, or email: CN.Doccheck@sgs.com
 3rd Building No. 880 Yuhuan Road Xuhui District, Shanghai China 200233 1EAE (86-21) 61402553 1EAE (86-21) 64953679 www.sgs.com
 中国·上海·徐汇区宜山路880号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)


Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 3 of 23

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>003</u>
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
IEC 62321 series is equivalent to EN 62321 series
http://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.

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>003</u>
Fluorine (F)	mg/kg	50	ND
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
Iodine (I)	mg/kg	50	ND

Element(s)

Test Method : With reference to US EPA Method 3050B:1996, analysis was performed by ICP-OES.



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8197 1443, or email: CN.Doccheck@sgs.com
3rd Building No. 839 Yahan Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64953679 www.sgs.com.cn
中国·上海·徐汇区宜山路839号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61159899 e sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 4 of 23

Test Item(s)	CAS NO.	Unit	MDL	003
Antimony (Sb)		mg/kg	10	ND
Beryllium (Be)		mg/kg	5	ND
Antimony trioxide (Sb ₂ O ₃) *		mg/kg	12	ND
Beryllium oxide (BeO) *		mg/kg	15	ND
Diarsenic trioxide (As ₂ O ₃) *	1327-53-3	mg/kg	10	ND
Arsenic (As)		mg/kg	10	ND
Diarsenic pentaoxide (As ₂ O ₅) *	1303-28-2	mg/kg	10	ND

Notes :

- (1) * Calculated concentration of BeO is based on the identified Be
 Calculated concentration of Sb₂O₃ is based on the identified Sb
 Calculated concentration of diarsenic pentaoxide and diarsenic trioxide are based on the identified arsenic and lead

Organic-tin compounds

Test Method : With reference to ISO 17353: 2004 with carbamate, analysis was performed by GC-MS.

Test Item(s)	Unit	MDL	003
Tributyl tin (TBT)	mg/kg	0.02	ND
Dibutyl tin (DBT)	mg/kg	0.02	ND
Diocetyl tin (DOT)	mg/kg	0.02	ND
Tripropyltin (TPT)	mg/kg	0.02	ND
Bis(tributyltin) oxide (TBTO) *	mg/kg	0.02	ND

Notes :

- (1) * = TBTO are back calculated based on the worst-case scenario of TBT

Polychlorinated Naphthalenes (PCNs)

Test Method : With reference to US EPA 8081B: 2007, analysis was performed by GC-MS

Test Item(s)	Unit	MDL	003
2-Chlorinated Naphthalene	mg/kg	5	ND
1,4-Dichlorinated Naphthalene	mg/kg	5	ND
1,5-Dichlorinated Naphthalene	mg/kg	5	ND
1,2-Dichlorinated Naphthalene	mg/kg	5	ND
1,8-Dichlorinated Naphthalene	mg/kg	5	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com
 3rd Building No. 839 Yahan Road Xuhui District, Shanghai China 200233 TEL (86-21) 61402553 FAX (86-21) 64953679 www.sgs.com
 中国·上海·徐汇区宜山路839号3号楼 邮编: 200233 TEL (86-21) 61402594 FAX (86-21) 61150899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 5 of 23

Test Item(s)	Unit	MDL	003
1,2,3-Trichlorinated Naphthalene	mg/kg	5	ND
1,2,3,4-Tetrachlorinated Naphthalene	mg/kg	5	ND
1,2,3,4,6-Pentachlorinated Naphthalene	mg/kg	5	ND
Octa-chlorinated Naphthalene	mg/kg	5	ND
1-Chlorinated Naphthalene	mg/kg	5	ND

Short-chain Chlorinated Paraffin (SCCP) and Medium-chain Chlorinated Paraffin (MCCP)

Test Method : With reference to US EPA 3550C: 2007, analysis was performed by GC-ECD / GC-NCI-MS

Test Item(s)	Unit	MDL	003
Short-chain Chlorinated Paraffin (SCCP) (C ₁₀ -C ₁₃)	mg/kg	50	ND
Medium-chain Chlorinated Paraffin (MCCP) (C ₁₄ -C ₁₇)	mg/kg	50	ND

Red Phosphorus

Test Method : SGS in house method(SHTC- CHEM- SOP -342-T), Analysis was performed by ICP-OES and Pyrolysis-GC/MS

Test Item(s)	Unit	MDL	003
Red Phosphorus	mg/kg	500	ND

Notes :

For Positive result, the testing result is based on the worst-case scenario, and confirmed by Pyrolysis-GC-MS.

