DELTA ELECTRONICS, INC.

# FHS-A9025S20

2011 New LGA1156

## Application:

Intel LGA1156 Nehalem(45nm 82W) / Westmere (32nm73W) CPU Lynnfield & Clarkdale sequence (Low Profile M/B mounting hole pitch 75x 75mm)

## Picture:

## Thermal & Mechanical Spec.:

Thermal performance for 82W &73W CPU
HSK Assembly Weight: 180 g (ref.) 3
Clipping Force: 15.9 Kgf (ref.)

## Component Specification:

5

1. Heat Sink
   Type: Extruded HSK
   Material: Aluminum A6063 or Equivalent.
   Dimension: 90*90*19.05 mm
2. Thermal interface material
   Material: Dow Corning TC-5630 or Equivalent. 7
3. Fan
   *(90x90x25 mm with Thermistor & PWM Control)*
   Rated Voltage: 12 V
   Life Expectance Time:
   Superflo bearing 80000 hrs at 45˚C.
   Connector:
   a. Lead wire: UL 10368 AWG #26 1
      pin 1: black wire--------(-)
      pin 2: yellow wire----------(+)
      pin 3: green wire---------(F00)
      pin 4: blue wire------------(PWM)
   b. Housing: Molex 47054-1000 or equivalent
   c. Terminal: Molex 2759T 08-50-0113 or equivalent

5

* All readings are typical values at rated voltage.
* Specifications are subject to change without notice


**DELTA ELECTRONICS, INC.**
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TAIWAN,R.O.C.
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**DELTA PRODUCTS CORPORATION**
4405 CUSHING PARKWAY
FREMONT, CA 94538, U.S.A.
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FAX: 1-510-668-0680

**DELTA ELECTRONICS(JAPAN), INC.**
DELTA SHIBADAIMON BLDG.
2-1-14 SHIBADAIMON, MINATO-KU,
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FAX: 81-3-5733-1211

**DELTA ELECTRONICS EUROPE LTD.**
WEGALAAN 16,
2132 JC HOOFDDORP,
THE NETHERLANDS
TEL: 31-23-566-8989
FAX: 31-23-5668910


Date: July-2009

# Delta Electronics Corp.

# APPROVAL SHEET

Customer Name：

Model Name： COOLER

Model Name： FHS-A9025S20

Customer Part No：

Spec Issue Date： 2015 / 12 / 14

Spec Revision： 07

**PLEASE SEND ONE COPY OF THIS SPECIFICATION BACK AFTER YOU SIGNED APPROVAL FOR PRODUCTION PRE-ARRANGMENT.**

**Approved By:** _____

**Date:** _____

| Approval | Check | Designer |
|---|---|---|
| Charles. Chen | Charles. Chen | Skyler.Huang |

# Delta Electronics Corp.

| REV. | Description | Drawn | Checked | Approved | Issue Date |
|---|---|---|---|---|---|
| 00 | ISSUE SPEC | Skyler-Huang 12/29'09 | Charles. Chen 12/29'09 | Alex-Hsia 12/29'09 | |
| 01 | 1. The wire is changed from UL 10368 AWG#22 to UL 10368 AWG#26. | HIKARU.CHEN 06/15'11 | Charles. Chen 06/15'11 | Alex-Hsia 06/15'11 | |
| 02 | 1. Add RoHS Certification. | HIKARU 09/21'11 | Charles. Chen 09/21'11 | Alex-Hsia 09/22'11 | |
| 03 | 1. The HSK is changed from 3346208500 to 3346777600. | HIKARU 11/21'11 | Charles. Chen 11/21'11 | Alex-Hsia 11/22'11 | |
| 04 | 1. Modify the Package spec<br>2. Change the Fan P/N | Skyler-Huang08/21'12 | Charles. Chen08/21'12 | Alex-Hsia 08/21'12 | |
| 05 | 1. Change the Fan P/N<br>2. Correct thermal resistance<br>3. Updated the Rohs<br>4. Modify the cable length to 250mm | Skyler-Huang05/20'13 | Charles. Chen05/20'13 | Charles. Chen05/20'13 | |
| 06 | 1. Modify the package spec<br>2. Modify the fan label form | Skyler-Huang06/10'13 | Charles. Chen06/10'13 | Charles. Chen06/10'13 | |
| 07 | 1. Change the grease from TC-1996 to TC-5630<br>2. Update RoHS | Skyler-Huang12/14'15 | Charles. Chen12/14'15 | Charles. Chen12/14'15 | |
| | | | | | |

Description:

SAMPLE REVISION CODE LIST

| Part No. | REV |
|---|---|
| DELTA MODEL : FHS-A9025S20 | TOTAL 76PAGE / 07 |

# Delta Electronics Corp.

# CONTENTS

# Delta Electronics Corp.

# 1. SPECIFICATION

## Characters

| Item | Description |
|---|---|
| Scope | THIS SPECIFICATION DEFINES THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF THE FAN HEATSINK |
| Application | INTEL CPU COOLER |
| Specification | |
| a: Thermal Resistance | 0.37 (℃/W) (REF.) |
| b: total weight | 180 g (REF.) |
| c: clip force | 15.9 kgf (REF.) |

## BOM

| Item | Part Name | Material | Part NO. | Q'TY | Remark |
|---|---|---|---|---|---|
| 1 | FAN | PBT | 3622922011 | 1 | |
| 2 | HSK | AL A6063-T5 | 3346777600 | 1 | |
| 3 | FASTENER CAP | PC | 3470415400 | 4 | |
| 4 | FASTENER BASE | PC | 3470415500 | 4 | |
| 5 | LABEL | PE | 3266799500 | 1 | |
| 6 | TIM | DOW TC-5630 | 4021107300 | 0.12g | Rev07 |
| | | | | | |
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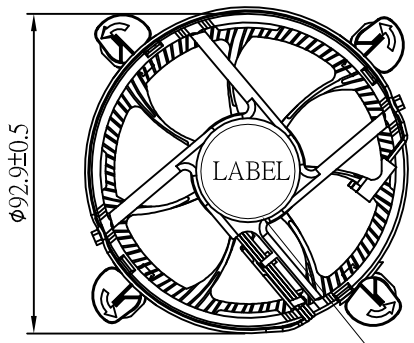
| | | | | | |

# 2. PRINT

## Assembly Drawing

## Parts Drawing

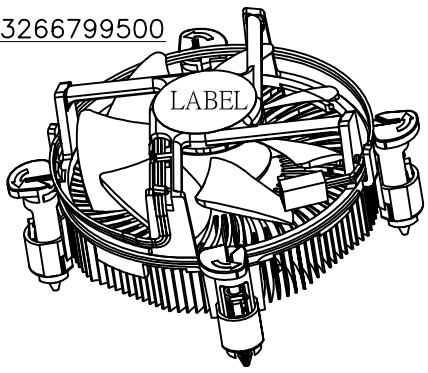
06 07

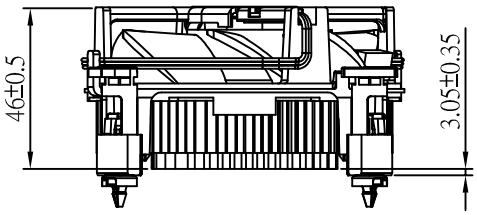


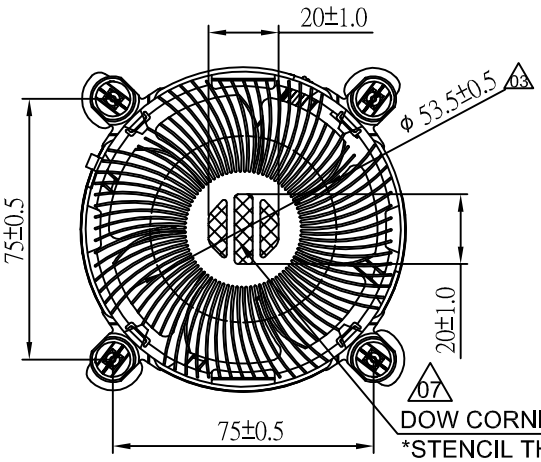

05

MODIFY THE CABLE LENGTH FROM 360MM TO 250 MM

FAN LABEL P/N:3266799500




DOW CORNING TC-5630 P/N:4021107300
*STENCIL THICKNESS=0.20(TYP.) 0.22(MAX.)
TIM WEIGHT ON HSK MUST BE 112MG+/-25MG

*NOTE : PLEASE ATTENTION FAN LABEL ORIENTATION.

UNIT：mm

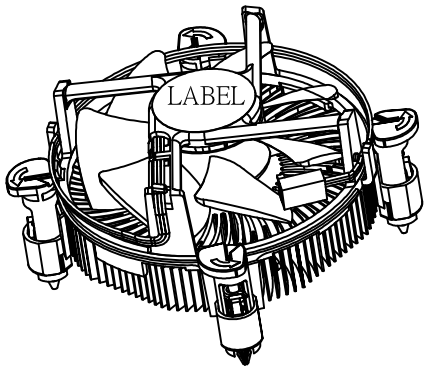
| | | | | | |
|---|---|---|---|---|---|
| DELTA 台達電子工業股份有限公司 DELTA ELECTRONICS, INC. | | | | DELTA MODEL: FHS-A9025S20 | Drawn: Skyler Huang |
| THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF DELTA ELECTRONICS, INC. AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SELL OF APPARATUSES OR DEVICES WITHOUT PERMISSION. | | | | CUSTOMER NAME: — — — | |
| | | | | CUSTOMER P/N: — — — | |
| DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5° ( ) <30 :±0.25 >30~100 :±0.35 >100~300 :±0.5 ABOVE 300 :±0.8 ( ) DECIMALS X :±0.3 X.X :±0.2 X.XX :±0.1 ( ) UP~100 :±0.2 100~150 :±0.25 150~200 :±0.3 200~250 :±0.35 ( ) 250~300 :±0.4 300~350 :±0.45 350~400 :±0.5 ( ) UP~600 :±1.5 600~900 :±2.4 900~OVER :±3.1 | | | | THIRD ANGLE PROJECTION | Description: PRODUCTION SPEC. (PHYSICAL DIMENSION) |
| | | | | A3 SIZE | Part No. FHS-A9025S20-PD |
| | | | | | REV. 07 |
| SCALE — — — | UNIT — — — | USED ON | COOLER | SHEET 1 OF 2 | ISSUE DATE: |

FRAME NAME : DF-PSLA4V-3R01.DWG

07

DATECODE POSITION

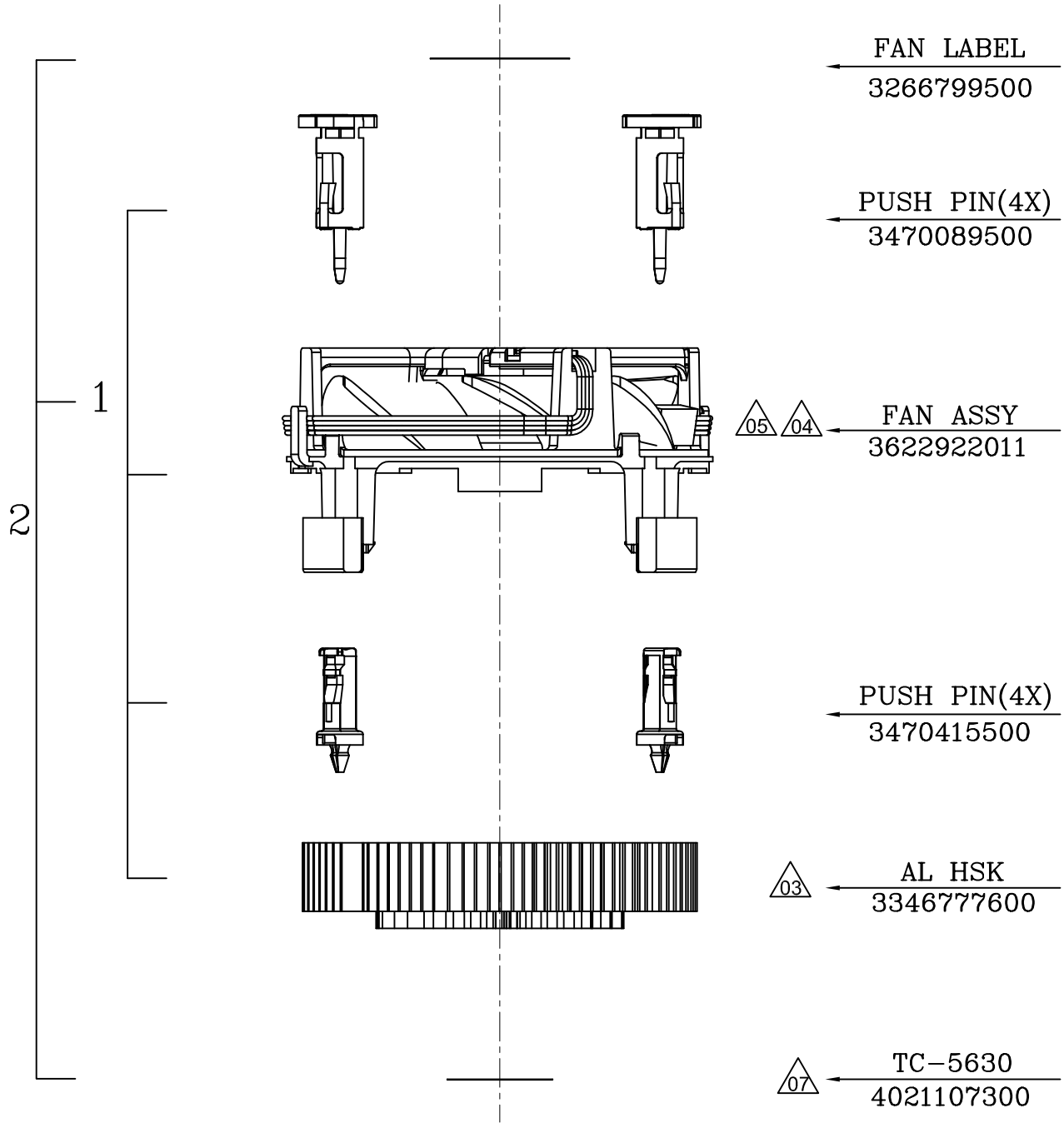

DATECODE POSITION
TYPE：WHITE INK




NOTE：
1. DATECODE ON FAN LABEL.
2. PLEASE REFER TO CP10S-00345 WHILE PRINTING DATECODE.

| | | | |
|---|---|---|---|
| 台達電子工業股份有限公司 DELTA ELECTRONICS, INC. | | DELTA MODEL: FHS-A9025S20 | Drawn: Skyler Huang |
| THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF DELTA ELECTRONICS, INC. AND SHALL NOT BE REPRODUCED OR USED AS THE BASIS FOR THE MANUFACTURE OR SELL OF APPARATUSES OR DEVICES WITHOUT PERMISSION. | | CUSTOMER NAME: — — — | |
| | | CUSTOMER P/N: — — — | |
| DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5° | | THIRD ANGLE PROJECTION | Description: PRODUCTION SPEC. (PHYSICAL DIMENSION) |
| ( ) <30 :±0.25 >30~100 :±0.35 >100~300 :±0.5 ABOVE 300 :±0.6 | ( ) DECIMALS X :±0.3 X.X :±0.2 X.XX :±0.1 | ( ) UP~100 :±0.2 100~150 :±0.25 150~200 :±0.3 200~250 :±0.35 | ( ) 250~300 :±0.4 300~350 :±0.45 350~400 :±0.5 UP~600 :±1.5 600~900 :±2.4 900~OVER :±3.1 |
| | | A3 SIZE | Part No. FHS-A9025S20-PD REV. 07 |
| SCALE — — — UNIT — — — USED ON COOLER | | | SHEET 2 OF 2 ISSUE DATE: |

FRAME NAME : DF-PSLA4V-3R01.DWG

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DELTA ELECTRONICS, INC.



