



# SPECIFICATION

## Surface Acoustic Wave Filter

USER


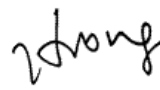

USER PART No.

SEMCO PART No. **SFWG42KB002**

DOC. No. SMS-51-L-SFT-FW-54

DATE March 13, 2014

REVISION 000

WISOL					
ISSUED BY	Kim, Young-hun 	APPROVED BY (R&D)	Hong, Seong-Su 	APPROVED BY (QC)	Choi, Jae hyeong 
User					
ISSUED BY		CHECKED BY		APPROVED BY	

WISOL CO., LTD.  
 531-7, Gajang-ro, Osan-si,  
 Gyeonggi-do, KOREA, 447-210  
<http://www.wisol.co.kr>

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](http://www.denovocn.com)

▶ **A TABLE OF CONTENTS**

<b>1. REVISION HISTORY</b> .....	3
<b>2. DEFINITION</b> .....	4
<b>3. PRECAUTIONS</b> .....	4
<b>4. OUTLINE DRAWING &amp; DIMENSIONS</b> .....	5
<b>5. MARKING</b> .....	6
<b>6. PERFORMANCE</b> .....	7
6-1. MAXIMUM RATINGS .....	7
6-2. ELECTRICAL CHARACTERISTICS .....	8
<b>7. RELIABILITY</b> .....	11
7-1. ENGINEERING SAMPLE FLOW CHART .....	11
7-2. TEST ITEM & CONDITION .....	12
<b>8. REFLOW CONDITION</b> .....	13
<b>9. RECOMMENDED PCB DIMENSIONS</b> .....	13
<b>10. CAUTION</b> .....	14
<b>11. PACKING</b> .....	15
11-1. DIMENSIONS.....	15
11-2. REELING QUANTITY .....	16
11-3. TAPING STRUCTURE.....	16
11-4. INNER BOX(Reel Packing) STRUCTURE.....	17
11-5. OUTER BOX STRUCTURE.....	18
<b>12. TAPE SPECIFICATIONS</b> .....	19
<b>13. RoHS DATA</b> .....	20

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](http://www.denovocn.com)

## 1. REVISION HISTORY

000	March 13, 2014	All Page	Make specification
-----	----------------	----------	--------------------

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](http://www.denovocn.com)

## 2. DEFINITION

### 2-1. PART No.

**S F W G 4 2 K B 0 0 2**

①      ②      ③      ④      ⑤      ⑥

No.	EXPLANATION	
①	SAW Filter	
②	Design Type	
③	Center Frequency Filter1	Filter1 : 1842.5MHz(1805~1880)
④	Balanced Filter	Input: Unbalanced 50 ohm Output: Balanced 150 ohm
⑤	Package size: 1.5×1.1mm <sup>2</sup>	
⑥	Design Revision (02 : Molding Type)	

### 2-2. APPLICATION: GSM 1800 & 1900 Rx Dual

## 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.

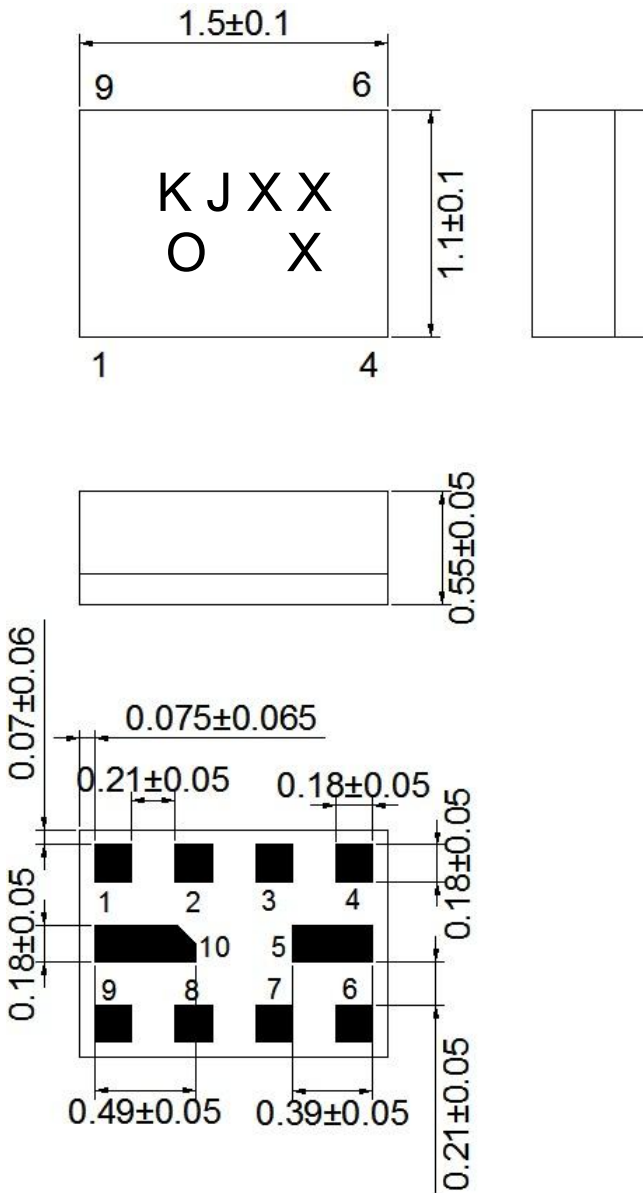
3-6. Sudden change of temperature shall be avoided, deterioration of the characteristics can occur.

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.

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](http://www.denovocn.com)

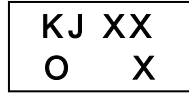
4. OUTLINE DRAWING & DIMENSIONS

[Unit: mm]



No.	Function
1	GSM1800/1900 Input
6,7	GSM 1900- Bal Output
8,9	GSM1800- Bal Output
2, 3, 4, 5,10	Ground

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

**5. MARKING**

**5-1. K J X X X**

- The 1<sup>st</sup> 2<sup>nd</sup> character 'KJ' indicates the model name of SAW Filter SFWG42KB002.
- The 3<sup>rd</sup> character 'X' indicates the year and the month of manufacture.