Tetrabromobisphenol A (TBBP-A)

Test Method : With reference to US EPA 3540C: 1996, analysis was performed by GC-MS.

Test Item(s)	Unit	MDL	003
Tetrabromobisphenol A (TBBP-A)	mg/kg	10	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8987 1443, or email: CN.Doccheck@sgs.com
 3rd Building, No. 855 Yantian Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64953679 www.sgs.com.cn
 中国·上海·徐汇区宜山路855号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61158999 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 6 of 23

PVC (Polyvinyl chloride)

Test Method : In-house method (SHTC-CHEM-SOP-115-T), analysis was performed by FTIR/HATR.

Test Item(s)	CAS NO.	Unit	MDL	003
PVC	9002-86-2	-	-	Negative

Notes :

(1) Negative=Undetectable, Positive=Detectable

Bisphenol-A

Test Method : Extraction by organic solvent, analysis by HPLC-DAD-MS.

Test Item(s)	Unit	MDL	003
Bisphenol-A	mg/kg	1	ND

Commission Regulation (EU) No 412/2012 and Entry 61 of Annex XVII of REACH Regulation (EC) No 1907/2006 - Dimethyl fumarate(DMF)

Test Method : Solvent extraction, analysis was performed by GC-MS.

Test Item(s)	Limit	Unit	MDL	003
Dimethyl fumarate(DMF)	0.1	mg/kg	0.1	ND

Polychlorinated Terphenyls (PCTs)

Test Method : With reference to US EPA 8082A: 2007, analysis was performed by GC-MS

Test Item(s)	Unit	MDL	003
Aroclor 5432	mg/kg	5	ND
Aroclor 5442	mg/kg	5	ND

Hexabromocyclododecane (HBCDD)

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8367 1443, or email: CN.Doccheck@sgs.com

3rd Building, No. 889 Yehen Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64853679 www.sgs.com.cn
 中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 1HL (86-21) 61402554 1HL (86-21) 61150899 e: sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 7 of 23

Test Item(s)	Unit	MDL	003
Hexabromocyclododecane (HBCDD)	mg/kg	10	ND

PFOS (Perfluorooctane Sulfonates) and PFOA (Perfluorooctanoic Acid)

Test Method : With reference to US EPA 3550C: 2007, analysis was performed by HPLC-MS.

Test Item(s)	Limit	Unit	MDL	003
Perfluorooctanesulfonate (PFOS) ^A	1000	mg/kg	10	ND
Perfluorooctanoic Acid (PFOA)	-	mg/kg	10	ND

Notes :

- (1) Max. limit specified by commission regulation (EU) No. 757/2010 amending regulation (EC) No 850/2004
- (2)^A PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluorooctanesulfonic acid, Perfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamide, N-Ethylperfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamidoethanol and N-Ethylperfluorooctane sulfonamidoethanol.

Polychlorinated Biphenyls (PCBs)

Test Method : With reference to US EPA 8082A: 2007, analysis was performed by GC-MS

Test Item(s)	CAS NO.	Unit	MDL	003
2,4,4'-Trichlorobiphenyl (PCB 28)	7012-37-5	mg/kg	0.5	ND
2,2',5,5'-Tetrachloro-biphenyl (PCB 52)	35693-99-3	mg/kg	0.5	ND
2,2',4,5,5'-Pentachloro-biphenyl (PCB 101)	37680-73-2	mg/kg	0.5	ND
2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	31508-00-6	mg/kg	0.5	ND
2,2',3,4,4',5'-Hexachloro-biphenyl (PCB 138)	35065-28-2	mg/kg	0.5	ND
2,2',4,4',5,5'-Hexachloro-biphenyl (PCB 153)	35065-27-1	mg/kg	0.5	ND
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	35065-29-3	mg/kg	0.5	ND

Phthalates Content

Test Method : With reference to IEC 62321-8 Ed.1.0 (111/321/CD) , determination of phthalates by GC-MS.