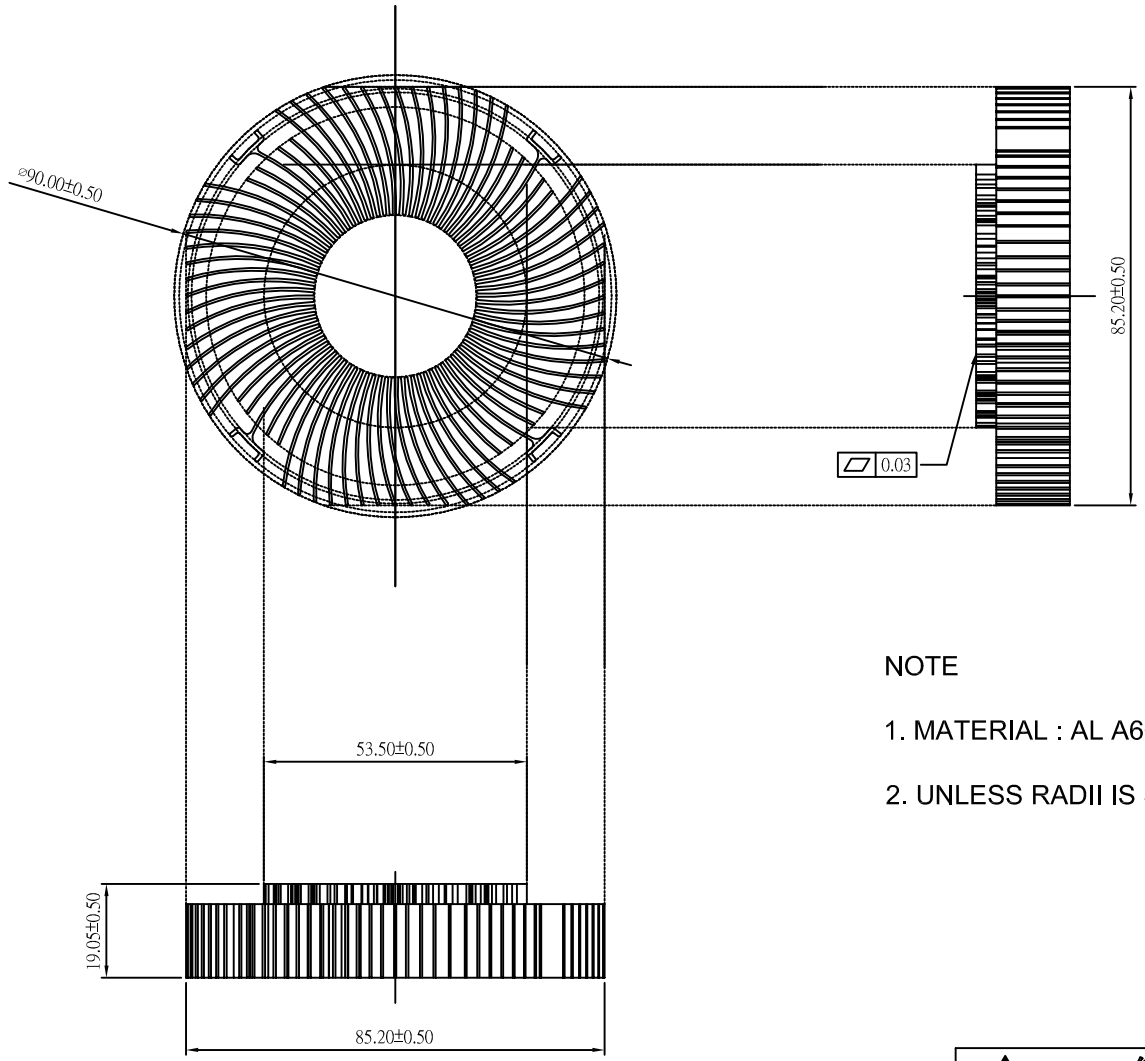
DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5°

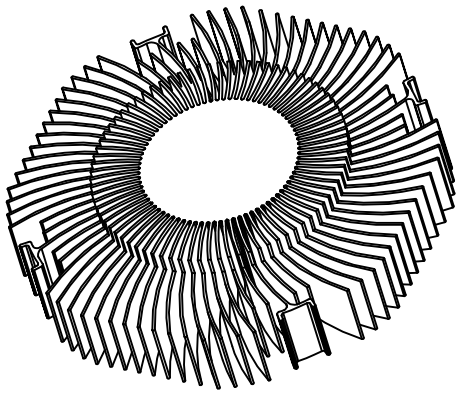
| ( ) | | ( ) | | ( ) | | | | ( ) | |
|---|---|---|---|---|---|---|---|---|---|
| <30 | :±0.25 | DECIMALS | | UP~100 | :±0.2 | 250~300 | :±0.4 | UP~600 | :±1.5 |
| >30~100 | :±0.35 | X | :±0.3 | 100~150 | :±0.25 | 300~350 | :±0.45 | 600~900 | :±2.4 |
| >100~300 | :±0.5 | X.X | :±0.2 | 150~200 | :±0.3 | 350~400 | :±0.5 | 900~OVER | :±3.1 |
| ABOVE 300 | :±0.8 | X.XX | :±0.1 | 200~250 | :±0.35 | | | | |

| SCALE | --- | UNIT | --- | USED ON | COOLER |
|---|---|---|---|---|---|

| | |
|---|---|
| DELTA MODEL: | FHS-A9025S20 |
| Drawn: | Skyler Huang |
| CUSTOMER NAME: | ----- |
| CUSTOMER P/N: | ----- |
| THIRD ANGLE PROJECTION | |
| Description: | PRODUCTION SPEC. (ASSEMBLY ORDER) |
| A4 SIZE | |
| Part No. | FHS-A9025S20-AS |
| REV. | 07 |
| SHEET — OF — | |
| ISSUE DATE: | |

FRAME NAME : DF-PSLA4V-3R01.DWG



NOTE

1. MATERIAL : AL A6063-T5. FINISH:NONE

2. UNLESS RADII IS SMALLER THAN 0.5R UNLESS OTHERWISE SPECIFIED.

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DELTA ELECTRONICS, INC.



THIRD ANGLE PROJECTION

DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5°

| ( ) | | (√) | | ( ) | | ( ) | |
|---|---|---|---|---|---|---|---|
| <30 | ±0.25 | DECIMALS | | UP~100 | ±0.2 | 250~300 | ±0.4 | UP~600 | ±1.5 |
| >30~100 | ±0.35 | X | ±0.5 | 100~150 | ±0.25 | 300~350 | ±0.45 | 600~900 | ±2.4 |
| >100~300 | ±0.5 | X.X | ±0.3 | 150~200 | ±0.3 | 350~400 | ±0.5 | 900~OVER | ±3.1 |
| ABOVE 300 | ±0.6 | X.XX | ±0.25 | 200~250 | ±0.35 | | | | |

| SCALE | 1/1 | UNIT | mm | USED ON | COOLER |
|---|---|---|---|---|---|

A3 SIZE

Drawn: Skyler Huang

DESCRIPTION: HEATSINK

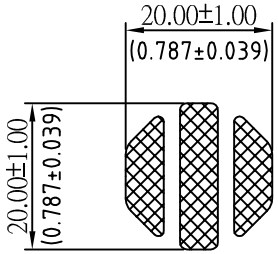
PART NO.: 3346777600

REV. 03

SHEET 2 OF 2

DF-MEA3H-4R00

07




NOTES:
1. THICKNESS: 0.20mm
2. VENDOR P/N: DOW CORNING TC-5630
3. COLOR: GRAY.
4. THERMAL CONDUCTIVITY: 4.5 W/m-°C
5. THERMAL CONTACT RESISTANCE: 0.06 °C-cm²/W @40psi
6. GROSS WEIGHT: 112±25 mg
7. VENDOR : DOW CORNING
8. MUST MEET DELTA'S SPEC : 10000-0162

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DELTA ELECTRONICS, INC.



THIRD ANGLE PROJECTION

DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5°

| ( ) | | (√) | | ( ) | | ( ) | |
|---|---|---|---|---|---|---|---|
| <30 | ±0.25 | DECIMALS | | UP~100 | ±0.2 | 250~300 | ±0.4 | UP~600 | ±1.5 |
| >30~100 | ±0.35 | X | ±0.5 | 100~150 | ±0.25 | 300~350 | ±0.45 | 600~900 | ±2.4 |
| >100~300 | ±0.5 | X.X | ±0.2 | 150~200 | ±0.3 | 350~400 | ±0.5 | 900~OVER | ±3.1 |
| ABOVE 300 | ±0.6 | X.XX | ±0.1 | 200~250 | ±0.35 | | | | |

| SCALE | 1/1 | UNIT | mm | USED ON | COOLER |
|---|---|---|---|---|---|

A4 SIZE

Drawn: Skyler Huang

DESCRIPTION: THERMAL INTERFACE

PART NO.: 4021107300

REV. 00

SHEET 1 OF 1

DF-MEA3H-4R00

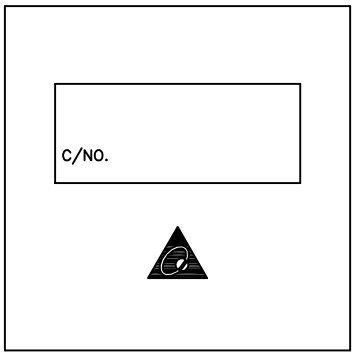
# 3. PACKING PLAN

## Packing Specification

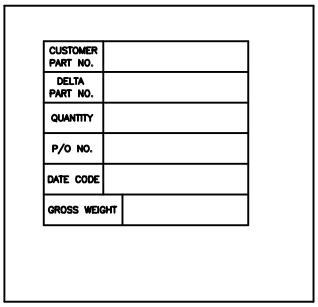
| CARTON ILLUSTRATE | SIZE | 524(L)*225(w)*475(H)(mm) 4 | PACKING QUANTITY | 6LAYERS/CARTON 4 |
|---|---|---|---|---|
| | MATERIAL | 3 LAYERS"AB" FLUTE | CARTON WEIGHT | 0.62 kg (REF.) |

CARTON OUTSIDE DEMONDTRATE

FRONT

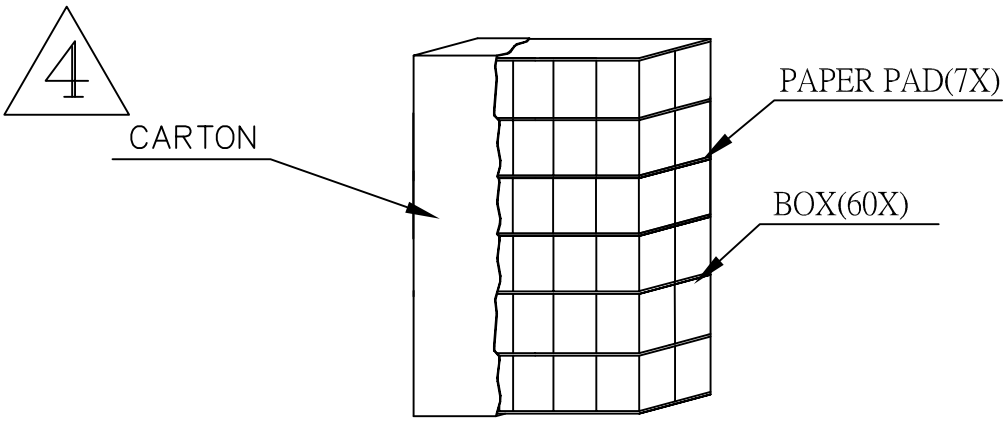



BACK




(ONE LABEL PER CARTON)

| PET TRAY PACKING ILLUSTRATE | SIZE | 94(L)*94(w)*30(H)(mm) | PACKING QUANTITY | 1PCS/PET TRAY |
|---|---|---|---|---|
| | MATERIAL | PET TRAY | | |
| | MATERIAL WEIGHT | 6g (REF.) | | |

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DELTA ELECTRONICS, INC.



DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5°

| ( ) | | ( ) | | ( ) | | ( ) | |
|---|---|---|---|---|---|---|---|
| <30 | :±0.25 | DECIMALS | | UP~100 | :±0.2 | 250~300 | :±0.4 | UP~600 | :±1.5 |
| >30~100 | :±0.35 | X | :±0.3 | 100~150 | :±0.25 | 300~350 | :±0.45 | 600~900 | :±2.4 |
| >100~300 | :±0.5 | XX | :±0.2 | 150~200 | :±0.3 | 350~400 | :±0.5 | 900~OVER | :±3.1 |
| ABOVE 300 | :±0.6 | X.XX | :±0.1 | 200~250 | :±0.35 | | | | |

| SCALE | --- | UNIT | mm | USED ON | COOLER |
|---|---|---|---|---|---|

| DELTA MODEL: FHS-A9025S20 | Drawn: Skyler Huang |
|---|---|
| CUSTOMER NAME: ----- | |
| CUSTOMER P/N: ----- | |

THIRD ANGLE PROJECTION

A4 SIZE

Description: PRODUCTION SPEC. (PACKING ASSMEBLY)

Part No. FHS-A9025S20-PA

REV. 06

SHEET 1 OF 2 | ISSUE DATE:

| | | | | |
|---|---|---|---|---|
| PART NO. | FHS-A9025S20 | | | |
| BASIC DATA | QUANTITY/CARTON | 60PCS (6 LAYERS/CARTON, 10PCS/LAYER) ④ | | |
| | PRODUCTION NET WEIGHT | 10.8kg (REF.) ④ | | |
| | PRODUCTION GROSS WEIGHT | 13.9kg (REF.) ④ ⑥ | | |
| 20(ft)CONTAINER ILLUSTRATE | SIZE | 5.889(L)*2.352(w)*2.386(H)m | PACKING QUANTITY | 20PALLETS/CONTAINER |
| | CONTAINER | STEEL | | |

CONTAINER FORM

CONTAINER LOADING MATHOD

| | | | | |
|---|---|---|---|---|
| PALLET | PALLET | PALLET | PALLET | PALLET |
| PALLET | PALLET | PALLET | PALLET | PALLET |

TOP VIEW

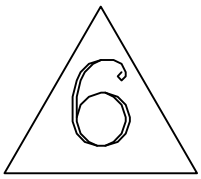
⑥

| | |
|---|---|
| PALLET | PALLET |
| PALLET | PALLET |

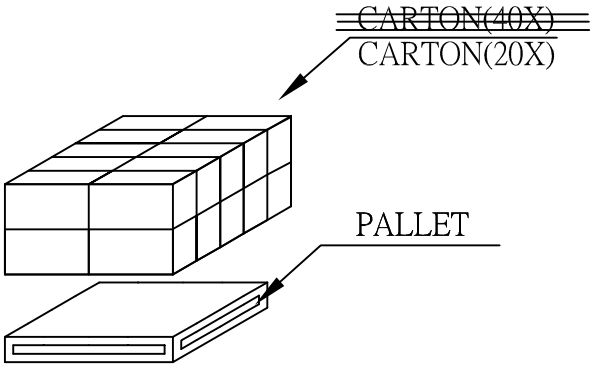
FRONT VIEW ⑥

| | | | | |
|---|---|---|---|---|
| PALLET LOADING ILLUSTRATE | SIZE | 117(L)*107(w)*13(H)cm | PACKING QUANTITY | 20 CARTONS/PALLET |
| | PALLET | WOOD | | |

PALLET ILLUSTRATE




PALLET LOADING MATHOD

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DELTA ELECTRONICS, INC.



DIMENSIONAL TOLERANCES HOLES : ±0.05 ANGLES : ±0.5°

| ( ) | | DECIMALS | ( ) | | ( ) | | ( ) | |
|---|---|---|---|---|---|---|---|---|
| <30 | :±0.25 | X | :±0.3 | UP~100 | :±0.2 | 250~300 | :±0.4 | UP~600 | :±1.5 |
| >30~100 | :±0.35 | XX | :±0.2 | 100~150 | :±0.25 | 300~350 | :±0.45 | 600~900 | :±2.4 |
| >100~300 | :±0.5 | XXX | :±0.1 | 150~200 | :±0.3 | 350~400 | :±0.5 | 900~OVER | :±3.1 |
| ABOVE 300 | :±0.6 | | | 200~250 | :±0.35 | | | | |

| SCALE | --- | UNIT | mm | USED ON | COOLER |
|---|---|---|---|---|---|

| | |
|---|---|
| DELTA MODEL: | FHS-A9025S20 |
| Drawn: | Skyler Huang |
| CUSTOMER NAME: | ----- |
| CUSTOMER P/N: | ----- |
| THIRD ANGLE PROJECTION | |
| Description: | PRODUCTION SPEC. (PACKING ASSMEBLY) |
| A4 SIZE | |
| Part No. | FHS-A9025S20-PA |
| REV. | 06 |
| SHEET 2 OF 2 | ISSUE DATE: |

# 4. FAN

## Fan Specification

# SPECIFICATION FOR APPROVAL

Customer T M P B U

Description DC FAN

Part No. _____ REV. _____

Delta Model No. AUC0912D-DB55 REV. 00

Sample Issue No. _____

Sample Issue Date FEB.21.2013

PLEASE SEND ONE COPY OF THIS SPECIFICAITON BACK AFTER YOU SIGNED APPROVAL FOR PRODUCTION PRE-ARRANGMENT.

APPROVED BY: _____

DATE : _____

DELTA ELECTRONICS, INC.
TAOYUAN PLANT
252, SHANG YING ROAD, KUEI SAN INDUSTRIAL ZONE TAOYUAN SHIEN, TAIWAN, R.O.C.
TEL:886-(0)3-3591968
FAX:886-(0)3-3591991

DELTA ELECTRONICS, INC.
252, SHANG YING ROAD, KUEI SAN
TAOYUAN HSIEN 333, TAIWAN, R. O. C.
TEL : 886-(0)3-3591968
FAX : 886-(0)3-3591991

# SPECIFICATION FOR APPROVAL

| | | | |
|---|---|---|---|
| Customer: | TMPBU | | |
| Description: | DC FAN | | |
| Customer P/N: | | REV: | |
| Delta Model NO.: | AUC0912D-DB55 | **Delta Safety Model NO.: AUC0912D-8L2V** | |
| Sample Rev: | 00 | Issue NO: | |
| Sample Issue Date: | FEB.21.2013 | Quantity: | |

1. SCOPE:

THIS SPECIFICATION DEFINES THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF THE DC BRUSHLESS AXIAL FLOW FAN. THE FAN MOTOR IS WITH SINGLE PHASES AND FOUR POLES.