Year	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>2013</b>	P	Q	R	S	T	U	V	W	X	Y	Z	a
<b>2014</b>	1	2	3	4	5	6	7	8	9	A	B	C
<b>2015</b>	D	E	F	G	H	I	J	K	L	M	N	O
<b>2016</b>	P	Q	R	S	T	U	V	W	X	Y	Z	a

※ This rotates by the 3 years.

- The 4<sup>th</sup>, 5<sup>th</sup> character 'X' indicates Lot No.

**5-2. O**

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

**5-3. Marking: Laser Marking**

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](http://www.denovocn.com)

## 6. PERFORMANCE

### 6-1. MAXIMUM RATINGS

CHARACTERISTICS	RATINGS	UNITS
DC Permissive Voltage	5	V
Maximum Input Power	15	dBm
Operating Temperature Range	- 30 ~ +85	°C
Storage Temperature Range	- 40 ~ +85	°C

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](http://www.denovocn.com)

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

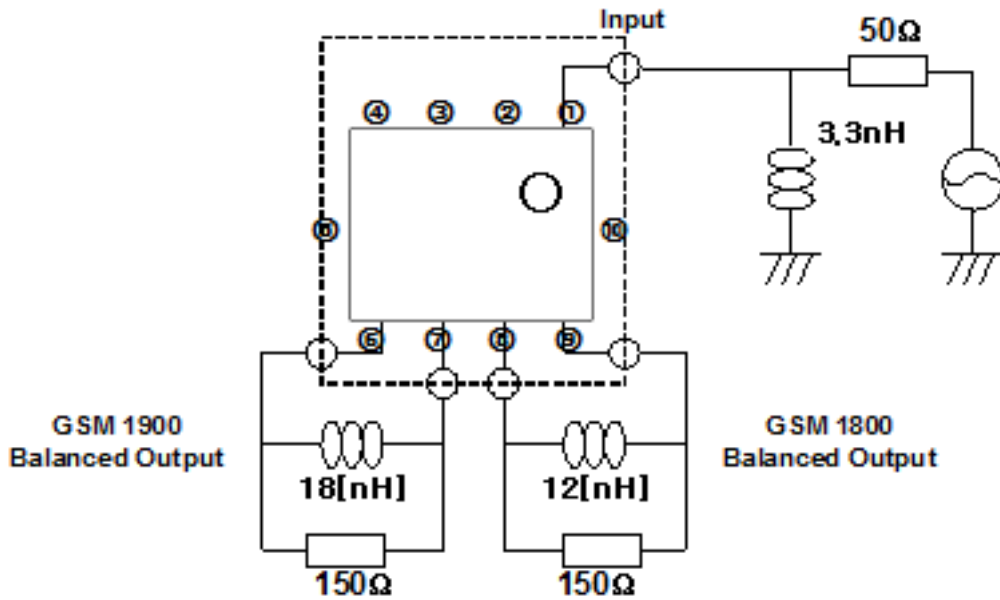
Ta = -30 ~ +85°C

ITEM	UNIT	GSM 1800				GSM 1900			
		Freq. Range [MHz]	Min.	Typ. (25°C)	Max.	Freq. Range [MHz]	Min.	Typ. (25°C)	Max.
Insertion Loss	dB	1805 ~ 1880	-	1.7	2.8	1930 ~ 1990	-	1.7	2.6
Inband Ripple	dB	1805 ~ 1880	-	0.5	1.7	1930 ~ 1990	-	0.4	1.5
Input VSWR	-	1805 ~ 1880	-	1.5	2.3	1930 ~ 1990	-	1.3	2.3
Output VSWR	-	1805 ~ 1880	-	1.6	2.3	1930 ~ 1990	-	1.3	2.3
Amplitude Imbalance	dB	1805 ~ 1880	-2.0	-	+2.0	1930 ~ 1990	-2.0	-	+2.0
Phase Imbalance	degree	1805 ~ 1880	-20	-	+20	1930 ~ 1990	-20	-	+20
Absolute Attenuation	dB	1600 ~ 1710	25	32	-	1760 ~ 1830	25	31	-
	dB	1710 ~ 1785	9	13	-	1830 ~ 1910	6	13	-
	dB	1925 ~ 2000	15	21	-	2080 ~ 2150	20	28	-
	dB	2000 ~ 2100	18	25	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
Termination Impedance	Input: Unbalanced 50 ohm // shunt 3.3nH					Input: Unbalanced 50 ohm // shunt 3.3nH			
	Output: Balanced 150 ohm // 12nH					Output: Balanced 150 ohm // 18nH			

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](http://www.denovocn.com)