Test Item(s)	CAS NO.	Unit	MDL	003
Diisononyl Phthalate (DINP)	28553-12-0	mg/kg	50	ND
Di-n-octyl Phthalate (DNOP)	/68515-48-0 117-84-0	mg/kg	50	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com
 3rd Building, No. 889 Yitian Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64853679 www.sgs.com
 中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61198899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 8 of 23

Test Item(s)	CAS NO.	Unit	MDL	Q03
Diisodecyl Phthalate (DIDP)	26761-40-0	mg/kg	50	ND
	/68515-49-1			
Dihexyl Phthalates (DnHP)	84-75-3	mg/kg	50	ND
Diisooheptyl phthalate (DIHP)	71888-89-6	mg/kg	50	ND
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters(DHNUP)	68515-42-4	mg/kg	50	ND
Bis(2-methoxyethyl) Phthalate (DMEP)	117-82-8	mg/kg	50	ND



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8367-1443, or email: CN.Check@sgs.com

SGS (China) Inspection & Testing Service Co., Ltd.
 3rd Building, No. 888 Yishan Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64853679 www.sgs.com.cn
 中国·上海·徐汇区宜山路888号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61158899 e: sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

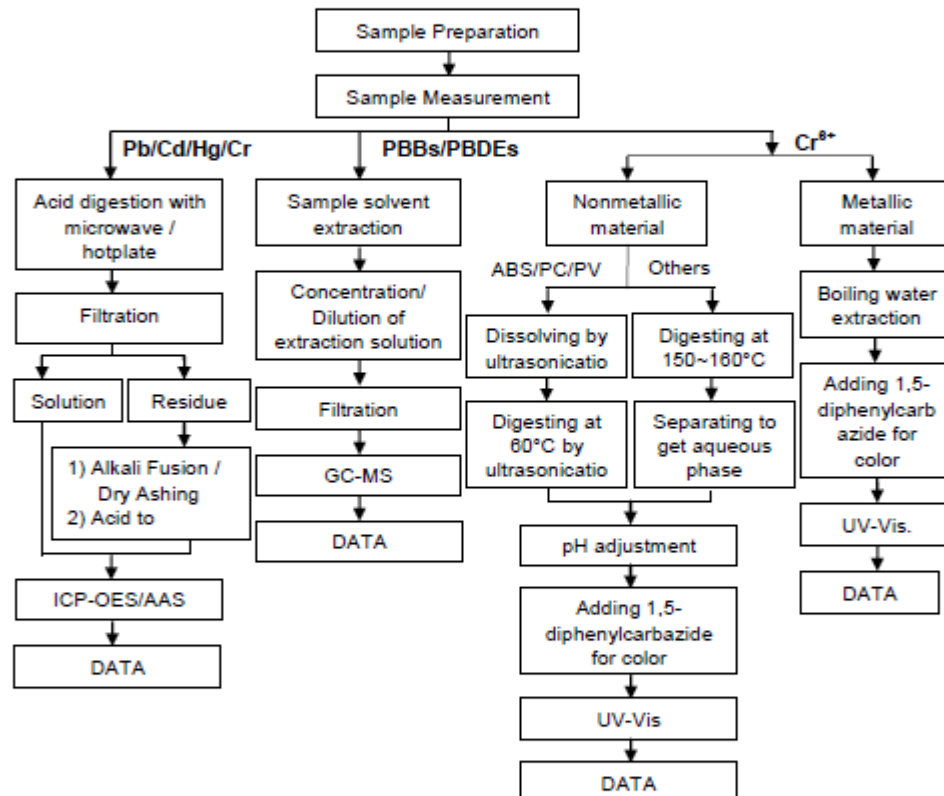
Date: 31 Aug 2017

Page 9 of 23

ATTACHMENTS

Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs Testing Flow Chart

- 1) Name of the person who made testing: Meria Jin/Gary Xu/ Rony Chen/Sielina Song
- 2) Name of the person in charge of testing: Jan Shi/Jessy Huang/Luna Xu/Shara Wang
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ and PBBs/PBDEs test method excluded)



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8987 1443, or email: CN.Doccheck@sgs.com
 3rd Building, No. 859 Yishan Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64953679 www.sgs.com.cn
 中国·上海·徐汇区宜山路859号3号楼 邮编: 200233 1HL (86-21) 61402584 1HL (86-21) 61150899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