2. CHARACTERS:

| ITEM | DESCRIPTION | |
|---|---|---|
| SENSOR TEMPERATURE | 30°C | 40°C |
| RATED VOLTAGE | 12.0 VDC | |
| OPERATION VOLTAGE | 10.8 - 13.2 VDC | |
| START UP CURRENT | MAX. 0.60A | MAX. 0.75A |
| INPUT CURRENT | 0.07 (MAX. 0.14) A **(CURRENT ON SAFETY LABEL 0.60A)** | 0.16 (MAX. 0.60) A **(CURRENT ON SAFETY LABEL 0.60A)** |
| INPUT POWER | 0.84 (MAX. 1.68) W | 1.68 (MAX. 7.20) W |
| SPEED (FAN ONLY) | 2050±10% R.P.M. | 3200±10% R.P.M. |
| SPEED (FAN ON SINK) | 2000±10% R.P.M. | 3150±10% R.P.M. |
| MAX. AIR FLOW (FAN ONLY) (AT ZERO STATIC PRESSURE) | 0.537 (MIN. 0.483) $M^3$/MIN.<br>18.96 (MIN. 17.06) CFM | 0.914 (MIN. 0.823) $M^3$/MIN.<br>32.29 (MIN. 29.06) CFM |
| MAX. AIR PRESSURE (FAN ONLY) (AT ZERO AIRFLOW) | 1.53 (MIN. 1.24) $mmH_20$<br>0.060 (MIN. 0.049) $inchH_20$ | 3.61 (MIN. 2.92 ) $mmH_20$<br>0.142 (MIN. 0.115) $inchH_20$ |
| ACOUSTICAL NOISE(ON SINK AVG.) | 26.0 (MAX. 30.0) dB-A | 36.0 (MAX. 40.0) dB-A |
| INSULATION TYPE | UL: CLASS A | |

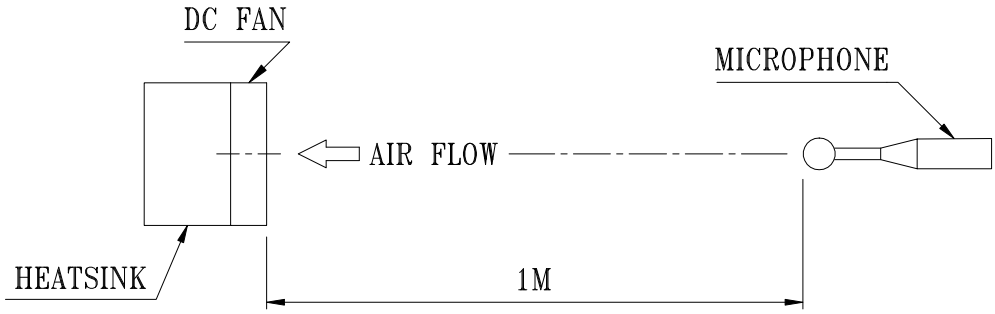
(continued)

PART NO:

DELTA MODEL: AUC0912D-DB55

| | |
|---|---|
| INSULATION STRENGTH | 10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL) |
| DIELECTRIC STRENGTH | 5 mA MAX. AT 500 VAC 50/60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL) |
| EXTERNAL COVER | OPEN TYPE |
| LIFE EXPECTANCE (AT LABEL VOLTAGE) | 80,000 HOURS CONTINUOUS OPERATION AT 45 °C WITH 15 ~ 65 %RH. |
| ROTATION | CLOCKWISE VIEW FROM NAME PLATE SIDE |
| OVER CURRENT SHUT DOWN | THE CURRENT WILL SHUT DOWN WHEN LOCKING ROTOR |
| LEAD WIRE | UL 10368 -F- AWG #26<br>BLACK WIRE:NEGATIVE(-)<br>YELLOW WIRE:POSITIVE(+)<br>GREEN WIRE:TACHOMETER OUTPUT (F00)<br>BLUE WIRE:SPEED CONTROL (PWM) |

NOTES:
1. ALL READINGS ARE MEASURED AFTER STABLY WARMING UP THROUGH 10 MINUTES.
2. **STANDARD AIR PROPERTY IS AIR AT (Td) 25°C TEMPERATURE, (RH) 65% RELATIVE HUMIDITY, AND (Pb) 760 mmHg BAROMETRIC PRESSURE.**
3. THE VALUES WRITTEN IN PARENS , ( ), ARE LIMITED SPEC.
4. ACOUSTICAL NOISE MEASURING CONDITION:




NOISE IS MEASURED AT RATED VOLTAGE IN FREE AIR IN ANECHOIC CHAMBER WITH B & K SOUND LEVEL METER WITH MICROPHONE AT A DISTANCE OF ONE METER FROM THE FAN INTAKE.

PART NO:

DELTA MODEL: AUC0912D-DB55

3. MECHANICAL:

3-1. DIMENSIONS ---------- SEE DIMENSIONS DRAWING

3-2. FRAME ---------- PLASTIC UL: 94V-0

(THE HALOGEN SUBSTANCE CONTENT IS LESS THAN 1500 PPM FOR USING EDX ...ETC)

3-3. IMPELLER ---------- PLASTIC UL: 94V-0

(THE HALOGEN SUBSTANCE CONTENT IS LESS THAN 1500 PPM FOR USING EDX ...ETC)

3-4. BEARING SYSTEM ---------- SUPERFLO BEARING

3-5. WEIGHT ---------- 82 GRAMS

4. ENVIRONMENTAL:

4-1. OPERATING TEMPERATURE ---------- -10 TO +70 DEGREE C

4-2. STORAGE TEMPERATURE ---------- -35 TO +80 DEGREE C

4-3. OPERATING HUMIDITY --- 85% RELATIVE HUMIDITY WITH 55 DEGREE C

4-4. STORAGE HUMIDITY ---------- 5 TO 95 % RH

5. PROTECTION:

5-1. LOCKED ROTOR PROTECTION

IMPEDANCE OF MOTOR WINDING PROTECTS MOTOR FROM FIRE IN 96 HOURS OF LOCKED ROTOR CONDITION AT THE RATED VOLTAGE.

5-2. POLARITY PROTECTION

BE CAPABLE OF WITHSTANDING IF REVERSE CONNECTION FOR POSITIVE AND NEGATIVE LEADS.

6. RE OZONE DEPLETING SUBSTANCES:

6-1. NO CONTAINING PBBs, PBBOs, CFCs, PBBEs, PBDPEs AND HCFCs.

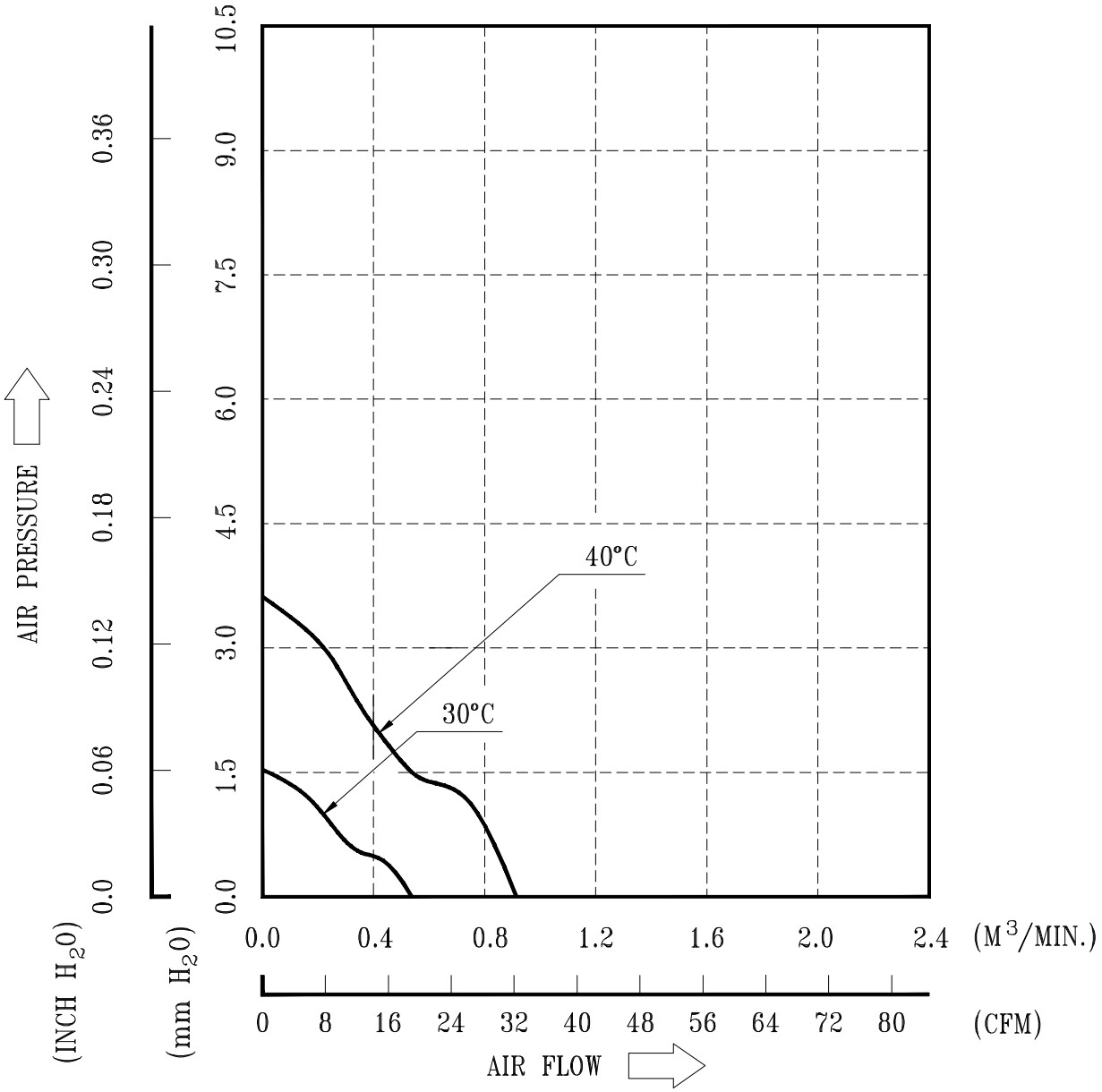
7. PRODUCTION LOCATION

7-1. PRODUCTS WILL BE PRODUCED IN CHINA OR THAILAND .

PART NO:

DELTA MODEL: AUC0912D-DB55

8. P & Q CURVE:
PWM 100% DUTY CYCLE

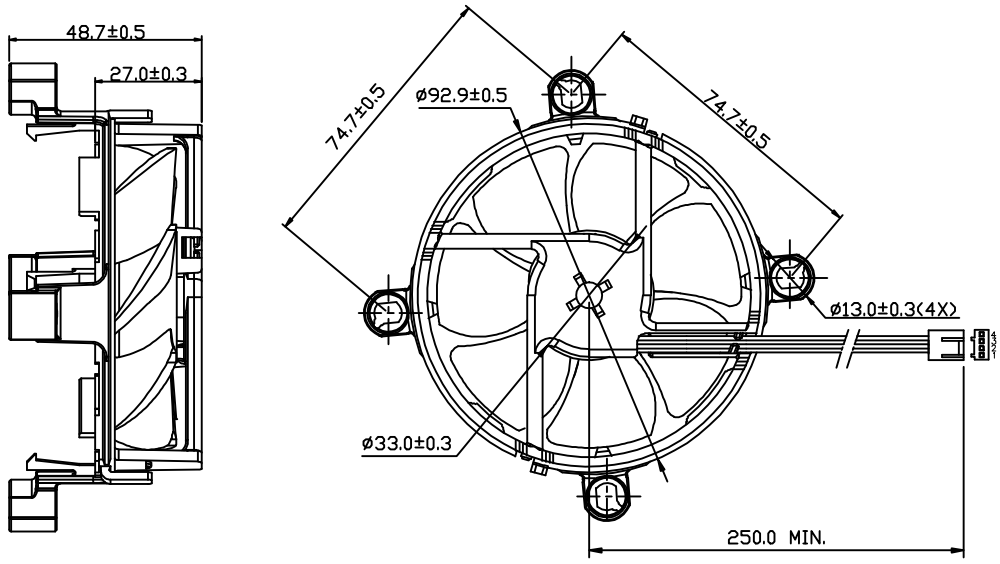



* TEST CONDITION: INPUT VOLTAGE ----- OPERATION VOLTAGE
TEMPERATURE ------ ROOM TEMPERATURE
HUMIDITY ---------- 65%RH

PART NO:

DELTA MODEL: AUC0912D-DB55

9. DIMENSION DRAWING:

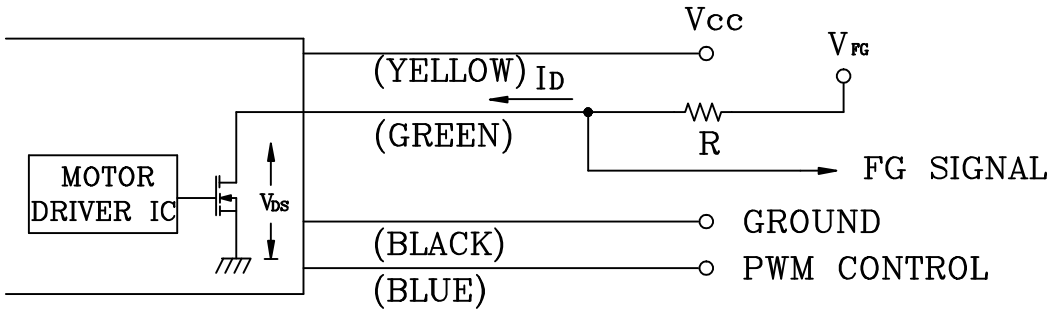



UNIT: MM

NOTE : 1. LEAD WIRE: UL 10368 -F- AWG #26
PIN 1 : BLACK WIRE: NEGATIVE(-)
PIN 2 : YELLOW WIRE: POSITIVE(+)
PIN 3 : GREEN WIRE: TACHOMETER OUTPUT (FOO)
PIN 4 : BLUE WIRE: SPEED CONTROL (PWM)
2. HOUSING : MOLEX 47054-1000 OR EQUIVALENT
3. TERMINAL : MOLEX 2759T 08-50-0113 OR EQUIVALENT
4. THIS PRODUCT IS RoHS COMPLIANT
5. DELTA'S RESTRICTIONS ON HALOGEN APPLY ONLY TO BROMINATED AND CHLORINATED COMPOUNDS. NO OTHER HALOGEN IS RESTRICTED.
SUBSTANCES RESTRICTIONS FOR HALOGEN-FREE(INCLUDE FAN PLASTIC PARTS, PWB BOARD, IC, ELECTRICAL MATERIALS & CABLE ASSY),
a. BROMINE(Br) ≤ 900 PPM.
b. CHLORINE(Cl) ≤ 900 PPM.
c. (Br) + (Cl) ≤ 1500 PPM.

## 10. FREQUENCY GENERATOR (FG) SIGNAL:

### 10-1. OUTPUT CIRCUIT - OPEN DRAIN MODE:



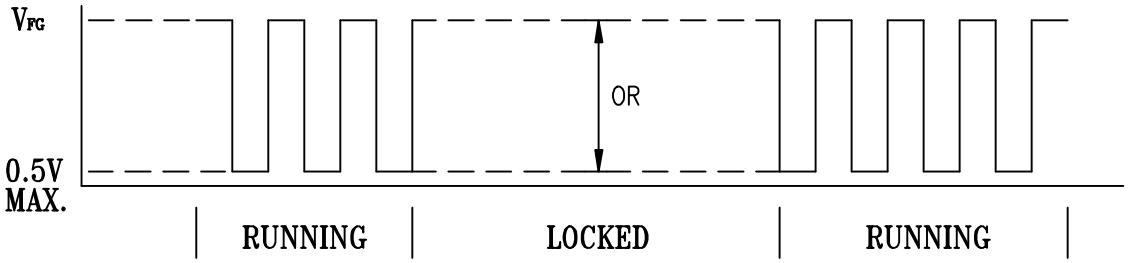

CAUTION: THE FG SIGNAL LEAD WIRE MUST BE KEPT AWAY FROM "+" LEAD WIRE & "−" LEAD WIRE.

### 10-2. SPECIFICATION:

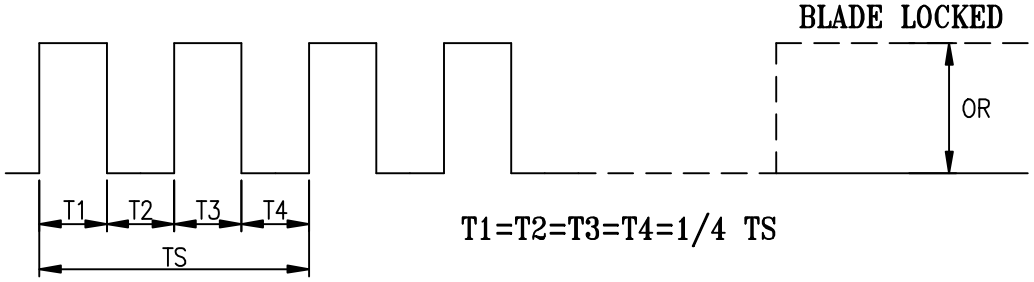
$V_{DS}$ (LINEAR)=0.5V MAX. $V_{FG}$ =5.0V TYP. (Vcc MAX.)

$I_D$ =5mA MAX. $R \geq V_{FG}/I_D$

### 10-3. FREQUENCY GENERATOR WAVEFORM:




FAN RUNNING FOR 4 POLES




T1=T2=T3=T4=1/4 TS

N=R.P.M

TS=60/N(SEC)

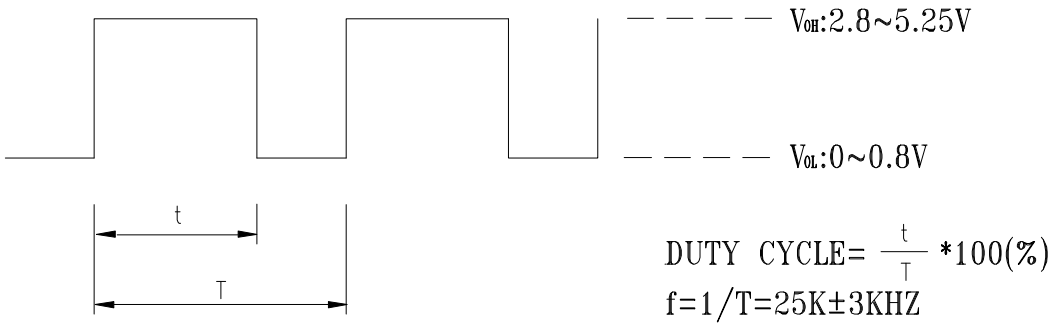
*VOLTAGE LEVEL AFTER BLADE LOCKED

*4 POLES

A00

## 11. PWM CONTROL FUNCTION:(FAN ON SINK)

### 11-1 SIGNAL DESCRIPTION:




$$\text{DUTY CYCLE} = \frac{t}{T} * 100(\%)$$

$$f = 1/T = 25K \pm 3KHZ$$

- AT 25K HZ 30% DUTY CYCLE ,THE FAN WILL BE ABLE TO START FROM A DEAD STOP .

### 11-2 SPEED CONTROL

TEST CONDITION : INPUT VCC=12V PWM FREQUENCY=25KHZ

#### 11-2-1 TEMPERATURE CONTROL

BELOW 30 DEGREE C,THE FAN SPEED IS 2000RPM.
ABOVE 40 DEGREE C,THE FAN SPEED IS 3150RPM.
BETWEEN 30~40 DEGREE C,THE FAN SPEED IS 2000RPM~3150RPM.