6-2-2. TEST FIXTURE

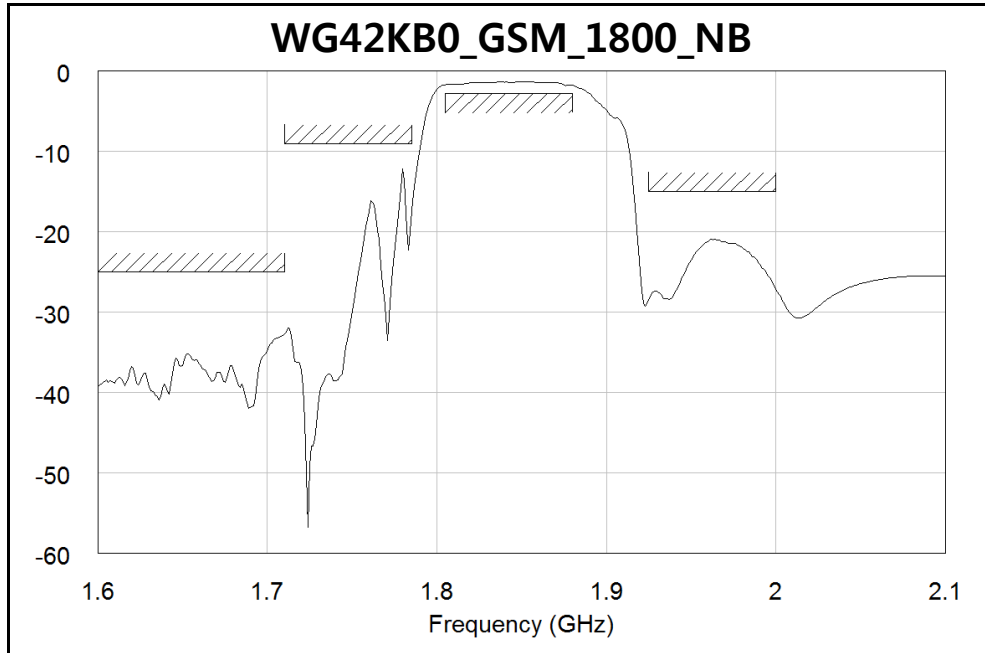


< X-ray Top View >

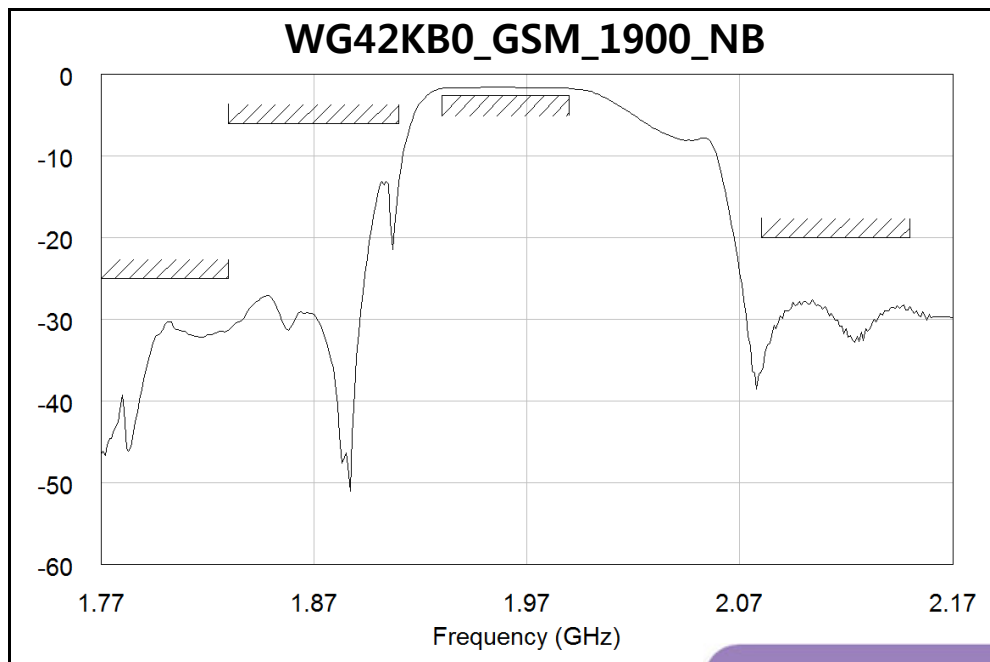
购买原装正品请认准-德方电子  
 免费服务热线: 400-655-8700  
 深圳总部电话: 0755-28187877  
 网址: www.denovocn.com

6-2-3. GRAPH

GSM 1800



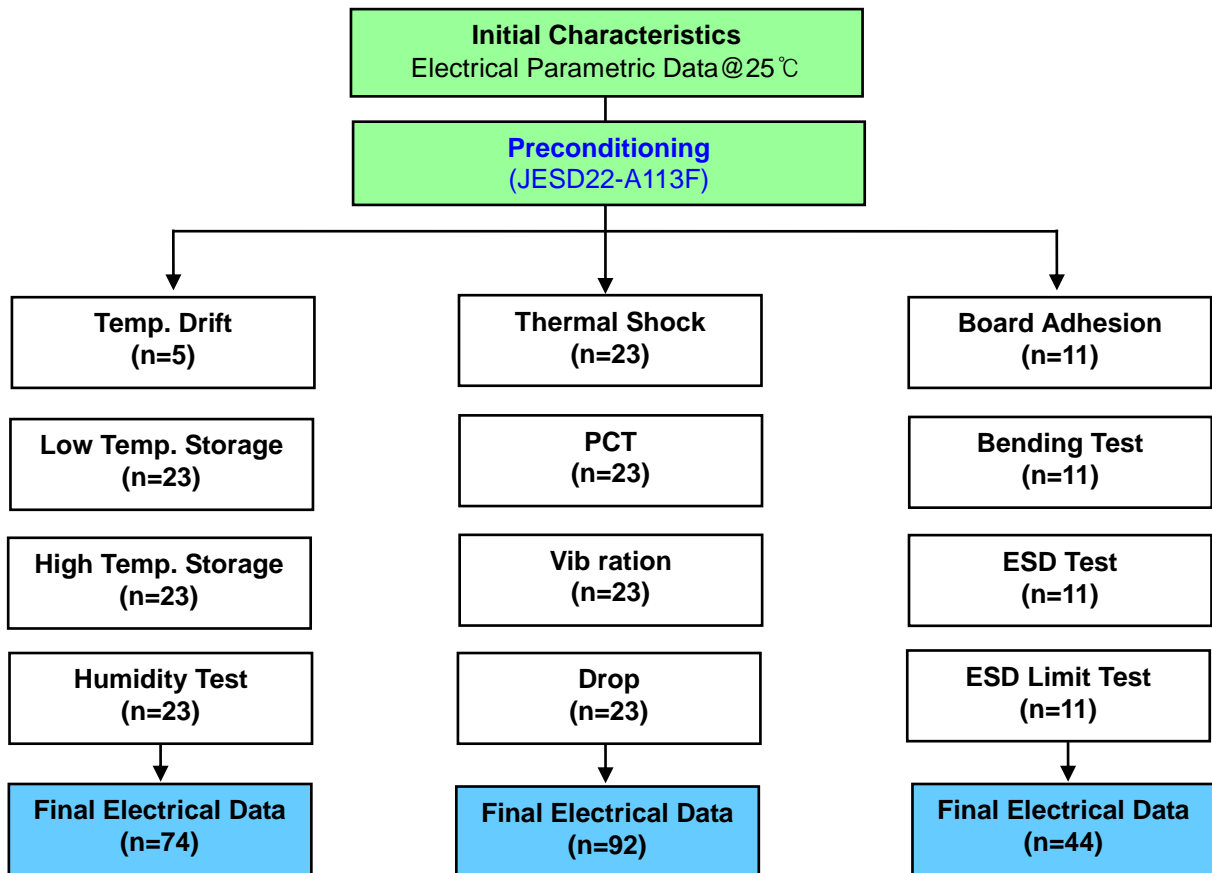
GSM 1900



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](http://www.denovocn.com)