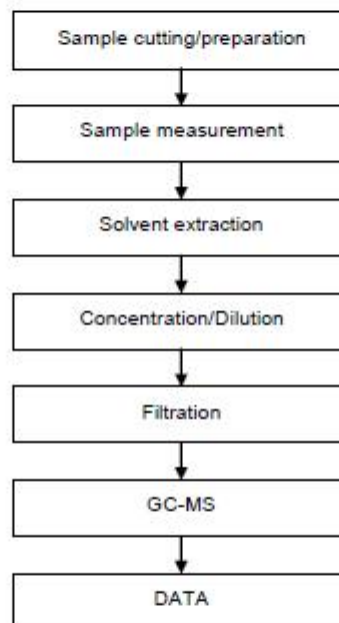
Date: 31 Aug 2017

Page 10 of 23

ATTACHMENTS

Phthalates Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing (inspection report & certificate, please contact us at telephone: (86-755) 8167 1443, or email: CN.Docscheck@sgs.com

3rd Building, No. 836 Yatan Road Xuhui District, Shanghai China 200233 1 E&E (86-21) 61402553 1 E&E (86-21) 64953679 www.sgs.com.cn
 中国·上海·徐汇区宜山路836号3号楼 邮编: 200233 1 HL (86-21) 61402554 1 HL (86-21) 61159899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

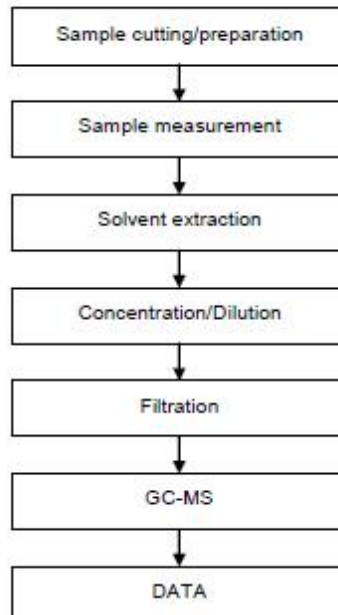
Date: 31 Aug 2017

Page 11 of 23

ATTACHMENTS

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8167 1443, or email: CN.Quechco@sgs.com
 3rd Building, No. 855 Yahan Road Xuhui District, Shanghai China 200233 | E&E (86-21) 61402553 | E&E (86-21) 64953679 | www.sgs.com
 中国·上海·徐汇区宜山路855号3号楼 邮编: 200233 | HL (86-21) 61432594 | HL (86-21) 61150899 | e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

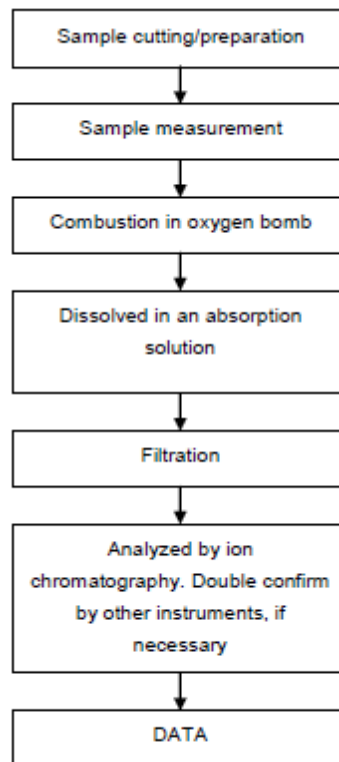
Date: 31 Aug 2017

Page 12 of 23

ATTACHMENTS

Halogen Testing (oxygen bomb) Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Inspection & Testing Service (Shanghai) Co., Ltd.
Testing Center (China) (Shanghai)

3rd Building, No. 839 Yachen Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64953679 www.sgs.com
中国·上海·徐汇区宜山路839号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