#### 11-2-2 PWM CONTROL

BELOW 30 DEGREE C
BETWEEN 0%~20% TO 100% DUTY CYCLE,THE FAN SPEED IS 1000RPM TO 2000RPM.
ABOVE 40 DEGREE C
BETWEEN 0%~20% TO 100% DUTY CYCLE,THE FAN SPEED IS 1000RPM TO 3150RPM.

| TEMPERATURE (°C) | DUTY CYCLE (%) | SPEED (R.P.M.) |
|---|---|---|
| 30 | 0~20 | 1000±200 |
| 30 | 100 | 2000±10% |
| 40 | 0~20 | 1000±200 |
| 40 | 100 | 3150±10% |

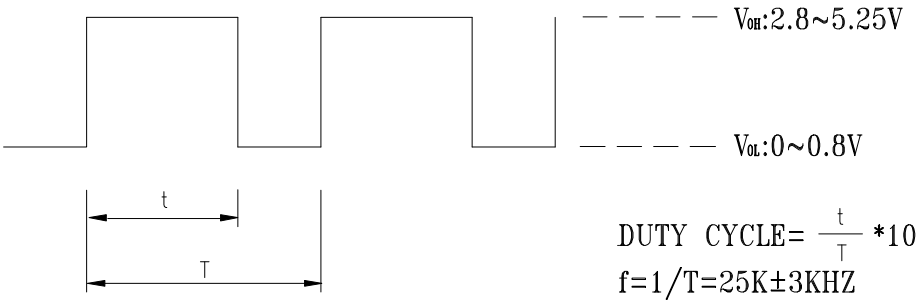
- IF THE CONTROL SIGNAL IS DISCONNECT THE FAN WILL GO TO TEMPERATURE CONTROL SPEED.

PART NO:

DELTA MODEL: AUC0912D-DB55

12. PWM CONTROL FUNCTION:(FAN ONLY)

12-1 SIGNAL DESCRIPTION:




$$\text{DUTY CYCLE} = \frac{t}{T} * 100(\%)$$

$f = 1/T = 25K \pm 3KHZ$

- AT 25K HZ 30% DUTY CYCLE ,THE FAN WILL BE ABLE TO START FROM A DEAD STOP .

12-2 SPEED CONTROL

TEST CONDITION : INPUT VCC=12V PWM FREQUENCY=25KHZ

12-2-1 TEMPERATURE CONTROL

BELOW 30 DEGREE C,THE FAN SPEED IS 2050RPM.

ABOVE 40 DEGREE C,THE FAN SPEED IS 3200RPM.

BETWEEN 30~40 DEGREE C,THE FAN SPEED IS 2050RPM~3200RPM.

12-2-2 PWM CONTROL

BELOW 30 DEGREE C

BETWEEN 0%~20% TO 100% DUTY CYCLE,THE FAN SPEED IS 1000RPM TO 2050RPM.

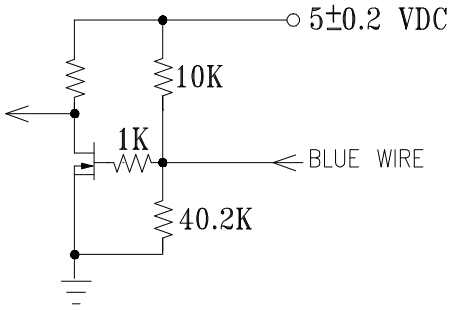
ABOVE 40 DEGREE C

BETWEEN 0%~20% TO 100% DUTY CYCLE,THE FAN SPEED IS 1000RPM TO 3200RPM.

| TEMPERATURE (°C) | DUTY CYCLE (%) | SPEED (R.P.M.) |
|---|---|---|
| 30 | 0~20 | 1000±200 |
| 30 | 100 | 2050±10% |
| 40 | 0~20 | 1000±200 |
| 40 | 100 | 3200±10% |

- IF THE CONTROL SIGNAL IS DISCONNECT THE FAN WILL GO TO TEMPERATURE CONTROL SPEED.

13. PWM CONTROL LEAD WIRE INPUT IMPEDANCE:



# Application Notice

1. **Delta will not guarantee the performance of the products if the application condition falls outside the parameters set forth in the specification.**
2. **A written request should be submitted to Delta prior to approval if deviation from this specification is required.**
3. **Please exercise caution when handling fans. Damage may be caused when pressure is applied to the impeller, if the fans are handled by the lead wires, or if the fan was hard-dropped to the production floor.**
4. **Except as pertains to some special designs, there is no guarantee that the products will be free from any such safety problems or failures as caused by the introduction of powder, droplets of water or encroachment of insect into the hub.**
5. **The above-mentioned conditions are representative of some unique examples and viewed as the first point of reference prior to all other information.**
6. **It is very important to establish the correct polarity before connecting the fan to the power source. Positive (+) and Negative (-). Damage may be caused to the fans if connection is with reverse polarity, if there is no foolproof method to protect against such error specifically mentioned in this spec.**
7. **Delta fans without special protection are not suitable where any corrosive fluids are introduced to their environment.**
8. **Please ensure all fans are stored according to the storage temperature limits specified. Do not store fans in a high humidity environment. We highly recommend performance testing is conducted before shipping, if the fans have been stored over 6 months.**
9. **Not all fans are provided with the Lock Rotor Protection feature. If you impair the rotation of the impeller for the fans that do not have this function, the performance of those fans will lead to failure.**
10. **Please be cautious when mounting the fan. Incorrect mounting of fans may cause excess resonance, vibration and subsequent noise.**
11. **It is important to consider safety when testing the fans. A suitable fan guard should be fitted to the fan to guard against any potential for personal injury.**
12. **Except where specifically stated, all tests are carried out at room (ambient) temperature and relative humidity conditions of 25°C, 65% RH. The test value is only for fan performance itself.**
13. **Be certain to connect an " 4.7μF or greater" capacitor to the fan externally when the application calls for using multiple fans in parallel, to avoid any unstable power.**

# 5. ROHS

## 5.1. PBT

## 5.2. AL6063-T5

## 5.3. PC

## 5.4. PET、INK、COATING

## 5.5. DOW TC-5630

KINGFA SCI. & TECH. CO., LTD.

NO.33 KEFENG ROAD,SCIENCE CITY,GUANGZHOU HI-TECHINDUSTRIAL DEVELOPMENT ZONE,GUANGZHOU CITY
CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as : PBT-NPG30

| | |
|---|---|
| SGS Job No. : | CP15-009615 - GZ |
| Date of Sample Received : | 09 Mar 2015 |
| Testing Period : | 09 Mar 2015 - 13 Mar 2015 |
| Test Requested : | Selected test(s) as requested by client. |
| Test Method : | Please refer to next page(s). |
| Test Results : | Please refer to next page(s). |
| Conclusion : | Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC. |

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Alkene Liang
Approved Signatory



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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|---|---|---|
| SN1 | CAN15-030477.002 | Black plastic grains |

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected ( < MDL )

(4) "-" = Not Regulated

RoHS Directive 2011/65/EU

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

| Test Item(s) | Limit | Unit | MDL | *002* |
|---|---|---|---|---|
| Cadmium (Cd) | 100 | mg/kg | 2 | ND |
| Lead (Pb) | 1,000 | mg/kg | 2 | 5 |
| Mercury (Hg) | 1,000 | mg/kg | 2 | ND |
| Hexavalent Chromium (CrVI) | 1,000 | mg/kg | 2 | ND |
| Sum of PBBs | 1,000 | 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 | 1,000 | mg/kg | - | ND |
| Monobromodiphenyl ether | - | mg/kg | 5 | ND |



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| Test Item(s) | Limit | Unit | MDL | *002* |
|---|---|---|---|---|
| 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 |

Notes :

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

## Halogen

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

| Test Item(s) | Unit | MDL | *002* |
|---|---|---|---|
| Chlorine (Cl) | mg/kg | 50 | ND |
| Bromine (Br) | mg/kg | 50 | ND |

## Elementary Analysis

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

| Test Item(s) | Unit | MDL | *002* |
|---|---|---|---|
| $Sb_2O_3$ | mg/kg | 12 | ND |

Notes :

(1) ◆ Calculated concentration of $Sb_2O_3$ is based on the identified Sb

## Polynuclear Aromatic Hydrocarbons (PAHs)

Test Method : With reference to ZEK 01.4-08 of German ZLS and its amendments, analysis was performed by GC-MS.




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| Test Item(s) | CAS NO. | Unit | MDL | *002* |
|---|---|---|---|---|
| Naphthalene(NAP) | 91-20-3 | mg/kg | 0.1 | ND |
| Acenaphthylene(ANY) | 208-96-8 | mg/kg | 0.1 | ND |
| Acenaphthene(ANA) | 83-32-9 | mg/kg | 0.1 | ND |
| Fluorene(FLU) | 86-73-7 | mg/kg | 0.1 | ND |
| Phenanthrene(PHE) | 85-01-8 | mg/kg | 0.1 | ND |
| Anthracene(ANT) | 120-12-7 | mg/kg | 0.1 | ND |
| Fluoranthene(FLT) | 206-44-0 | mg/kg | 0.1 | ND |
| Pyrene(PYR) | 129-00-0 | mg/kg | 0.1 | ND |
| Benzo(a)anthracene(BaA) | 56-55-3 | mg/kg | 0.1 | ND |
| Chrysene(CHR) | 218-01-9 | mg/kg | 0.1 | ND |
| Benzo(b)fluoranthene(BbF) + Benzo(j)fluoranthene(BjF) | 205-99-2/205-82-3 | mg/kg | 0.1 | ND |
| Benzo(k)fluoranthene(BkF) | 207-08-9 | mg/kg | 0.1 | ND |
| Benzo(e)pyrene(BeP) | 192-97-2 | mg/kg | 0.1 | ND |
| Benzo(a)pyrene(BaP) | 50-32-8 | mg/kg | 0.1 | ND |
| Indeno(1,2,3-c,d)pyrene(IPY) | 193-39-5 | mg/kg | 0.1 | ND |
| Dibenzo(a,h)anthracene(DBA) | 53-70-3 | mg/kg | 0.1 | ND |
| Benzo(g,h,i)perylene(BPE) | 191-24-2 | mg/kg | 0.1 | ND |
| Sum of 18 PAHs | | mg/kg | - | ND |



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Note 1: ZEK 01.4-08: Restraining maximum values for products

| Parameter | Category 1 | Category 2 | Category 3 |
|---|---|---|---|
| | Material indented to be put in the mouth or material for toys with normal skin contact for children aged < 36 months | Materials those are not included in Category 1, with predictable contact with the skin longer than 30 s. (long-term skin contact) | Materials those are not included in Category 1 or 2, with predictable skin contact up to 30 s (short-term skin contact). |
| Benzo[a]pyrene (mg/kg) | Not detectable (<0.2)*** | 1 | 20 |
| Sum of 18 PAH (mg/kg)** | Not detectable (<0.2)*** | 10 | 200 |

** = Only PAH substances >0.1 mg/kg are taken into account while calculating the sum of PAHs
*** = In case that the maximum values exceed the limits of category 1, but are within the limits of categor 2, one may confirm the suitability of the tested material which is indented to be put in the mouth by additional specific migration tests of PAH components based on DIN EN 1186ff and §64 LFGB 80.3 The conclusion of the migration test results must be made based on food law criteria.

**Phthalate**

Test Method : With reference to EN14372: 2004. Analysis was performed by GC-MS.

| Test Item(s) | CAS NO. | Unit | MDL | *002* |
|---|---|---|---|---|
| Dibutyl Phthalate (DBP) | 84-74-2 | %(w/w) | 0.003 | ND |
| Benzylbutyl Phthalate (BBP) | 85-68-7 | %(w/w) | 0.003 | ND |
| Bis(2-ethylhexyl) Phthalate (DEHP) | 117-81-7 | %(w/w) | 0.003 | ND |
| Diisononyl Phthalate (DINP) | 28553-12-0 / 68515-48-0 | %(w/w) | 0.010 | ND |
| Di-n-octyl Phthalate (DNOP) | 117-84-0 | %(w/w) | 0.003 | ND |



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| Test Item(s) | CAS NO. | Unit | MDL | 002 |
|---|---|---|---|---|
| Diisodecyl Phthalate (DIDP) | 26761-40-0 / 68515-49-1 | %(w/w) | 0.010 | ND |
| Dimethyl Phthalate (DMP) | 131-11-3 | %(w/w) | 0.003 | ND |
| Diethyl Phthalate (DEP) | 84-66-2 | %(w/w) | 0.003 | ND |
| Diisobutyl Phthalate (DIBP) | 84-69-5 | %(w/w) | 0.003 | ND |
| Dinonyl Phthalate (DNP) | 84-76-4 | %(w/w) | 0.003 | ND |
| Diisooctyl Phthalate (DIOP) | 27554-26-3 | %(w/w) | 0.010 | ND |
| Dipropyl Phthalate (DPrP) | 131-16-8 | %(w/w) | 0.003 | ND |
| Dicyclohexyl Phthalate (DCHP) | 84-61-7 | %(w/w) | 0.003 | ND |
| Di-n-pentyl Phthalate (DnPP) | 131-18-0 | %(w/w) | 0.003 | ND |
| Dibenzyl Phthalate (DBzP) | 523-31-9 | %(w/w) | 0.003 | ND |
| Diphenyl Phthalate (DPhP) | 84-62-8 | %(w/w) | 0.003 | ND |
| Di-n-hexyl Phthalate (DnHP) | 84-75-3 | %(w/w) | 0.003 | ND |

Notes :

(1)DBP,BBP,DEHP Reference information: Entry 51 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC):
i) Shall not be used as substances or in mixtures, in concentrations greater than 0.1 % by weight of the plasticised material, in toys and childcare articles.



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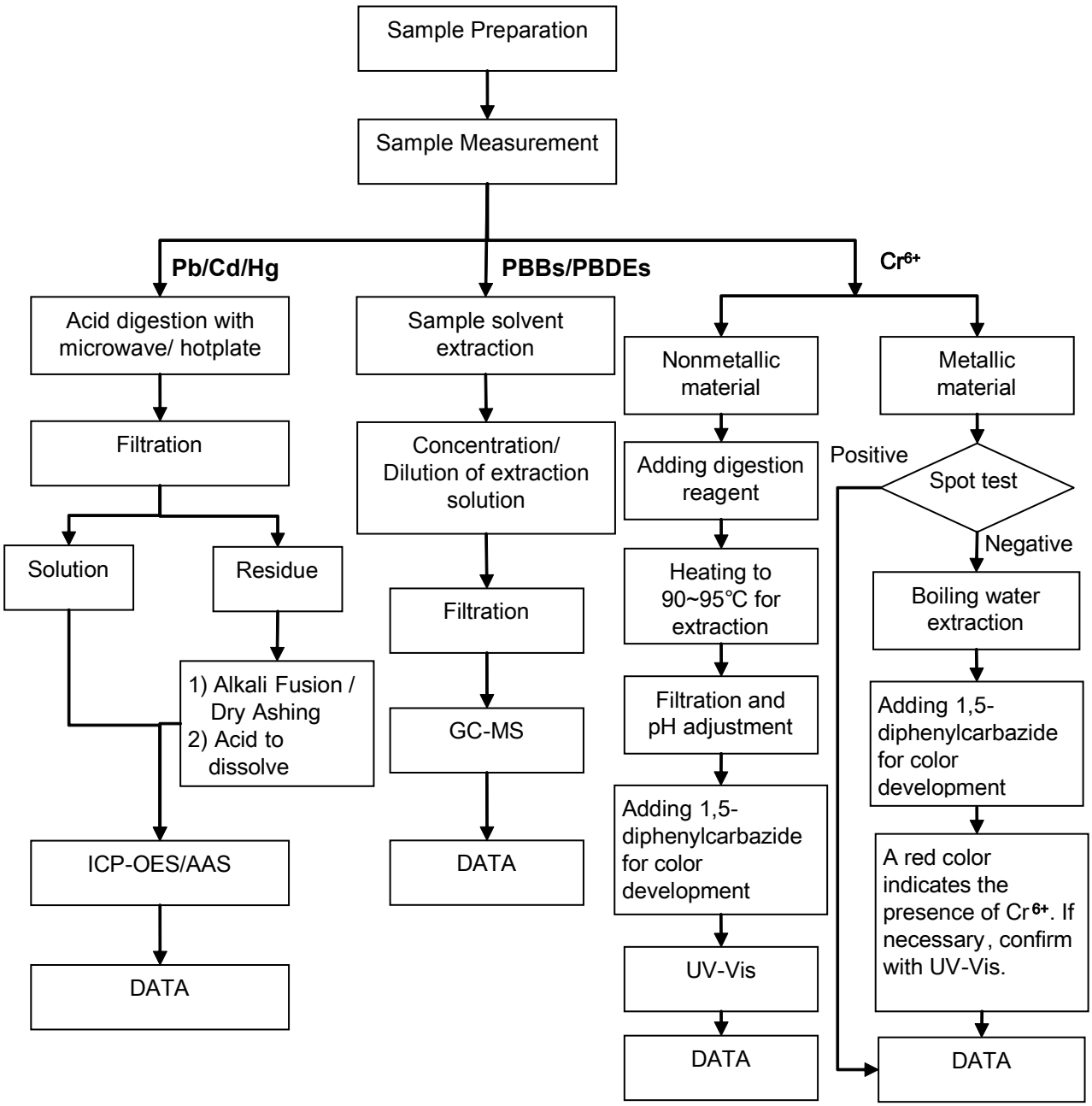
ii) Toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.
Please refer to Regulation (EC) No 552/2009 to get more detail information
(2)DINP, DNOP, DIDP Reference information: Entry 52 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC).
i) Shall not be used as substances or in mixtures, in concentrations greater than 0.1 % by weight of the plasticised material, in toys and childcare articles which can be placed in the mouth by children.
ii) Such toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.
Please refer to Regulation (EC) No 552/2009 to get more detail information

## ATTACHMENTS

**RoHS Testing Flow Chart**

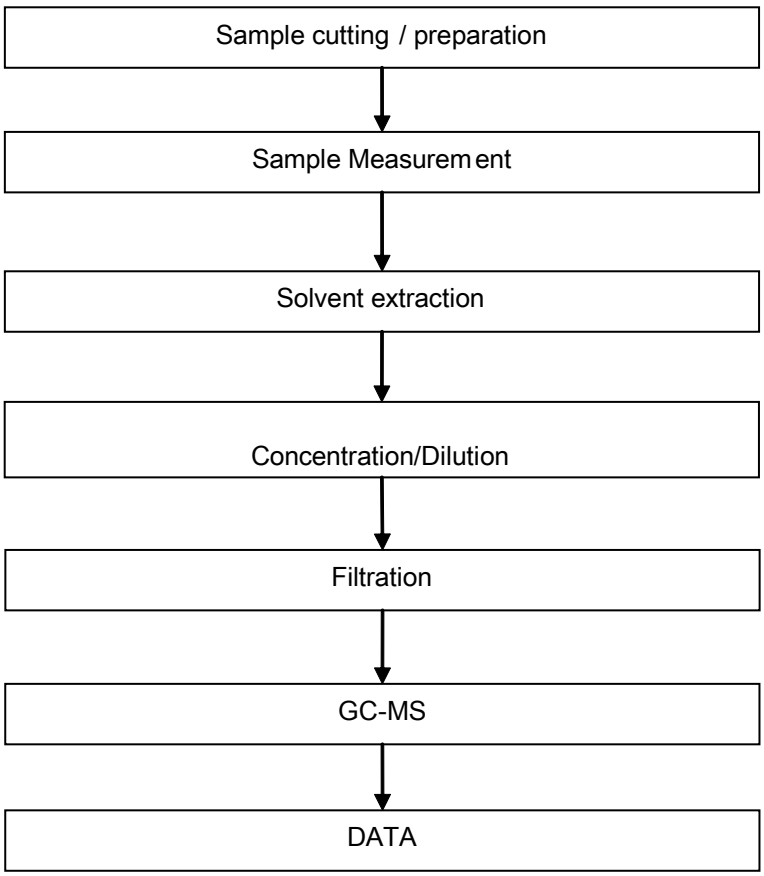
1) Name of the person who made testing: Bruce Xiao / Sunny Hu
2) Name of the person in charge of testing: Bella Wang / Cutey Yu
3) These samples were dissolved totally by pre -conditioning method according to below flow chart ($Cr^{6+}$ and PBBs/PBDEs test method excluded).