7. RELIABILITY

7-1. ENGINEERING SAMPLE FLOW CHART



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

**7-2. TEST ITEM & CONDITION**

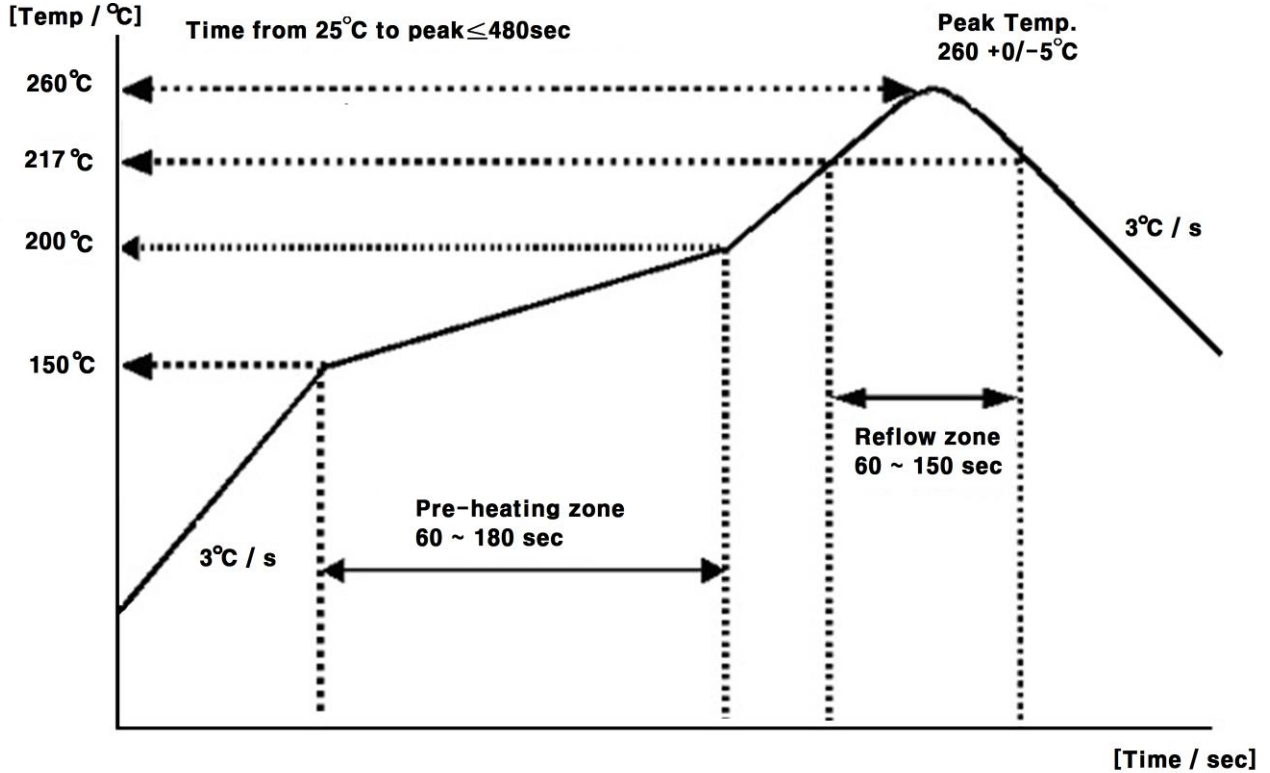
CATEGORY	TEST ITEM	TEST CONDITION	REMARK
	Preconditioning	+125℃ 24hr Baking → +60℃ 60%RH 120hr → Reflow Test(3times)	JESD22A113F