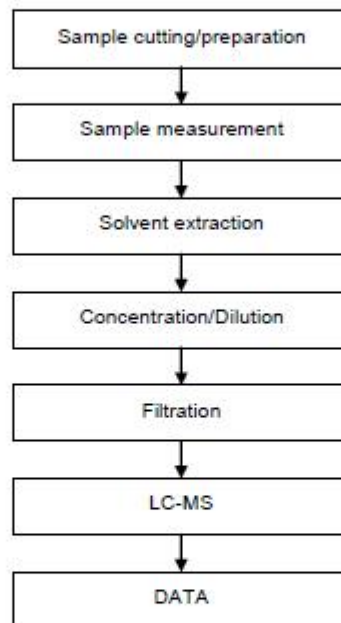
Date: 31 Aug 2017

Page 13 of 23

ATTACHMENTS

PFOS/PFOA Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for electronic documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8397 1443, or email: CN.Questcheck@sgs.com
 3rd Building, No. 836 Yixian Road Xuhui District, Shanghai China 200233 TEL (86-21) 61402553 FAX (86-21) 64953579 www.sgs.com.cn
 中国·上海·徐汇区宜山路836号3号楼 邮编: 200233 TEL (86-21) 61402554 FAX (86-21) 61150886 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

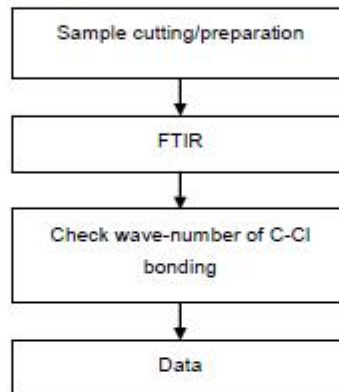
Date: 31 Aug 2017

Page 14 of 23

ATTACHMENTS

PVC Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issue defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8167 1443, or email: CH_Doccheck@sgs.com

SGS-CTI, a Swiss entity, Shanghai Branch, Inspection & Testing Service (Pvt.) Ltd.
 3rd Building, No. 888 Yitian Road Xuhui District, Shanghai, China 200233 TEL (86-21) 61402553 FAX (86-21) 64953679 www.sgs.com.cn
 中国·上海·徐汇区宜山路888号3号楼 邮编: 200233 TEL (86-21) 61402554 FAX (86-21) 61198899 e: sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

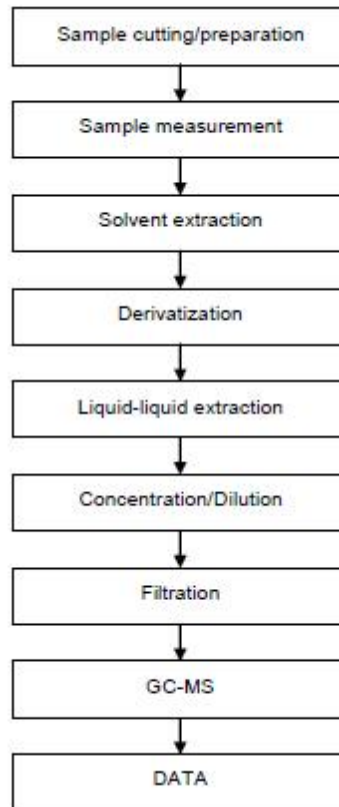
Date: 31 Aug 2017

Page 15 of 23

ATTACHMENTS

Organotin Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8187 1443, or email: CN.Check@sgs.com

S' Building No. 839 Yitian Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402563 1E&E (86-21) 64953679 www.sgs.com.cn
中国·上海·徐汇区宜山路839号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150999 e: sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

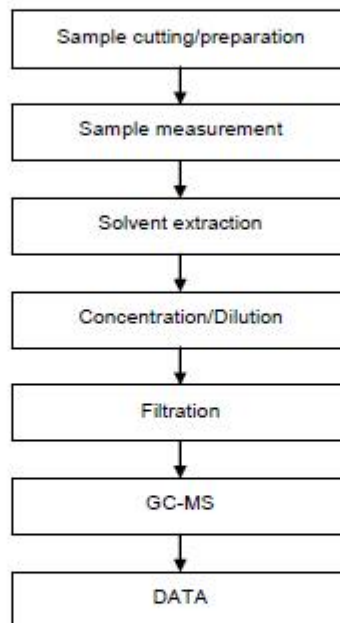
Date: 31 Aug 2017

Page 16 of 23

ATTACHMENTS

PCB/ PCT/ PCN Testing Flow Chart

- 1) Name of the person who made testing: Jenny Zhang
- 2) Name of the person in charge of testing: Ziroo Yu