## ATTACHMENTS

### Phthalates Testing Flow Chart

1) Name of the person who made testing: Sunny Hu
2) Name of the person in charge of testing: Cutey Yu



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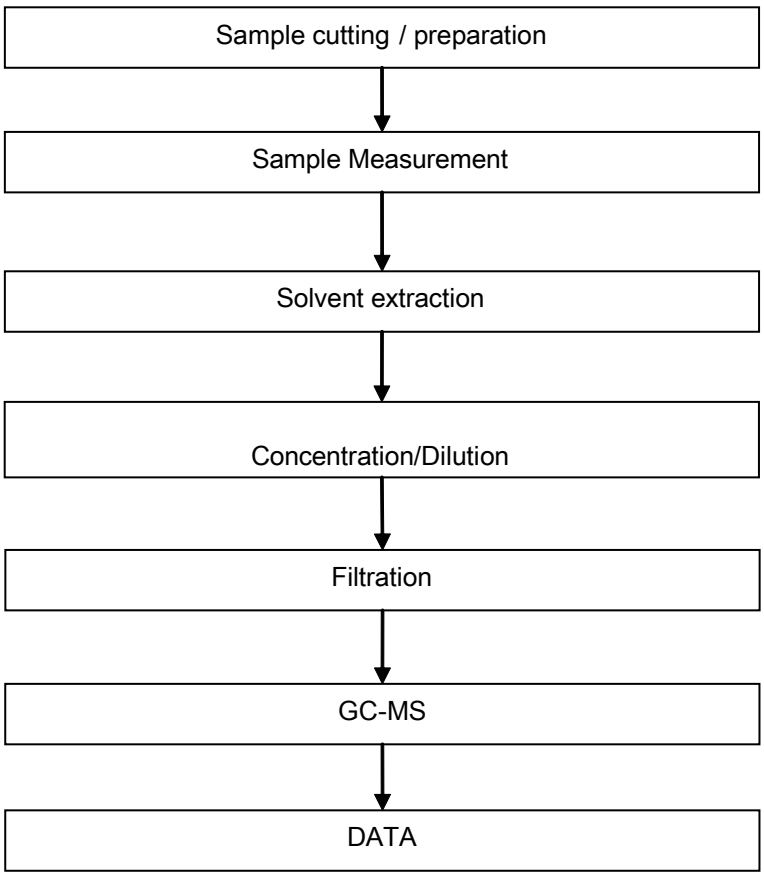
## ATTACHMENTS

### PAHs Testing Flow Chart

1) Name of the person who made testing: Sunny Hu
2) Name of the person in charge of testing: Cutey Yu



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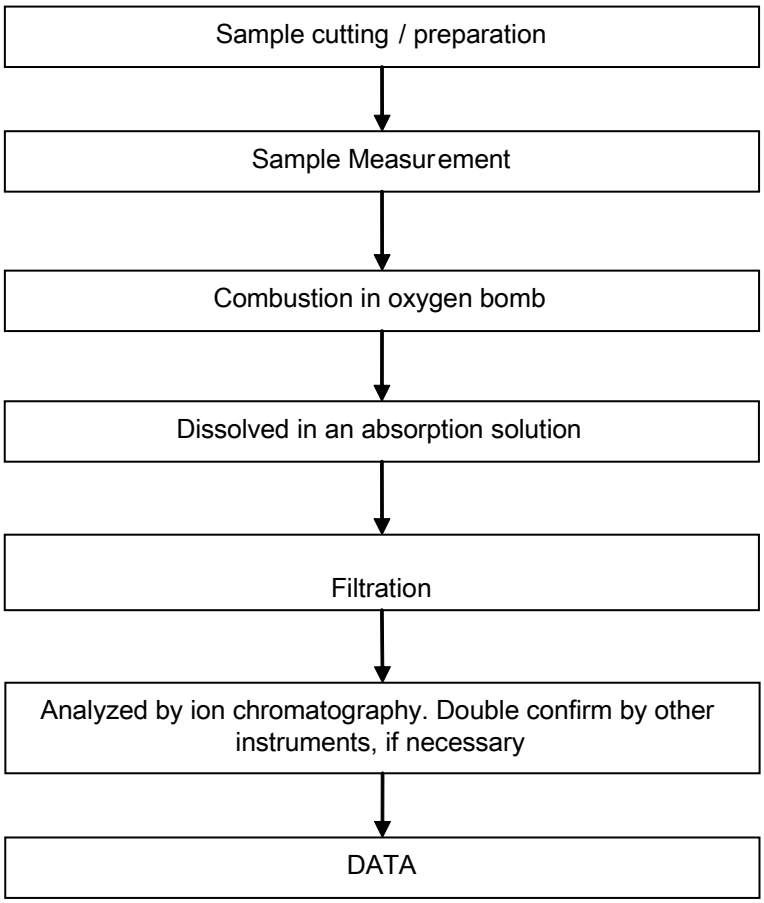
## ATTACHMENTS

### Halogen Testing Flow Chart

1) Name of the person who made testing: Hanming Xiao
2) Name of the person in charge of testing: Bella Wang



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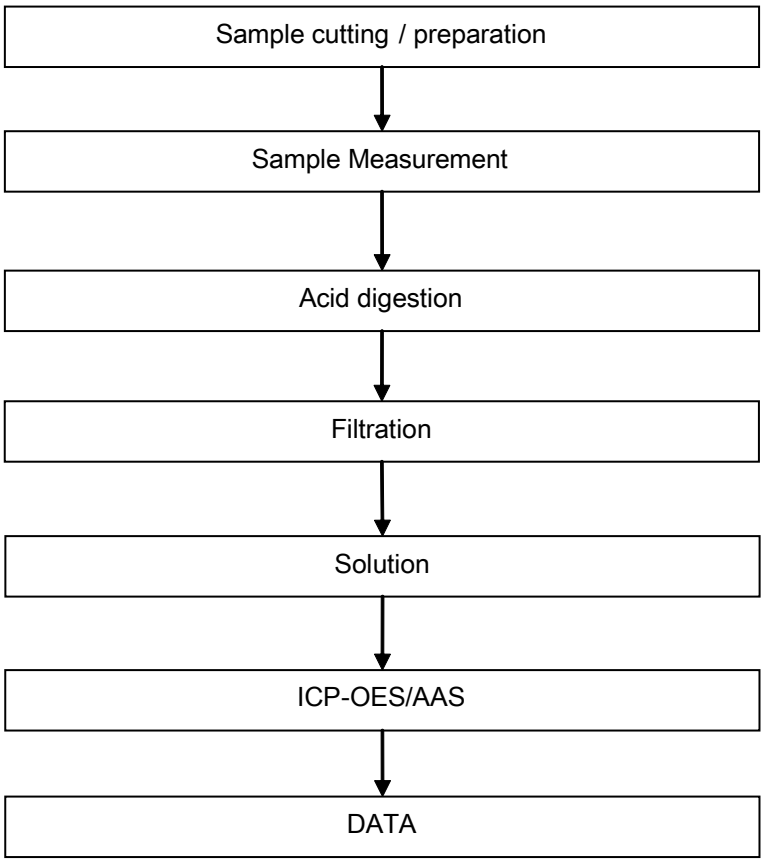
## ATTACHMENTS

### Elementary Testing Flow Chart

1) Name of the person who made testing : Bruce Xiao
2) Name of the person in charge of testing : Bella Wang



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Sample photo:


CAN15-030477.002

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GUANGDONG XINGFA ALUMINIUM CO., LTD

RENGHE ROAD 23#,NANZHUANG TOWN,CHANGCHENG DISTRICT,FOSHAN CITY,GUANGDONG PROVINCE,CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as :
6063-T5 Aluminium alloy profiles

| | |
|---|---|
| SGS Job No. : | GZIN1501001229PC - GZ |
| Internal Reference No. : | GZIN1501001119ML |
| Date of Sample Received : | 09 Jan 2015 |
| Testing Period : | 09 Jan 2015 - 14 Jan 2015 |
| Test Requested : | Selected test(s) as requested by client. |
| Test Method : | Please refer to next page(s). |
| Test Results : | Please refer to next page(s). |
| Conclusion : | Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC. |

Signed for and on behalf of
SGS-CSTC Ltd.

Echo

Echo Yeung
Approved Signatory



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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|---|---|---|
| SN1 | CAN15-004606.001 | Silvery metal |

Remarks :

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected ( < MDL )

(4) "-" = Not Regulated

**RoHS Directive 2011/65/EU**

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

| Test Item(s) | Limit | Unit | MDL | ___ |
|---|---|---|---|---|
| Cadmium (Cd) | 100 | mg/kg | 2 | ND |
| Lead (Pb) | 1,000 | mg/kg | 2 | ND |
| Mercury (Hg) | 1,000 | mg/kg | 2 | ND |
| Hexavalent Chromium (CrVI) | - | - | ◇ | Negative |

Notes :

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

(2)◇Spot-test:
Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;
(The tested sample should be further verified by boiling-water-extraction method if the spot test result is Negative or cannot be confirmed.)
◇Boiling-water-extraction:
Negative = Absence of CrVI coating
Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm2 sample surface area.
Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing.



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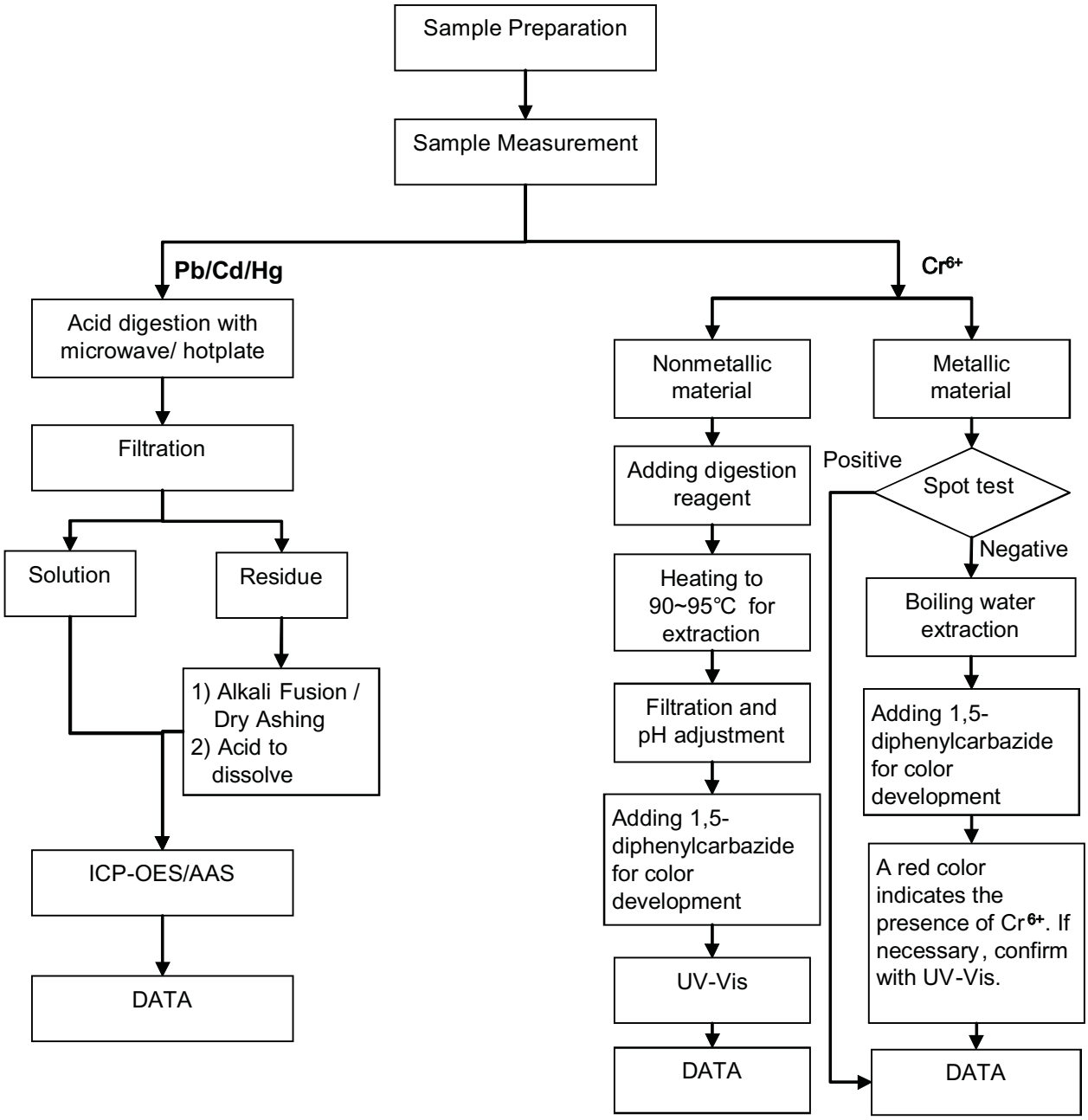
## ATTACHMENTS

**RoHS Testing Flow Chart**

1) Name of the person who made testing: Bruce Xiao
2) Name of the person in charge of testing: Bella Wang
3) These samples were dissolved totally by pre -conditioning method accord ing to below flow chart (Cr6+ test method excluded ).



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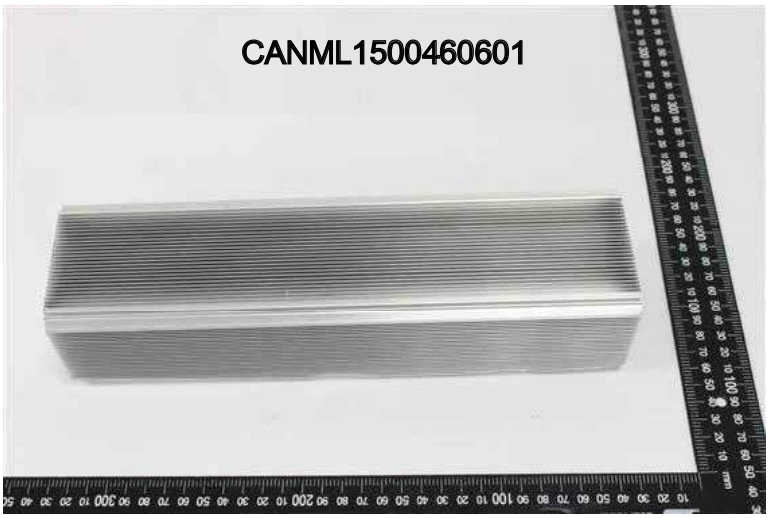
Sample photo:




CAN15-004606.001

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SABIC Innovative Plastics™

**01-March-2010**

**Dear Valued Customer,**

**Subject: Status of our products with respect to RoHS Directive 2002/95/EC (and its amendments)**

Thank you for using SABIC INNOVATIVE PLASTICS' products.

With reference to your request for the information regarding status of our Products with respect to the RoHS Directive 2002/95/EC (and its amendments), SABIC INNOVATIVE PLASTICS can provide following information:

The CYCOLAC*, CYCOLOY*, EXTEM*, GELOY*, LEXAN*, NORYL*, NORYL GTX*, NORYL PPX*, ULTEM*, VALOX*, XENOY*, XYLEX* resins and, COLORCOMP*, FARADEX*, KONDUIT*, LUBRICOMP*, LUBRILOY*, STARAMIDE* STARFLAM*, STAT-KON*, STAT-LOY*, THERMOCOMP*, THERMOTUF*, VERTON* compounds [all existing grade-colors, except those which are designed to consume Post Consumer Recycle (PCR)] do not contain any chemicals listed below as intentionally added components or as expected process impurities [above threshold limits of 0.1% for Lead, Mercury, Hexavalent Chromium, PBB and PBDE, and 0.01% for Cadmium]

- Cadmium and its compounds
- Lead and its compounds
- Mercury and its compounds
- Hexavalent Chromium compounds
- Polybrominated biphenyls (PBBs)
- Polybrominated diphenyl ethers (PBDEs including Deca-BDE)

Please note that analysis of the raw materials and/or finished goods for presence of the above mentioned substances on a routine basis is neither a part of our quality control plan, nor is a part of the SABIC-IP product specifications, and hence it should not be construed as any warranty, expressed or implied.