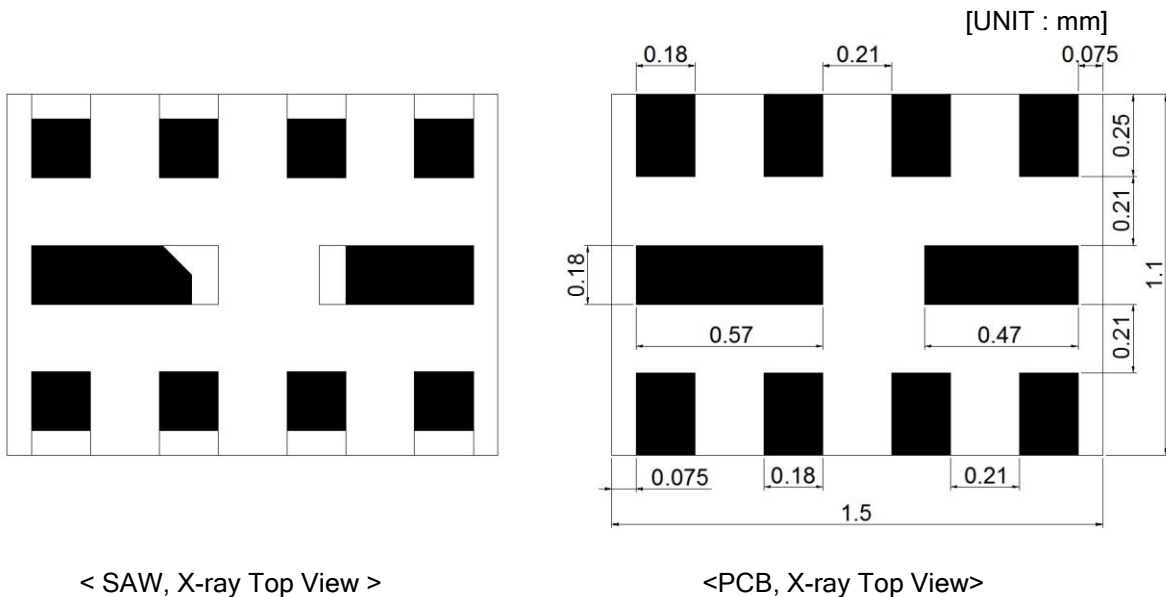
Environment Test	Temp. Drift	-30℃ → +25℃ → +85℃	description
	High Temp. Storage	+85℃ 240hr	JESD22-A103C
	Low Temp. Storage	-40℃ 240hr	JESD22-A119
	High Temp. High Humidity Storage	+85℃ 85%RH 240hr	JESD22-A106B
	Thermal Shock	-40℃/30min ⇔ +85℃/30min , 100cycle	JESD22-A106A
	High Temp. Operating	+121℃ 100%RH 96hr	JESD22-A102C
Mechanical Test	Vibration Test (Random)	20 Hz~2000 Hz,0.053G <sup>2</sup> /Hz or 8gs RMS,15min/plane	IEC 68-2-36 Fdb
	Drop Test	152 cm 12times Steel floor JIG(110g~150g)	IEC 1178-1.4.8.9
	Board Adhesion	0.5 mm/sec 1point push	IEC 68-2-21 Ue3
	Bending Test	0.5 mm/sec 3times -PCB : FR4 , PCB SIZE : 100*40 mm	IEC 68-2-21 Ue3
Physical Test	Solder Heat Resistance	±250V,C=100pF,R=1.5 kΩ,1times	IEC 68-2-21 Ue3
	static marginal test	C=100pF,R=1.5 kΩ,1times(demand of customer)	JESD22-A114F

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

8. REFLOW CONDITION



9. RECOMMENDED PCB DIMENSIONS



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

## 10. CAUTION

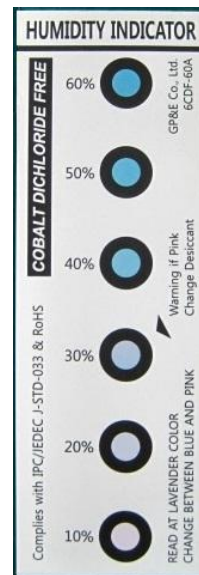
### Moisture Sensitivity Device Caution (MSL LEVEL=2a)

1. Calculated shelf life in sealed bag : 12 month at < 40°C and < 90% relative Humidity(RH)
  2. Peak package body temperature : **260°C**
  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 °C/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°C
    - (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)

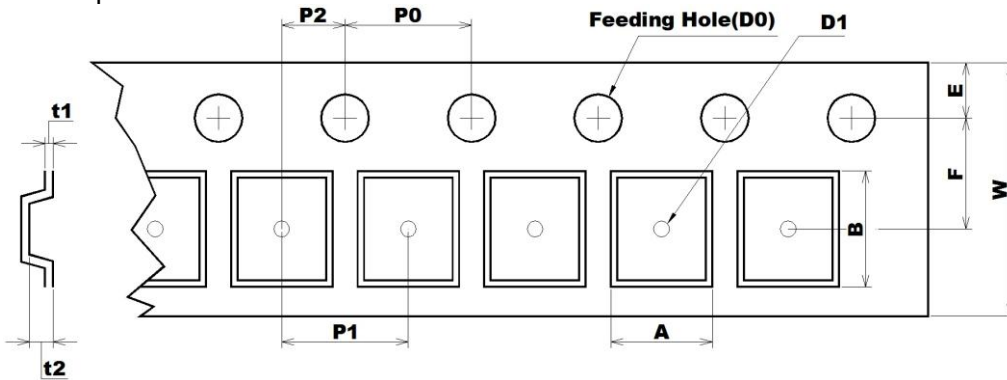


10 to 60% RH

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](http://www.denovocn.com)

**11. PACKING**
**11-1. DIMENSIONS**

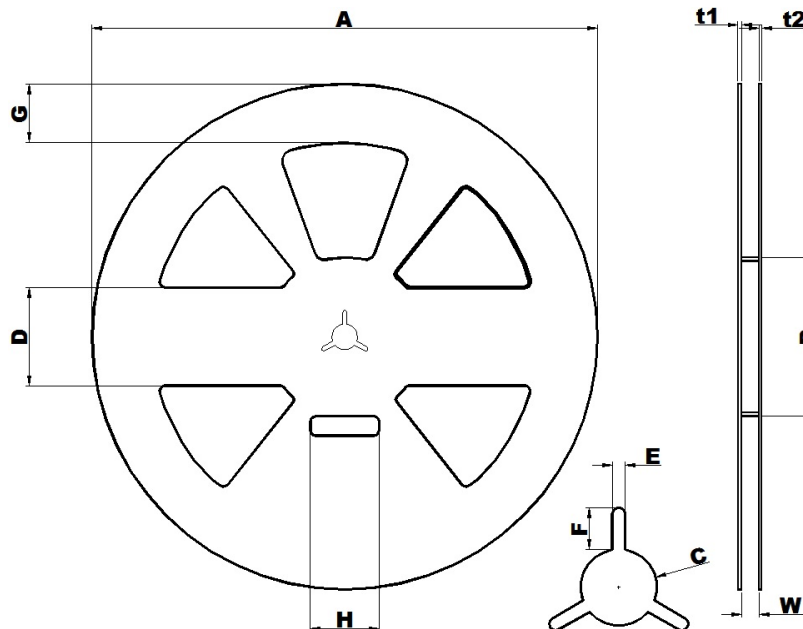
- Carrier Tape



[Unit: mm]

A	B	D0	D1	E	F	P0	P1	P2	t1	t2	W
1.35	1.75	Ø1.50	Ø0.50	1.75	3.50	4.00	4.00	2.00	0.25	0.70	8.00
+0.05	+0.05	+0.10	+0.05	+0.10	+0.05	+0.10	+0.10	+0.05	+0.02	+0.07	+0.30
-0.05	-0.05	-0.00	-0.05	-0.10	-0.05	-0.10	-0.10	-0.05	-0.02	-0.07	-0.10

- Reel



[Unit: mm]

A	B	C	D	E	F	G	H	t1	t2	W
Ø 258.0	Ø 81.0	Ø 13.0	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.