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.cn/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.cn/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Denocn@sgs.com
 3rd Building, No. 889 Yitian Road Xuhui District, Shanghai, China 200233 TEL (86-21) 61402553 FAX (86-21) 64963679 www.sgs.com.cn
 中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 TEL (86-21) 61402594 FAX (86-21) 61159899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

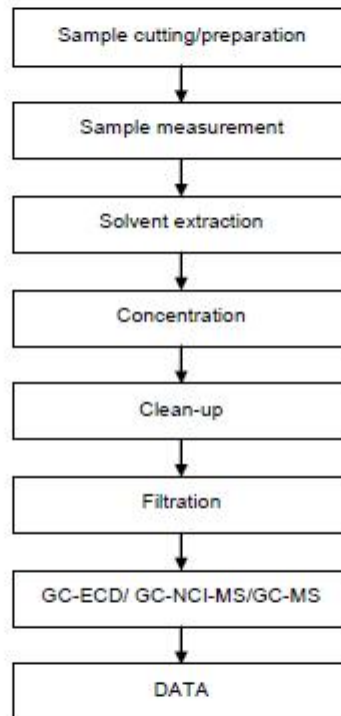
Date: 31 Aug 2017

Page 17 of 23

ATTACHMENTS

SCCP/MCCP Testing Flow Chart

- 1) Name of the person who made testing: Jenny Zhang
- 2) Name of the person in charge of testing: Zirco Yu



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 0307 1443, or email: CN.Doccheck@sgs.com
 3rd Building, No. 836 Yishan Road Xuhui District, Shanghai China 200233 TEL (86-21) 61402553 FAX (86-21) 64853679 www.sgs.com.cn
 中国·上海·徐汇区宜山路836号3号楼 邮编: 200233 TEL (86-21) 61402554 FAX (86-21) 61150889 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

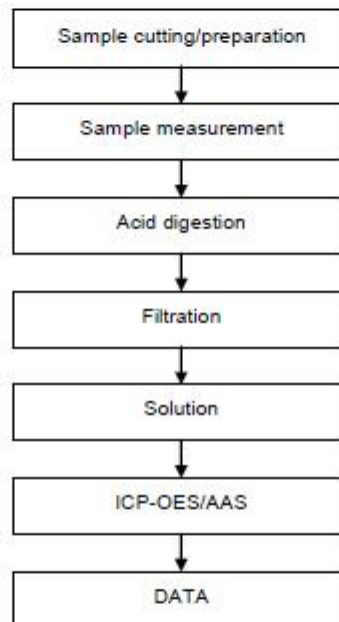
Date: 31 Aug 2017

Page 18 of 23

ATTACHMENTS

Elements Testing Flow Chart

- 1) Name of the person who made testing: Meria Jin/Sielina Song
- 2) Name of the person in charge of testing: Luna Xu/Jan Shi



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8367 1443, or email: CN_Doccheck@sgs.com
 3rd Building, No. 886 Yihuan Road Xuhui District, Shanghai China 200233 1EAE (86-21) 61402553 1EAE (86-21) 64953679 www.sgs.com
 中国·上海·徐汇区宜山路886号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61158899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

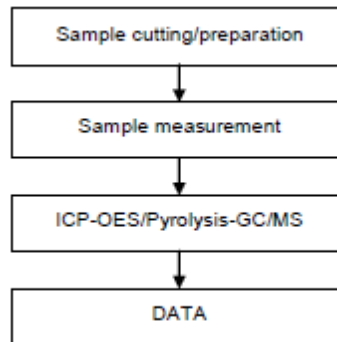
Date: 31 Aug 2017

Page 19 of 23

ATTACHMENTS

Red Phosphorus Testing Flow Chart

- 1) Name of the person who made testing: Jessica Qin / Zhengyong Rao
- 2) Name of the person in charge of testing: Linda Li/Summer Jin



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-and-Conditions.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

3rd Building, No. 889 Yehen Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64853679 www.sgs.com.cn
 中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