Please be informed that, certain SABIC-IP products are designed to consume PCR for environmental waste reduction. The details about use of the PCR, if any, are stated in the respective MSDS. Please contact our Customer Service or Product Stewardship team to request information regarding the chemical compliance attributes of these products, which may differ from those contained in this letter.

If you have any further questions, or you require any additional information, please contact: gopal.majmudar@SABIC-IP.com (Phone: +91 265 3068501) or chris.wu@sabic-ip.com (Phone: +86 20 38488383 3003)

Sincerely,

**Gregory Porta, Ph.D.**
for SABIC Innovative Plastics

Encl: Nil


**Gregory Porta, Ph.D.**
Director-Product Stewardship & Toxicology

T: 1-304-863-7594
F: 1-304-863-7693
E: greg.porta@sabic-ip.com




This version for the letter supersedes all previous versions of it on the same subject.

FOUR PILLARS INDUSTRIAL(SHENZHEN)CO.,LTD.

FOUR PILLARS TECHNOLOGIES & APPLIED MATERIALS(SHENZHEN)CO.,LTD.
FIRST AND SECOND BUILDING,THIRD INDUSTRIAL ZONE,FENGHUANG COUNTRY,FUYONG TOWN,BAOAN DISTRICT,SHENZHEN ,CHINA

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

| | |
|---|---|
| SGS Job No. : | CP15-058194 - SZ |
| Lot No. : | 40371004 |
| Model No. : | PO32AZ |
| Client Ref. Info. : | PO32AZ，PO3BZ，PO3MAZ，PO3MZ，PO6BZ，PO6GZ，PO6LZ，PO6MZ, PO6NZ，PO6TZ，PO6WZ，PO72AZ，PO72BZ，PO72TZ，PO72Z，PO7MCZ, PO7YZ，PO7NZ，PO92Z，PO94AZ，PO9BHZ，PO9LZ，PO9MGZ，PO9MHZ，PO9MZ，PO9WZ,POBDZ,POBEZ,POBGZ,POBHZ,POBKZ,PO3BWZ，PO5MZ, PO9BZ，PO4MHZ，PO7YBZ |
| Manufacturer : | FOUR PILLARS INDUSTRIAL(SHENZHEN)CO.,LTD.<br>FOUR PILLARS TECHNOLOGIES & APPLIED MATERIALS(SHENZHEN)CO.,LTD. |
| Manufacturer Address : | FIRST AND SECOND BUILDING,THIRD INDUSTRIAL ZONE,FENGHUANG COUNTRY,FUYONG TOWN,BAOAN DISTRICT,SHENZHEN ,CHINA |
| Date of Sample Received : | 19 Oct 2015 |
| Testing Period : | 19 Oct 2015 - 22 Oct 2015 |
| Test Requested : | Selected test(s) as requested by client. |
| Test Method : | Please refer to next page(s). |
| Test Results : | Please refer to next page(s). |
| Conclusion : | Based on the performed tests on selected part of 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. |



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中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075113 e sgs.china@sgs.com

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Violet

Violet,Shi
Approved Signatory



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Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|---|---|---|
| SN1 | CAN15-177881.006 | Silver-grey adhesive sheet |

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 : (1)With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES.
(2)With reference to IEC 62321-5:2013, determination of Lead by ICP-OES.
(3)With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES.
(4)With reference to IEC 62321:2008, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis.
(5)With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS.
(6)With reference to EN 14372:2004, determination of phthalates by GC-MS.

| Test Item(s) | Limit | Unit | MDL | *006* |
|---|---|---|---|---|
| Cadmium (Cd) | 100 | mg/kg | 2 | ND |
| Lead (Pb) | 1,000 | mg/kg | 2 | ND |
| Mercury (Hg) | 1,000 | mg/kg | 2 | ND |
| Hexavalent Chromium (CrVI) | 1,000 | mg/kg | 2 | ND |
| Sum of PBBs | 1,000 | 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 | 1,000 | mg/kg | - | ND |
| Monobromodiphenyl ether | - | mg/kg | 5 | ND |



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| Test Item(s) | Limit | Unit | MDL | *006* |
|---|---|---|---|---|
| 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) | 1,000 | mg/kg | 30 | ND |
| Butyl benzyl phthalate (BBP) | 1,000 | mg/kg | 30 | ND |
| Bis (2-ethylhexyl) phthalate (DEHP) | 1,000 | mg/kg | 30 | ND |
| Diisobutyl Phthalates (DIBP) | 1,000 | mg/kg | 30 | ND |

Notes :

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

**Halogen**

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

| Test Item(s) | Unit | MDL | *006* |
|---|---|---|---|
| Fluorine (F) | mg/kg | 50 | ND |
| Chlorine (Cl) | mg/kg | 50 | ND |
| Bromine (Br) | mg/kg | 50 | ND |
| Iodine (I) | mg/kg | 50 | ND |



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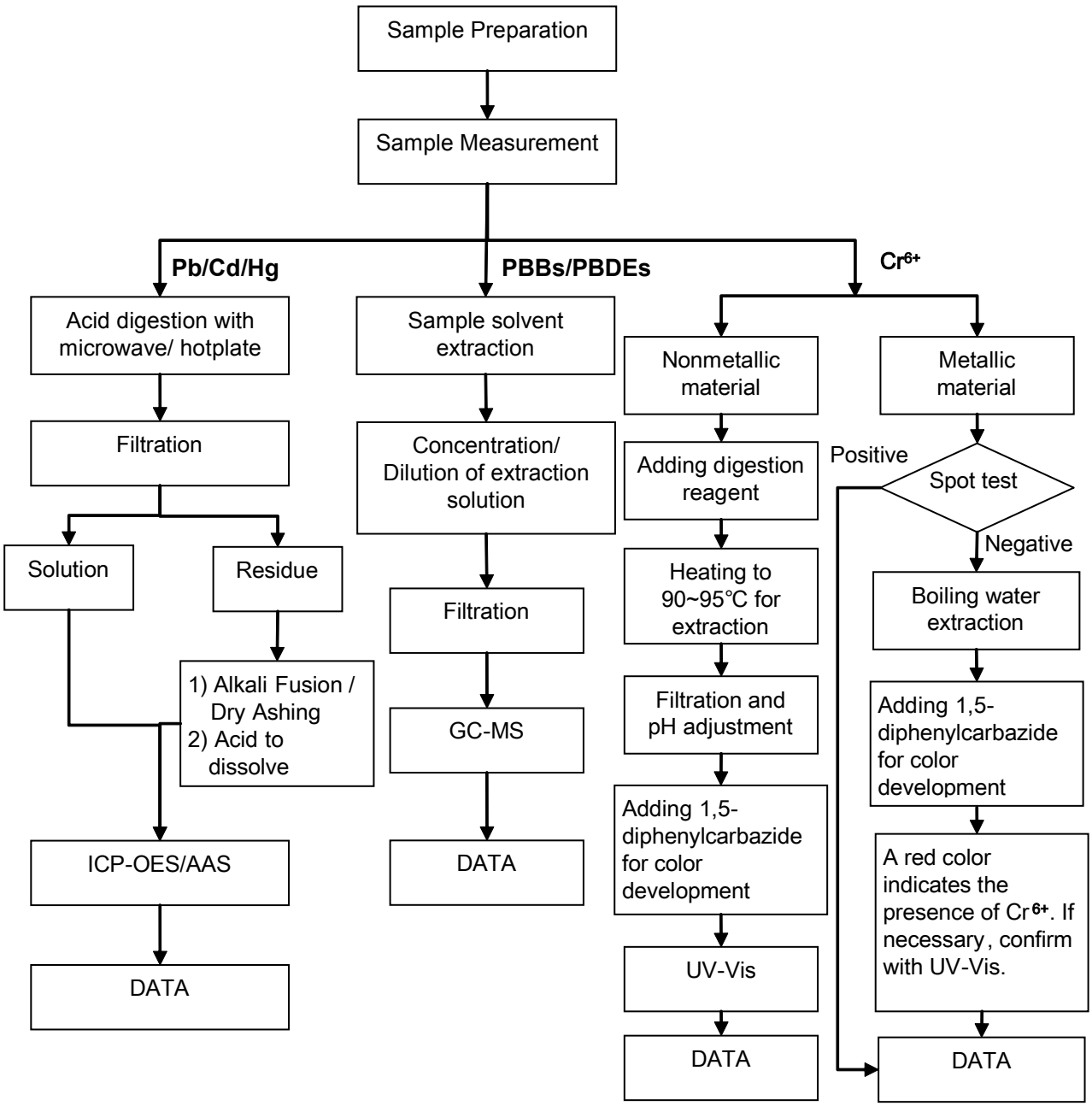
## ATTACHMENTS

**RoHS Testing Flow Chart**

1) Name of the person who made testing: Bruce Xiao / Sunny Hu
2) Name of the person in charge of testing: Bella Wang / Cutey Yu
3) These samples were dissolved totally by pre -conditioning method according to below flow chart ($Cr^{6+}$ and PBBs/PBDEs test method excluded).



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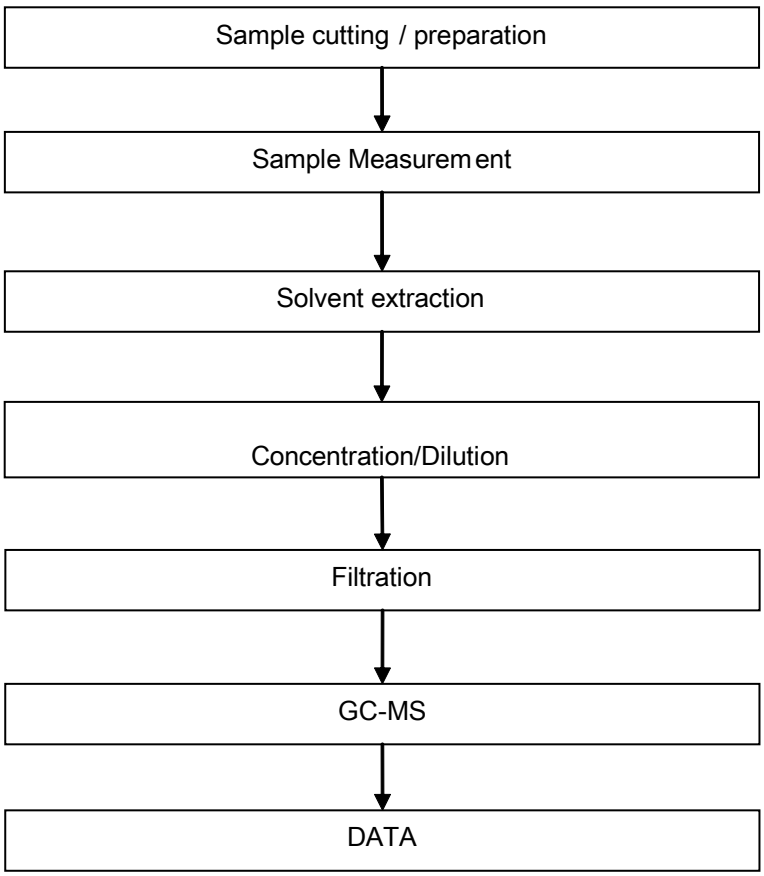
## ATTACHMENTS

### Phthalates Testing Flow Chart

1) Name of the person who made testing: Sunny Hu
2) Name of the person in charge of testing: Cutey Yu



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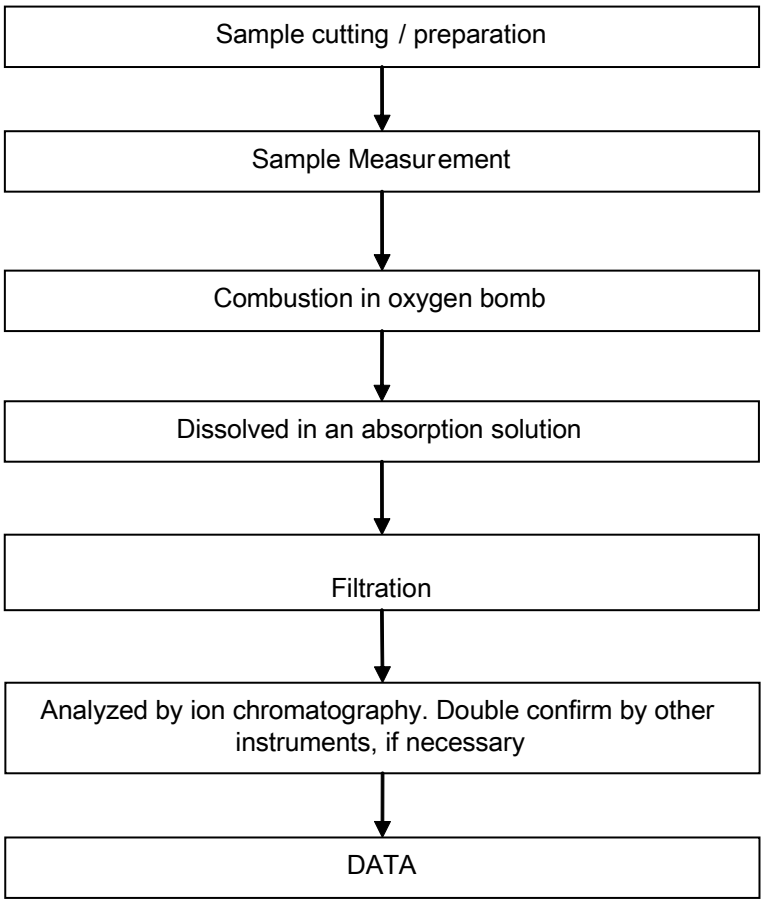
## ATTACHMENTS

### Halogen Testing Flow Chart

1) Name of the person who made testing: Hanming Xiao
2) Name of the person in charge of testing: Bella Wang



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Sample photo:


CAN15-177881.006

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*** End of Report ***



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# Test Report

No. SHAEC1515770519 Date: 13 Aug 2015 Page 1 of 5

NANTONG DIC COLOR CO.,LTD

NO 11 ZHONGYANG ROAD NANTONG ECONOMIC&TECHNOLOGICAL DEVELOPMENT AREA JIANGSU PROVINCE

The following sample(s) was/were submitted and identified on behalf of the clients as : DRAGON-FC BLACK

| | |
|---|---|
| SGS Job No. : | SP15-026570 - SH |
| Date of Sample Received : | 06 Aug 2015 |
| Testing Period : | 06 Aug 2015 - 13 Aug 2015 |
| Test Requested : | Selected test(s) as requested by client. |
| Test Method : | Please refer to next page(s). |
| Test Results : | Please refer to next page(s). |
| Conclusion : | Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC. |

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

Terry Wang
Approved Signatory



3rd Building,No.889 Yishan Road Xuhui District,Shanghai China 200233 t E&E (86-21) 61402553 f E&E (86-21)64953679 www.sgsgroup.com.cn
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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|---|---|---|
| SN1 | SHA15-157705.015 | Black mud |

Remarks :

(1) 1 mg/kg = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected ( < MDL )

(4) "-" = Not Regulated

**RoHS Directive 2011/65/EU**

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

| Test Item(s) | Limit | Unit | MDL | *015* |
|---|---|---|---|---|
| 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 | 2 | 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 |



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| Test Item(s) | Limit | Unit | MDL | *015* |
|---|---|---|---|---|
| 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 |

Notes :

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

(2) Result shown is of the total weight of wet sample.



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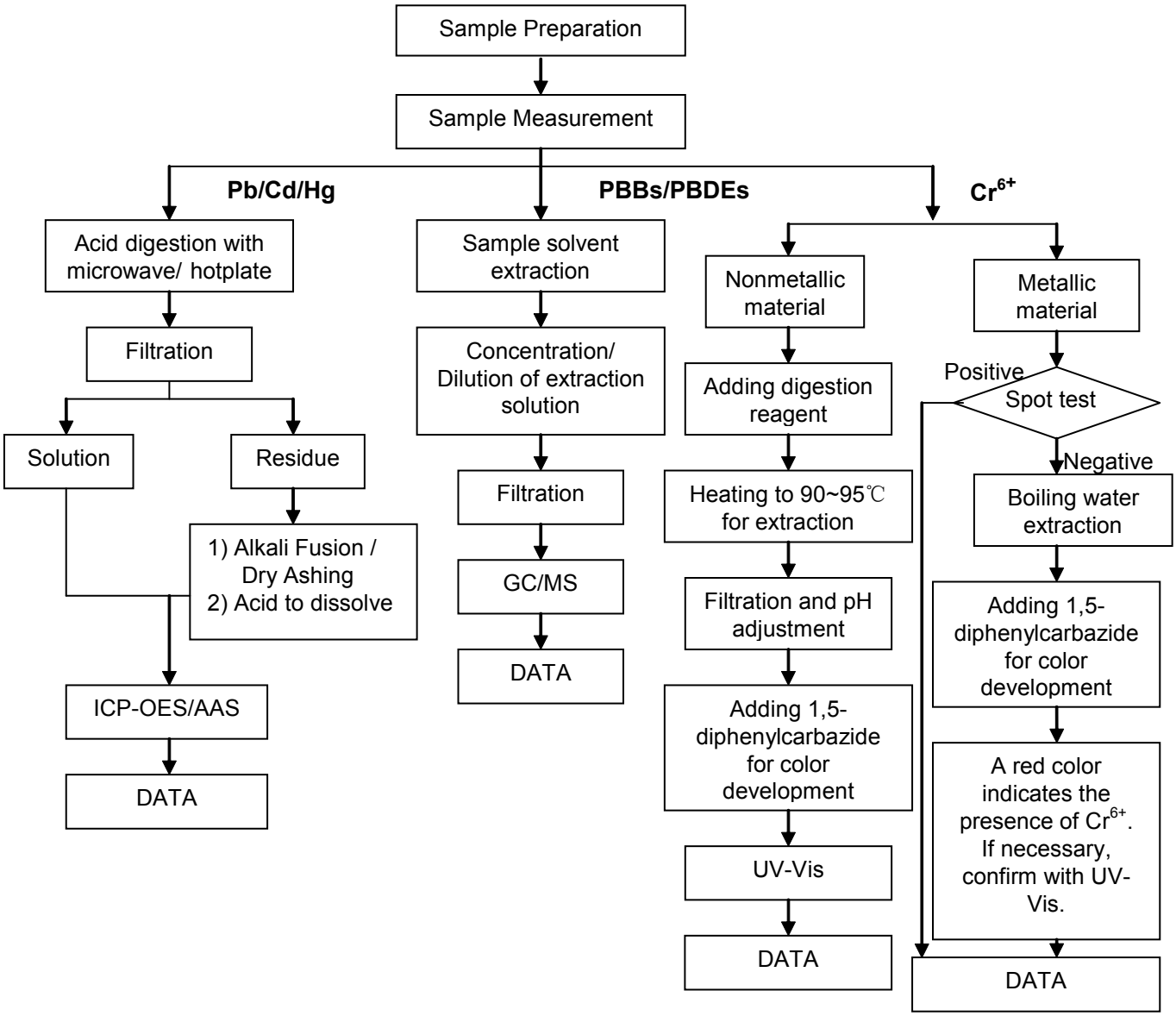
## ATTACHMENTS

### RoHS Testing Flow Chart

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



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# Test Report



Sample photo:


SHA15-157705.015

SGS authenticate the photo on original report only

*** End of Report ***



SGS 检测专用章 Testing Service
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center
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t HL (86-21) 61402594 f HL (86-21)61156899 e sgs.china@sgs.com

# Test Report

**Report No.** SCL01H013155001 Page 1 of 7

**Applicant** DONGGUAN SUNWAY PRINTING INDUSTRY CO.,LTD
**Address** YINLING INDUSTRIAL, XIAQIAO GUANLONG ROAD, DONGCHENG ZONE, DONGGUAN CITY, GUANGDONG PROVINCE, CHINA

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

| | |
|---|---|
| Sample Name | 上光PP膜 |
| Part No. | OPAT |
| Color | 透明 |
| Manufacturer | FUZHOU |
| Sample Received Date | Mar. 2, 2015 |
| Testing Period | Mar. 2, 2015 to Mar. 4, 2015 |

**Test Requested** As specified by client, to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium(Cr(VI)), Polybrominated Biphenyl(PBBs) , Polybrominated Diphenyl Ethers(PBDEs), Fluorine(F), Chlorine(Cl), Bromine(Br), Iodine(I), Hexabromocyclododecane (HBCDD), Phthalates in the submitted sample(s).