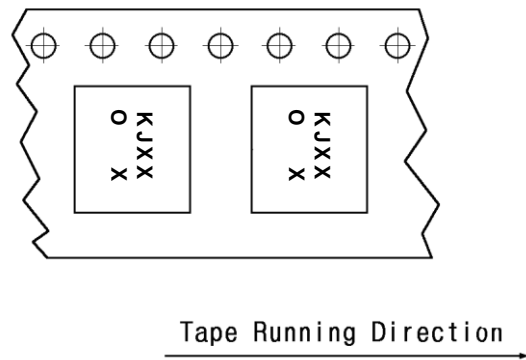
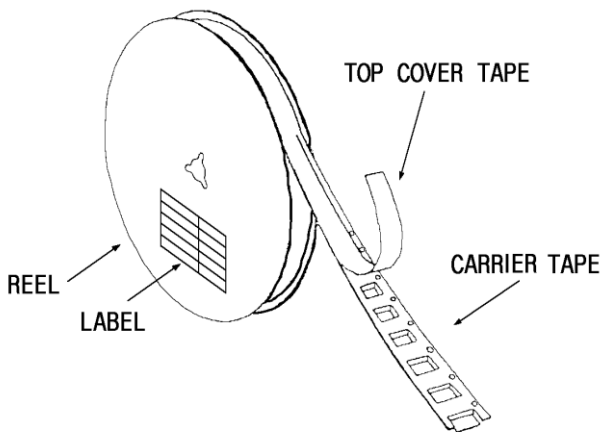
购买原装正品请认准-德方电子  
 免费服务热线: 400-655-8700  
 深圳总部电话: 0755-28187877  
 网址: www.denovocn.com

11-2. REELING QUANTITY

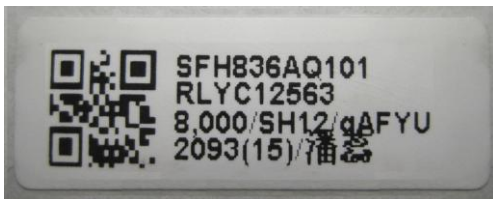
10 inch reel : 8,000 pcs/reel


11-3. TAPING STRUCTURE

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



11-3-2. BAR CODE LABEL



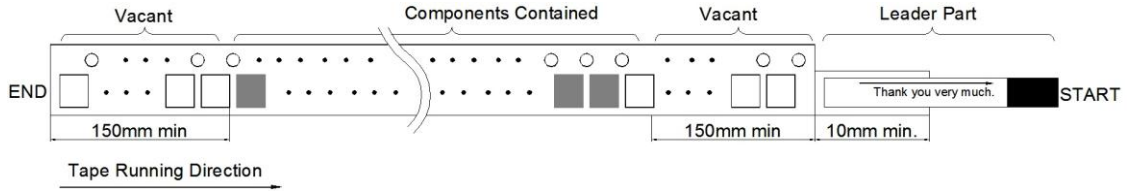
- |   |   |                    |
|---|---|--------------------|
| ① |  | MODEL NAME BARCODE |
| ② | SFH836AQ101   | Model Name         |
| ③ | RLYC12563   | Reel number        |
| ④ | 8,000 / qAFYU   | Quantity / Marking |

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



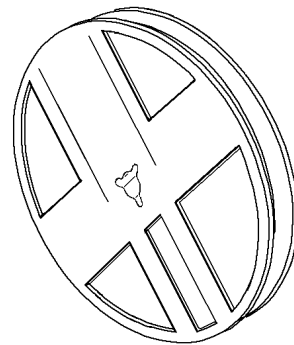
DUAL GSM 1800 Rx 1842.5MHz 1.5×1.1×0.55mm<sup>3</sup> 10pin lay-out Version: 000  
 GSM 1900 Rx 1960MHz