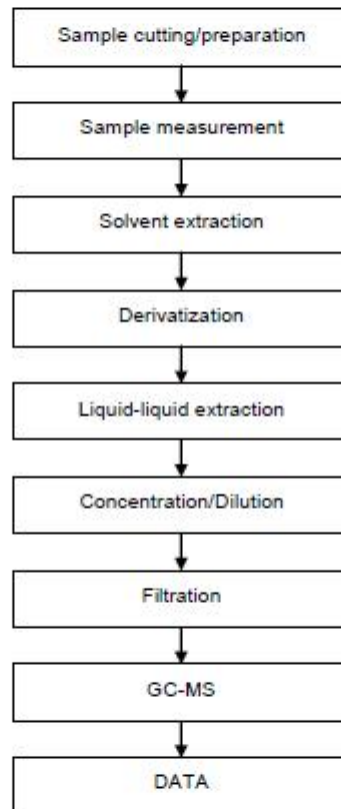
Date: 31 Aug 2017

Page 20 of 23

ATTACHMENTS

TBBP-A Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-20) 8167 1443, or email: CN.Doccheck@sgs.com

SGS (China) Inspection & Testing Services (Co., Ltd.) 3rd Building No. 805 Yihuan Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64953679 www.sgs.com.cn
中国·上海·徐汇区宜山路805号3号楼 邮编: 200233 1HL (86-21) 61402564 1HL (86-21) 61150899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

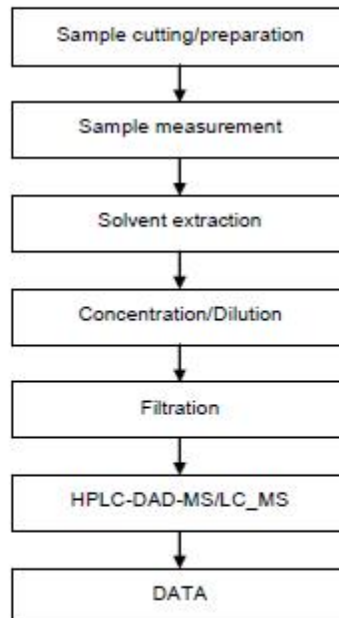
Date: 31 Aug 2017

Page 21 of 23

ATTACHMENTS

BPA Testing Flow Chart

- 1) Name of the person who made testing: Alfred Chen
- 2) Name of the person in charge of testing: Judy Li



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing inspection report & certificate, please contact us at telephone: (86-755) 8367 1443, or email: CN.Doccheck@sgs.com

3rd Building No. 835 Yuhuan Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64653679 www.sgs.com.cn
 中国·上海·徐汇区宜山路835号3号楼 邮编: 200233 1HL (86-21) 61402554 1HL (86-21) 61150899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

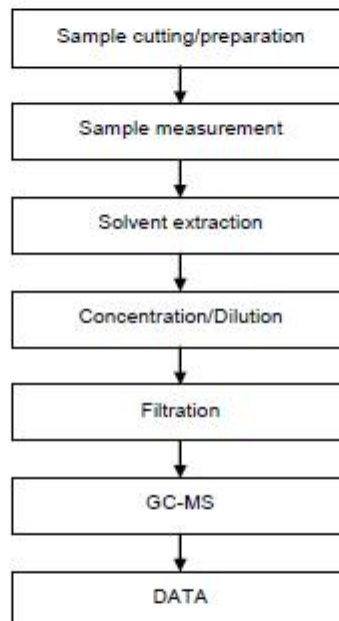
Date: 31 Aug 2017

Page 22 of 23

ATTACHMENTS

DMF (Dimethyl fumarate) Testing Flow Chart

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. 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 findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8387 1443, or email: CN.Doccheck@sgs.com

SGS China Inspection & Testing Service (Shanghai) Co. Ltd.
 3rd Building, No. 885 Yachen Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64653679 www.sgs.com.cn
 中国·上海·徐汇区宜山路885号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150899 e.sgs.china@sgs.com

Member of the SGS Group (SGS SA)



Test Report

No. SHAEC1718798806

Date: 31 Aug 2017

Page 23 of 23

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/terms-and-conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/terms-and-conditions/terms-e-document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document 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 the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Attention: To check the authenticity of testing (inspection report & certificate), please contact us at telephone: (86-755) 8367 1443, or email: CN.Doccheck@sgs.com

3rd Building, No. 809 Yehen Road Xuhui District, Shanghai China 200233 1E&E (86-21) 61402553 1E&E (86-21) 64653679 www.sgs.com
中国·上海·徐汇区宜山路809号3号楼 邮编: 200233 1HL (86-21) 61402594 1HL (86-21) 61150899 sgs.china@sgs.com

Member of the SGS Group (SGS SA)