**Test Method** Please refer to the following page(s).

**Test Result(s)** Please refer to the following page(s).

Tested by _____ Reviewed by Cathy

Approved by _____ Date Mar. 4, 2015

Danny Liu
Technical Manager

No. R148192600

# Test Report



**Test Method**

| Test Item(s) | Test Method | Measured Equipment(s) |
|---|---|---|
| Lead (Pb) | IEC 62321-5:2013 Ed.1.0 | ICP-OES |
| Cadmium (Cd) | IEC 62321-5:2013 Ed.1.0 | ICP-OES |
| Mercury (Hg) | IEC 62321-4:2013 Ed.1.0 | ICP-OES |
| Hexavalent Chromium(Cr(VI)) | IEC 62321:2008 Ed.1 Annex C | UV-Vis |
| Polybrominated Biphenyl(PBBs) | IEC 62321:2008 Ed.1 Annex A | GC-MS |
| Polybrominated Diphenyl Ethers(PBDEs) | IEC 62321:2008 Ed.1 Annex A | GC-MS |
| Fluorine(F) | Refer to BS EN 14582:2007 | IC |
| Chlorine(Cl) | Refer to BS EN 14582:2007 | IC |
| Bromine(Br) | Refer to BS EN 14582:2007 | IC |
| Iodine(I) | Refer to BS EN 14582:2007 | IC |
| Hexabromocyclododecane (HBCDD) | Refer to US EPA 3540C:1996 & US EPA 8270D:2007 | GC-MS |
| Phthalates | Refer to EN 14372:2004(E) | GC-MS |

**Test Result(s)**

| **Tested Item(s)** | **Result** | **MDL** |
|---|---|---|
| Lead (Pb) | N.D. | 2 mg/kg |
| Cadmium (Cd) | N.D. | 2 mg/kg |
| Mercury (Hg) | N.D. | 2 mg/kg |
| Hexavalent Chromium (Cr(VI)) | N.D. | 2 mg/kg |

| **Tested Item(s)** | **Result** | **MDL** |
|---|---|---|
| **Polybrominated Biphenyl(PBBs)** | | |
| Monobromobiphenyl | N.D. | 5 mg/kg |
| Dibromobiphenyl | N.D. | 5 mg/kg |
| Tribromobiphenyl | N.D. | 5 mg/kg |
| Tetrabromobiphenyl | N.D. | 5 mg/kg |
| Pentabromobiphenyl | N.D. | 5 mg/kg |
| Hexabromobiphenyl | N.D. | 5 mg/kg |
| Heptabromobiphenyl | N.D. | 5 mg/kg |
| Octabromobiphenyl | N.D. | 5 mg/kg |
| Nonabromobiphenyl | N.D. | 5 mg/kg |
| Decabromobiphenyl | N.D. | 5 mg/kg |

# Test Report



| Tested Item(s) | Result | MDL |
|---|---|---|
| **Polybrominated Diphenyl Ethers(PBDEs)** | | |
| Monobromodiphenyl ether | N.D. | 5 mg/kg |
| Dibromodiphenyl ether | N.D. | 5 mg/kg |
| Tribromodiphenyl ether | N.D. | 5 mg/kg |
| Tetrabromodiphenyl ether | N.D. | 5 mg/kg |
| Pentabromodiphenyl ether | N.D. | 5 mg/kg |
| Hexabromodiphenyl ether | N.D. | 5 mg/kg |
| Heptabromodiphenyl ether | N.D. | 5 mg/kg |
| Octabromodiphenyl ether | N.D. | 5 mg/kg |
| Nonabromodiphenyl ether | N.D. | 5 mg/kg |
| Decabromodiphenyl ether | N.D. | 5 mg/kg |

| Tested Item(s) | Result | MDL |
|---|---|---|
| **Halogen(s)** | | |
| Fluorine(F) | N.D. | 10 mg/kg |
| Chlorine(Cl) | N.D. | 10 mg/kg |
| Bromine(Br) | N.D. | 10 mg/kg |
| Iodine(I) | N.D. | 10 mg/kg |

| Tested Item(s) | Result | MDL |
|---|---|---|
| Hexabromocyclododecane (HBCDD) | N.D. | 5 mg/kg |

# Test Report

**Report No.** SCL01H013155001 

| Tested Item(s) | Result | MDL |
|---|---|---|
| **Phthalates** | | |
| Dimethyl phthalate(DMP) CAS#:131-11-3 | N.D. | 50 mg/kg |
| Diethyl phthalate(DEP) CAS#:84-66-2 | N.D. | 50 mg/kg |
| Diisobutyl phthalate(DIBP) CAS#:84-69-5 | N.D. | 50 mg/kg |
| Dibutyl phthalate(DBP) CAS#:84-74-2 | N.D. | 50 mg/kg |
| Butylbenzyl phthalate(BBP) CAS#:85-68-7 | N.D. | 50 mg/kg |
| Di-2-ethylhexyl phthalate(DEHP) CAS#:117-81-7 | N.D. | 50 mg/kg |
| Di-n-octyl phthalate(DNOP) CAS#:117-84-0 | N.D. | 50 mg/kg |
| Diisononyl phthalate(DINP) CAS#:28553-12-0,68515-48-0 | N.D. | 50 mg/kg |
| Diisodecyl phthalate(DIDP) CAS#:26761-40-0,68515-49-1 | N.D. | 50 mg/kg |
| Di-n-hexyl phthalate (DNHP) CAS#:84-75-3 | N.D. | 50 mg/kg |

**Tested Sample/Part Description** Transparent plastic film with adhesive paste

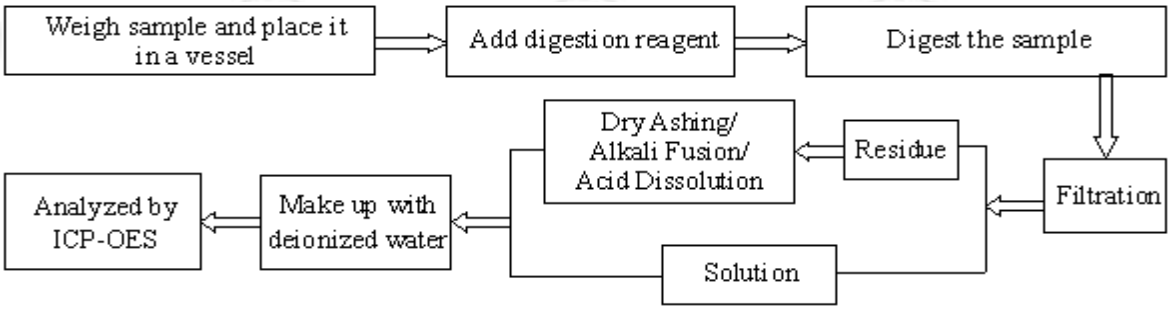
**Remark:** **The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.**
-MDL = Method Detection Limit
-N.D. = Not Detected (<MDL )
-mg/kg = ppm = parts per million

# Test Report

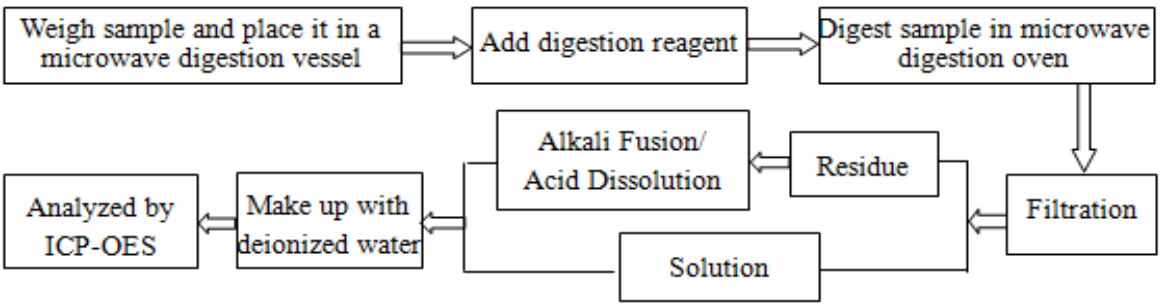


**Test Process**

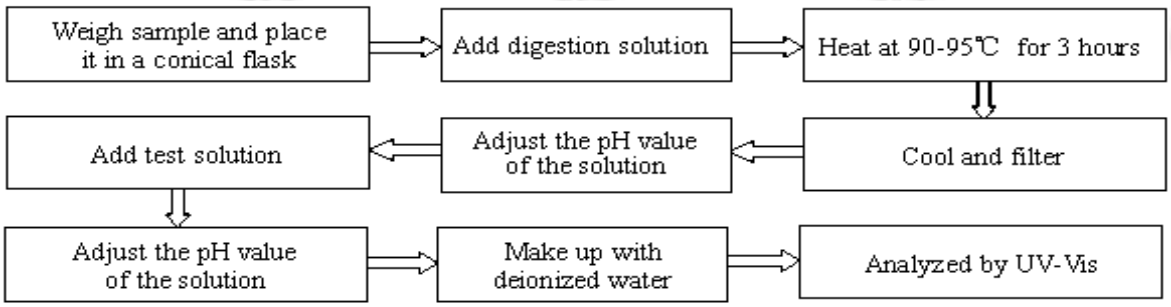
**1. Lead (Pb), Cadmium (Cd)**



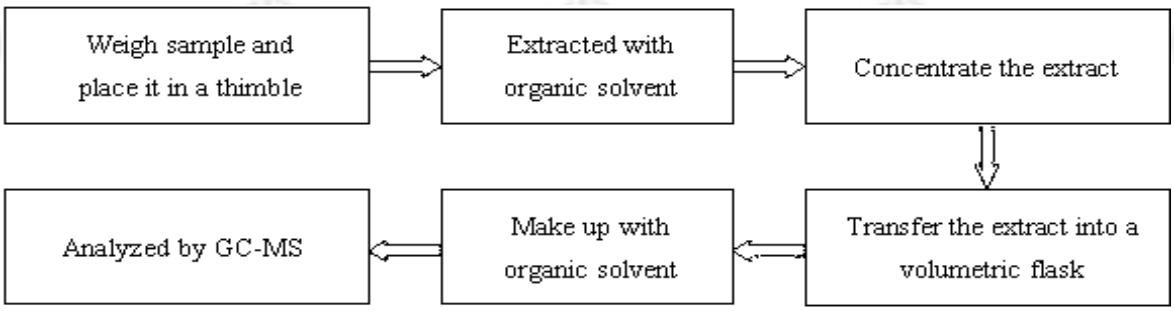

**2. Mercury (Hg)**




**3. Hexavalent Chromium(Cr(VI))**



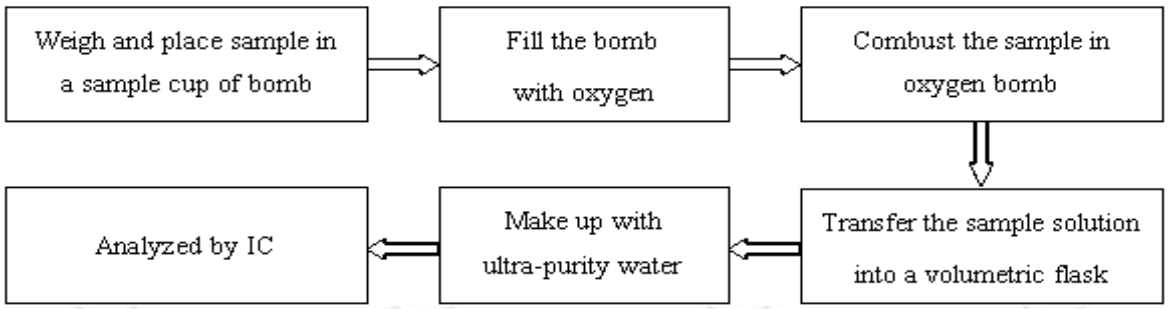

**4. Phthalates**



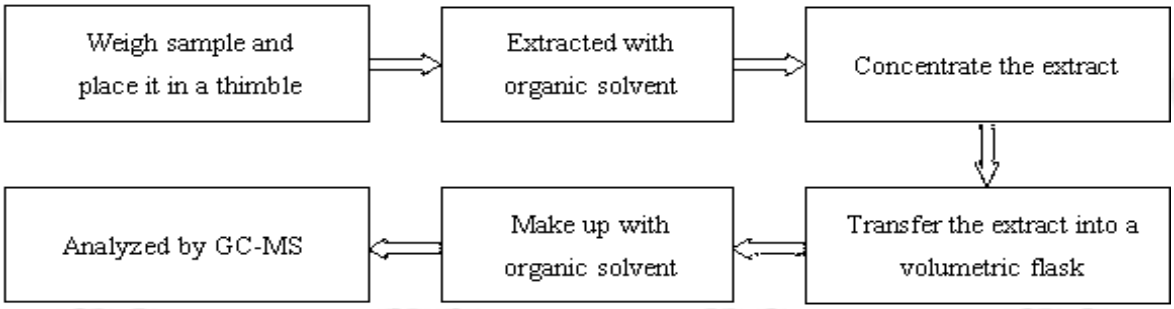
# Test Report



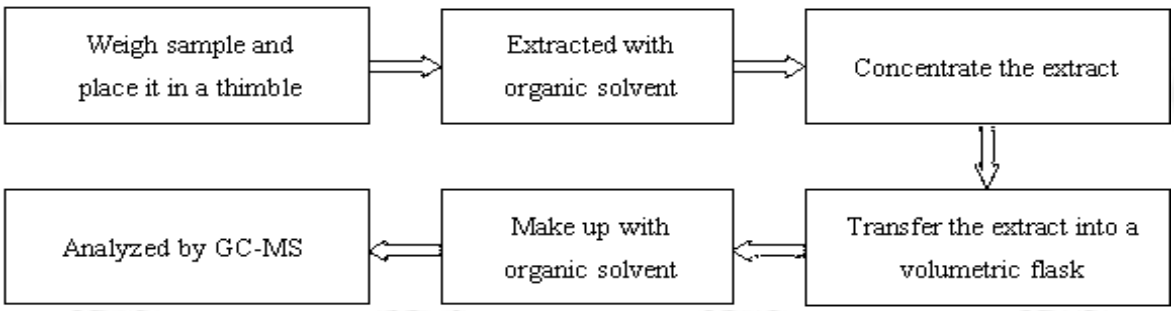
**5. Bromine(Br), Chlorine(Cl), Fluorine(F), Iodine(I)**




**6. Polybrominated Biphenyl(PBBs) , Polybrominated Diphenyl Ethers(PBDEs)**



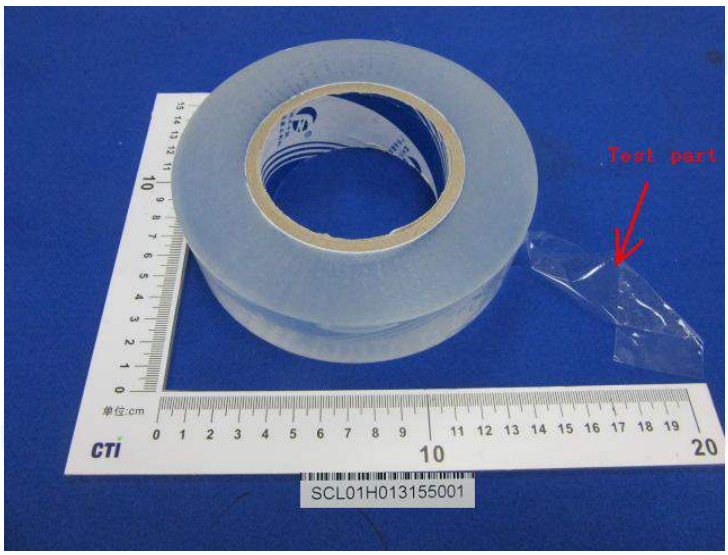

**7. Hexabromocyclododecane (HBCDD)**



# Test Report



## Photo(s) of the sample(s)




*** End of report ***

# 測試報告
# Test Report

號碼(No.) : CE/2015/53008　　日期(Date) : 2015/05/20　　頁數(Page): 1 of 11

喬越實業有限公司
SIL-MORE INDUSTRIAL LTD.
新北市三重區興德路100號16樓
16F, NO. 100, XINGDE RD., SANCHONG DISTRICT, NEW TAIPEI CITY 24158, TAIWAN

**以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by/on behalf of the applicant as)：**

| | | |
|---|---|---|
| 樣品名稱(Sample Description) | : | DOW CORNING TC-5630 THERMALLY CONDUCTIVE COMPOUND |
| 收件日期(Sample Receiving Date) | : | 2015/05/14 |
| 測試期間(Testing Period) | : | 2015/05/14 TO 2015/05/20 |

==========

**測試需求(Test Requested)：**

(1) 依據客戶要求，參考RoHS 2011/65/EU Annex II 指令測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚. (As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.)