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

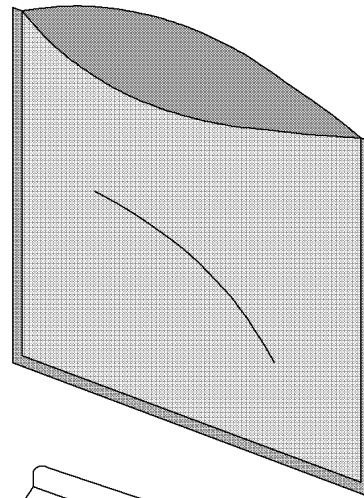


11-4. INNER BOX(Reel Packing) STRUCTURE

Material: Polycarbonate



Material: Polyethylene + Aluminium  
 Size: 310×370mm<sup>2</sup>



Material: Paper  
 Size: (D)260×(W)37×(H)265mm<sup>3</sup>

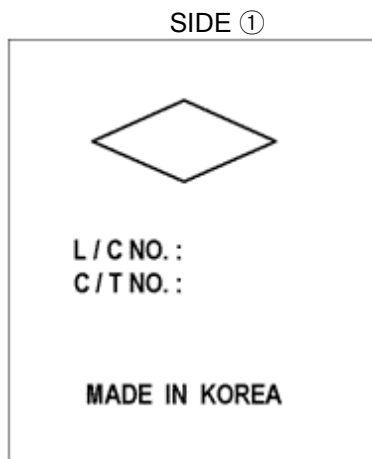
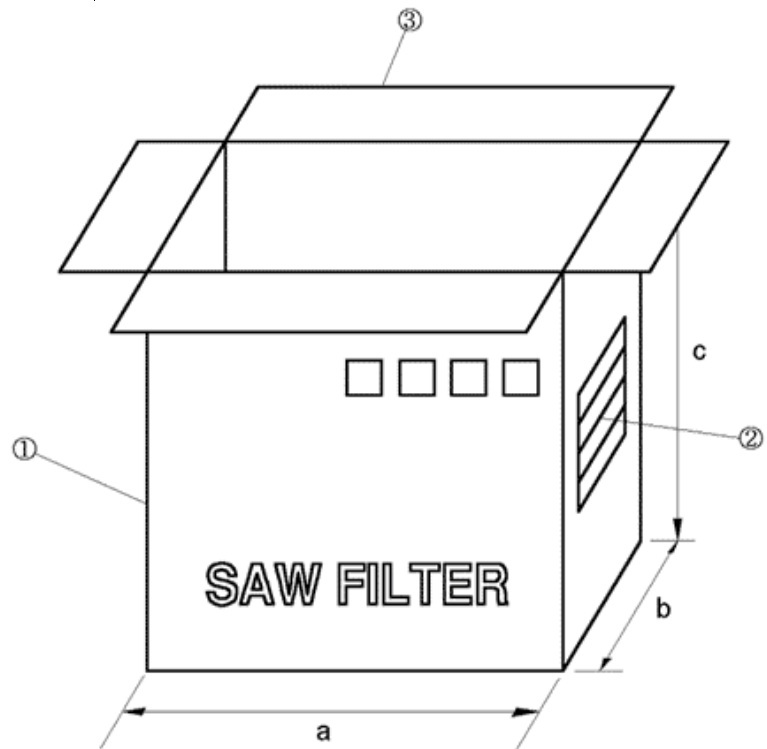


购买原装正品请认准-德方电子  
 免费服务热线: 400-655-8700  
 深圳总部电话: 0755-28187877  
 网址: www.denovocn.com

11-5. OUTER BOX STRUCTURE

Material: Paper

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



SIDE ②

MODEL	
Q'TY	EA
USER	
DATE	

- SIDE is the same as front side.

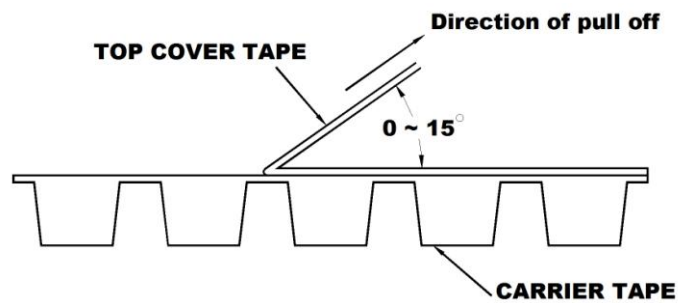
购买原装正品请认准-德方电子  
 免费服务热线: 400-655-8700  
 深圳总部电话: 0755-28187877  
 网址: [www.denovocn.com](http://www.denovocn.com)

## 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



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](http://www.denovocn.com)

**13. RoHS DATA**

**Test Report No. F690101/LF-CTSAYAA13-31939**

Issued Date: 2013. 07. 08 Page 1 of 6

**To: WISOL CO., LTD.**  
 373-7  
 Gajang-dong  
 Osan-si  
 Gyeonggi-do  
 Korea

The following merchandise was submitted and identified by the client as :

<b>SGS File No.</b>	: AYAA13-31939
<b>Product Name</b>	: SAW FILTER
<b>Item No./Part No.</b>	: N/A
<b>Received Date</b>	: 2013. 07. 03
<b>Test Period</b>	: 2013. 07. 04 to 2013. 07. 08
<b>Buyer(s)</b>	: SAMSUNG
<b>Test Results</b>	: For further details, please refer to following page(s)
<b>Test Performed</b>	: SGS Korea tested the sample(s) selected by applicant with following results.
<b>Test Comments</b>	: By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.

 Timothy Jeon  
 Jinhee Kim  
 Cindy Park  
 Jerry Jung/ Testing Person

SGS Korea Co., Ltd.



Jeff Jang / Chemical Lab Mgr

Document is issued by the Company subject to the General Conditions of Service printed hereon, or copies of [www.sgs.com/conditions](http://www.sgs.com/conditions) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/conditions](http://www.sgs.com/conditions). Operator is aware of the limitation of liability, indemnification and jurisdiction clause printed herein. Any issue of the document is subject to the information contained herein, which is the Company's finding of the state of its information only and under the title of Client's Information. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from existing at the time and obligations under the transaction document. This document cannot be reproduced except in full without prior written approval of the Company. Any unauthorized alteration or distribution of the content or appearance of this document is prohibited and offenders may be prosecuted to the fullest extent of the law. All information related to the results shown in this test report refer only to the sample(s) tested and each sample(s) are retained for 30 days only.

DS2 Version 5

SGS Korea Co., Ltd.

 322, The O valley, 555-8, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 131-050  
 t +82 (0)31 4808 000 f +82 (0)31 4808 059 jf

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](http://www.denovocn.com)



**Test Report No.** F690101/LF-CTSAYAA13-31939

Issued Date: 2013. 07. 08 Page 2 of 6

**Sample No.** : AYAA13-31939.001  
**Sample Description** : SAW FILTER  
**Item No./Part No.** : N/A  
**Materials** : N/A

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tri bromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tri bromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = 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 cm<sup>2</sup> sample surface area.

This document is issued to the Company subject to the General Conditions of Service printed hereon, available on request or available at <http://www.sgs.com/ClientConditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/ClientConditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses defined therein. Any holder of the 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. It may. The Company's sole responsibility is to its Client and the document does not constitute advice or a transaction from examining of 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 report refer only to the samples tested and each sample(s) are retained for 90 days only.

SGS Korea Co., Ltd.