(2) 依據客戶要求，參考 WTO/TBT 通報 G/TBT/N/EU/256，檢測 DBP, BBP, DEHP, DIBP. (As specified by client, with reference to G/TBT/N/EU/256 of WTO/TBT to test DBP, BBP, DEHP, DIBP.)

(3) 其他測試項目請見下一頁 . / Please refer to next pages for the other item(s).

**測試結果(Test Results)　：**　請見下一頁 (Please refer to next pages).

SGS TAIWAN LTD
SGS
TAIWAN

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

# 測試報告
# Test Report

號碼(No.) : CE/2015/53008　　日期(Date) : 2015/05/20　　頁數(Page): 2 of 11

喬越實業有限公司
SIL-MORE INDUSTRIAL LTD.
新北市三重區興德路100號16樓
16F, NO. 100, XINGDE RD., SANCHONG DISTRICT, NEW TAIPEI CITY 24158, TAIWAN

**測試結果(Test Results)**

測試部位(PART NAME)No.1　　:　灰色膏狀 (GRAY PASTE)

| 測試項目 (Test Items) | 單位 (Unit) | 測試方法 (Method) | 方法偵測極限值 (MDL) | 結果 (Result) |
|---|---|---|---|---|
| | | | | No.1 |
| 鎘 / Cadmium (Cd) | mg/kg | 參考IEC 62321-5: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES. | 2 | n.d. |
| 鉛 / Lead (Pb) | mg/kg | 參考IEC 62321-5: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES. | 2 | n.d. |
| 汞 / Mercury (Hg) | mg/kg | 參考IEC 62321-4: 2013方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4: 2013 and performed by ICP-AES. | 2 | n.d. |
| 六價鉻 / Hexavalent Chromium Cr(VI) | mg/kg | 參考IEC 62321: 2008方法, 以UV-VIS檢測. / With reference to IEC 62321: 2008 and performed by UV-VIS. | 2 | n.d. |
| 鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |

喬越實業有限公司
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16F, NO. 100, XINGDE RD., SANCHONG DISTRICT, NEW TAIPEI CITY 24158, TAIWAN

| 測試項目 (Test Items) | 單位 (Unit) | 測試方法 (Method) | 方法偵測極限值 (MDL) | 結果 (Result) |
|---|---|---|---|---|
| | | | | No.1 |
| 鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二 (2-乙基己基)酯 / DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |
| 鄰苯二甲酸二戊酯 / Di-n-pentyl phthalate (CAS No.: 131-18-0) | mg/kg | 參考IEC 62321-8 (111/321/CD)，以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. |

# 測試報告
# Test Report

號碼(No.) : CE/2015/53008　　日期(Date) : 2015/05/20　　頁數(Page): 4 of 11

喬越實業有限公司
SIL-MORE INDUSTRIAL LTD.
新北市三重區興德路100號16樓
16F, NO. 100, XINGDE RD., SANCHONG DISTRICT, NEW TAIPEI CITY 24158, TAIWAN

| 測試項目 (Test Items) | 單位 (Unit) | 測試方法 (Method) | 方法偵測極限值 (MDL) | 結果 (Result) |
|---|---|---|---|---|
| | | | | No.1 |
| 六溴環十二烷及所有主要被辨別出的異構物 / Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8)) | mg/kg | 參考IEC 62321: 2008方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 method. Analysis was performed by GC/MS. | 5 | n.d. |
| **多溴聯苯總和 / Sum of PBBs** | mg/kg | 參考IEC 62321: 2008方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS. | - | n.d. |
| 一溴聯苯 / Monobromobiphenyl | mg/kg | | 5 | n.d. |
| 二溴聯苯 / Dibromobiphenyl | mg/kg | | 5 | n.d. |
| 三溴聯苯 / Tribromobiphenyl | mg/kg | | 5 | n.d. |
| 四溴聯苯 / Tetrabromobiphenyl | mg/kg | | 5 | n.d. |
| 五溴聯苯 / Pentabromobiphenyl | mg/kg | | 5 | n.d. |
| 六溴聯苯 / Hexabromobiphenyl | mg/kg | | 5 | n.d. |
| 七溴聯苯 / Heptabromobiphenyl | mg/kg | | 5 | n.d. |
| 八溴聯苯 / Octabromobiphenyl | mg/kg | | 5 | n.d. |
| 九溴聯苯 / Nonabromobiphenyl | mg/kg | | 5 | n.d. |
| 十溴聯苯 / Decabromobiphenyl | mg/kg | | 5 | n.d. |
| **多溴聯苯醚總和 / Sum of PBDEs** | mg/kg | | - | n.d. |
| 一溴聯苯醚 / Monobromodiphenyl ether | mg/kg | | 5 | n.d. |
| 二溴聯苯醚 / Dibromodiphenyl ether | mg/kg | | 5 | n.d. |
| 三溴聯苯醚 / Tribromodiphenyl ether | mg/kg | | 5 | n.d. |
| 四溴聯苯醚 / Tetrabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 五溴聯苯醚 / Pentabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 六溴聯苯醚 / Hexabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 七溴聯苯醚 / Heptabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 八溴聯苯醚 / Octabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 九溴聯苯醚 / Nonabromodiphenyl ether | mg/kg | | 5 | n.d. |
| 十溴聯苯醚 / Decabromodiphenyl ether | mg/kg | | 5 | n.d. |

# 測試報告
# Test Report

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喬越實業有限公司
SIL-MORE INDUSTRIAL LTD.
新北市三重區興德路100號16樓
16F, NO. 100, XINGDE RD., SANCHONG DISTRICT, NEW TAIPEI CITY 24158, TAIWAN

| 測試項目 (Test Items) | 單位 (Unit) | 測試方法 (Method) | 方法偵測極限值 (MDL) | 結果 (Result) |
|---|---|---|---|---|
| | | | | No.1 |
| **鹵素 / Halogen** | | | | |
| 鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8) | mg/kg | 參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC. | 50 | n.d. |
| 鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1) | mg/kg | | 50 | n.d. |
| 鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2) | mg/kg | | 50 | n.d. |
| 鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8) | mg/kg | | 50 | n.d. |

**備註(Note):**

1. mg/kg = ppm；0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)

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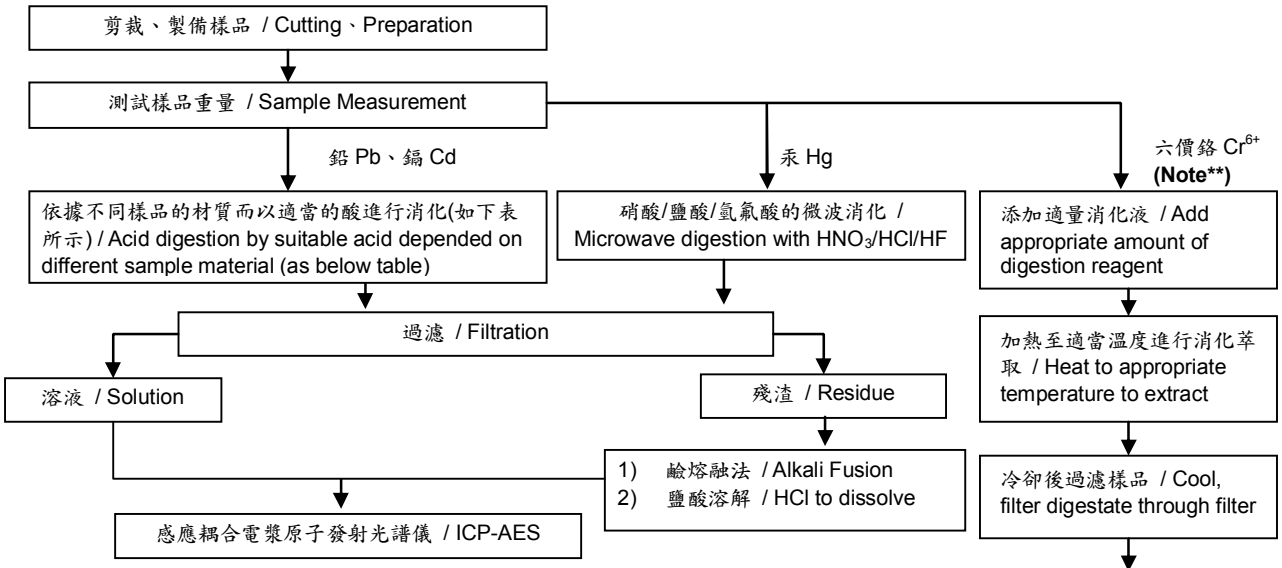
1) 根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. ($Cr^{6+}$ test method excluded)
2) 測試人員：楊登偉 / Name of the person who made measurement: Climbgreat Yang
3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang




| 樣品材質 / Sample Material | 消化酸液種類 / Digestion Acid |
|---|---|
| 鋼, 銅, 鋁, 焊錫 / Steel, copper, aluminum, solder | 王水, 硝酸, 鹽酸, 氫氟酸, 雙氧水 / Aqua regia, $HNO_3$, HCl, HF, $H_2O_2$ |
| 玻璃 / Glass | 硝酸,氫氟酸 / $HNO_3$/HF |
| 金, 鉑, 鈀, 陶瓷 / Gold, platinum, palladium, ceramic | 王水 / Aqua regia |
| 銀 / Silver | 硝酸 / $HNO_3$ |
| 塑膠 / Plastic | 硫酸, 雙氧水, 硝酸, 鹽酸 / $H_2SO_4$, $H_2O_2$, $HNO_3$, HCl |
| 其他 / Others | 加入適當的試劑至完全溶解 / Added appropriate reagent to total digestion |

**Note** (For IEC 62321)**
(1) 針對非金屬材料加入鹼性消化液，加熱至 90~95℃萃取. / For non-metallic material, add alkaline digestion reagent and heat to 90~95℃.
(2) 針對金屬材料加入純水，加熱至沸騰萃取. / For metallic material, add pure water and heat to boiling.

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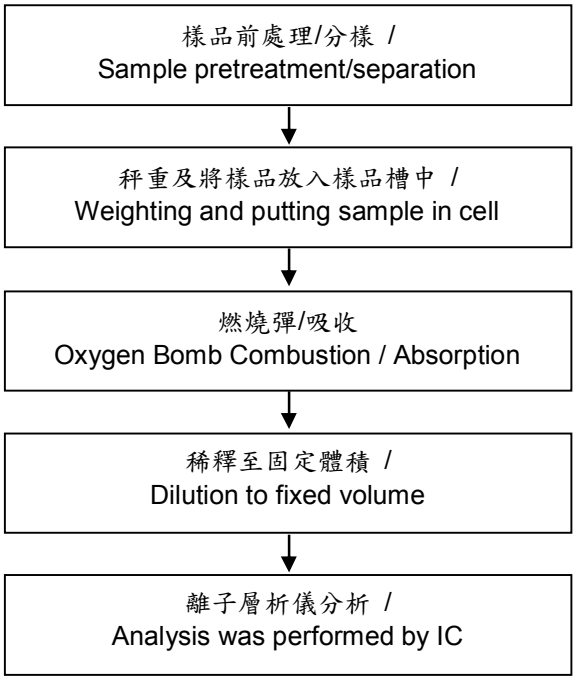
## 鹵素分析流程圖 / Analytical flow chart of halogen content

- 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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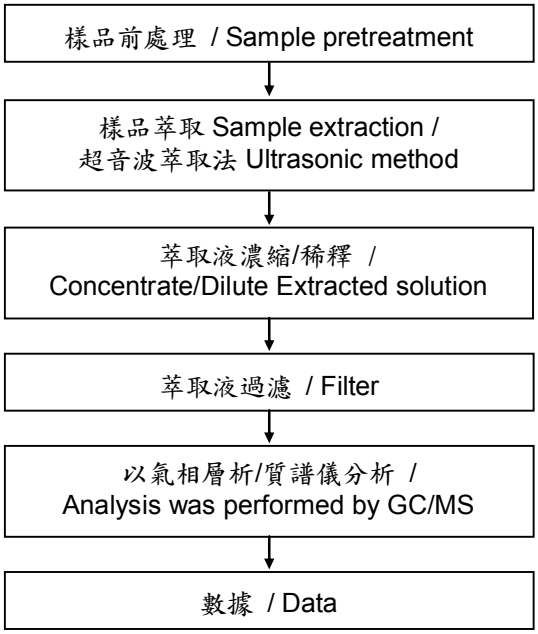
**六溴環十二烷分析流程圖 / HBCDD analytical flow chart**

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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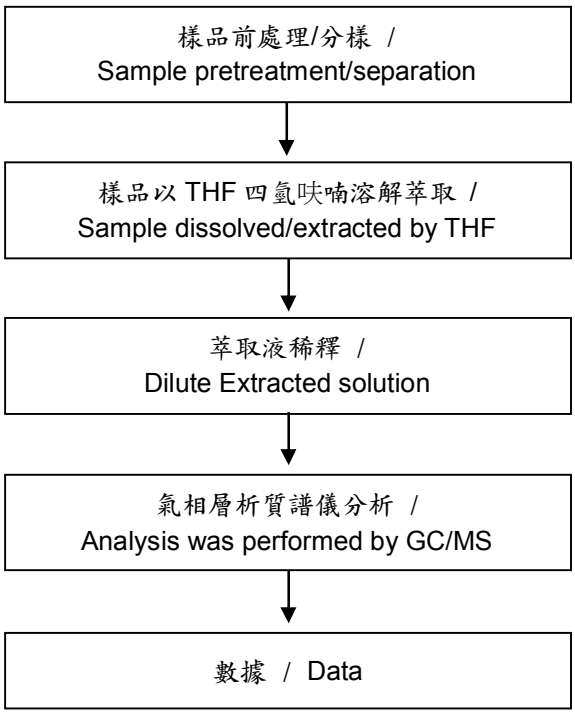
**可塑劑分析流程圖 / Analytical flow chart of phthalate content**

- 測試人員：徐毓明 / Name of the person who made measurement: Andy Shu
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang

**【測試方法/Test method: IEC 62321-8 】**



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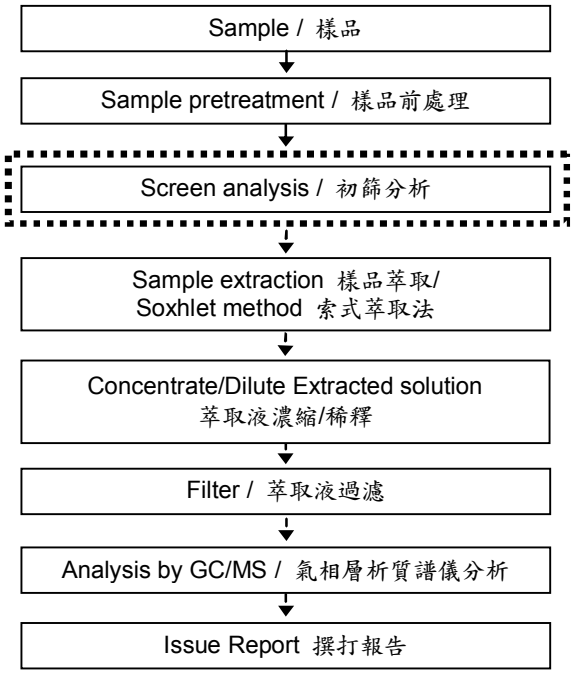
## 多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang

初次測試程序 / First testing process ⟶
選擇性篩檢程序 / Optional screen process ▪▪▪▪▪▪▪▪▪
確認程序 / Confirmation process — · — ·▸



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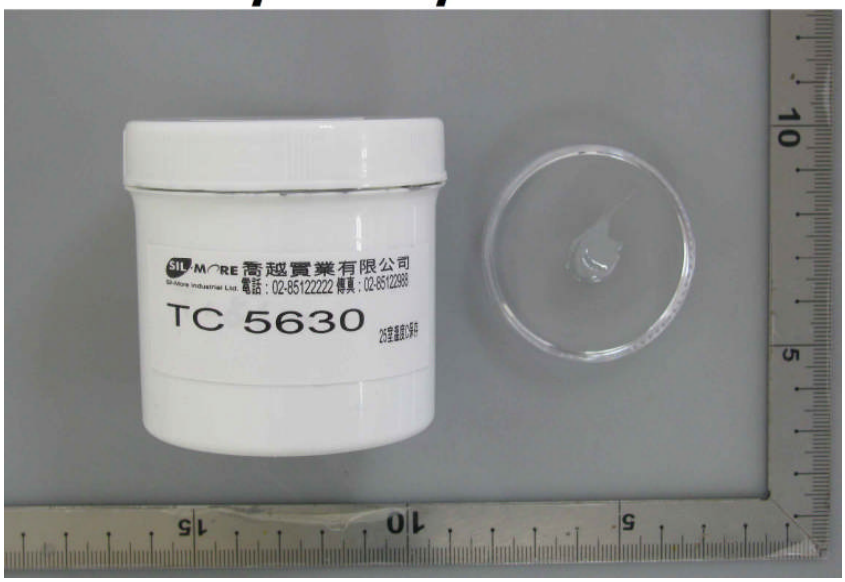
*** 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. ***
**(The tested sample / part is marked by an arrow if it's shown on the photo.)**

**CE/2015/53008**




** 報告結尾 (End of Report) **