322, The O valley, 555-9, Hogeje-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 t +82 (0)31 4808 000 f +82 (0)31 4808 050 <http://www.sgs.kor.kr> [www.kr.sgs.com/greenlab](http://www.kr.sgs.com/greenlab)

FD52 Version5

Member of the SGS Group (Société Générale de Surveillance)

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](http://www.denovocn.com)

DUAL

GSM 1800 Rx 1842.5MHz  
GSM 1900 Rx 1960MHz

1.5×1.1×0.55mm<sup>3</sup> 10pin lay-out

Version: 000



**Test Report No.** F690101/LF-CTSAYAA13-31939

Issued Date: 2013. 07. 08 Page 3 of 6

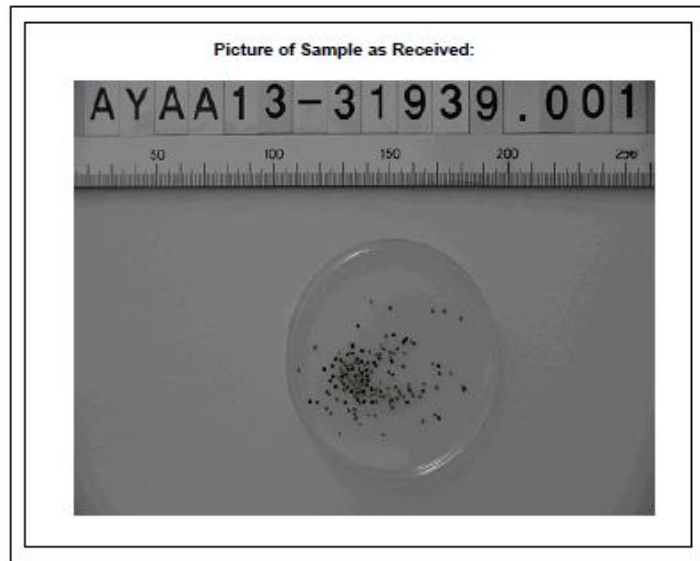
**Sample No.** : AYAA13-31939.001  
**Sample Description** : SAW FILTER  
**Item No./Part No.** : N/A  
**Materials** : N/A

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

**Halogen Content**

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	BS EN 14582:2007 , IC	30	N.D.



**NOTE:**

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = 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.

This document is issued by the Company subject to the General Conditions of Service printed hereon, available on request at [www.sgs.com](http://www.sgs.com) or [sgs@sgs.com](mailto:sgs@sgs.com), for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/sgsweb/sgsweb.htm](http://www.sgs.com/sgsweb/sgsweb.htm). Reference is drawn to the limitation of liability, indemnification and jurisdiction clauses without breach. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its issuance 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 either a transaction nor involving at 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, copying or modification of the content or appearance of this document is prohibited and offenders may be prosecuted to the fullest extent of the law. Client's attention shall be drawn to the fact that only the results reported here only to the company's tests and not otherwise are related to ISO 17025.

SGS Korea Co., Ltd.

322, The O valley, 555-8, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
t +82 (0)31 4608 000 f +82 (0)31 4608 050 [info@korea.sgs.com](mailto:info@korea.sgs.com) [www.korea.sgs.com](http://www.korea.sgs.com)

FD52 Version 5

Member of the SGS Group (Société Générale de Surveillance)

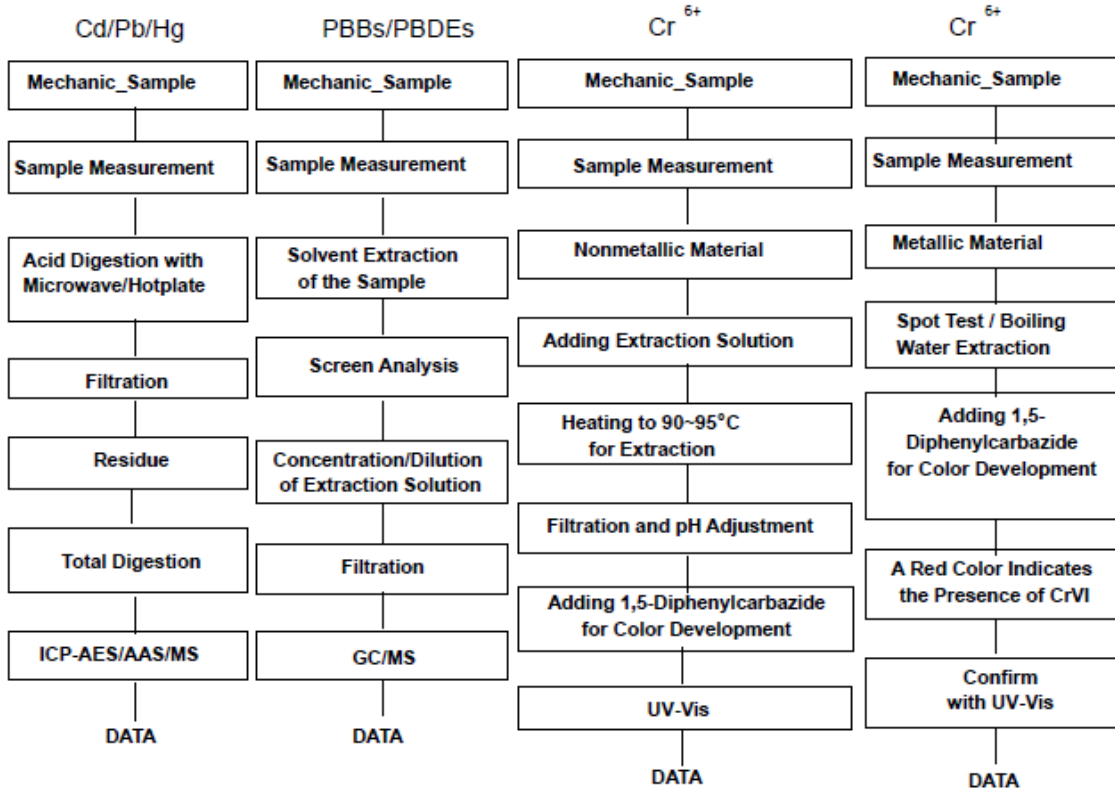
购买原装正品请认准-德方电子  
免费服务热线: 400-655-8700  
深圳总部电话: 0755-28187877  
网址: [www.denovocn.com](http://www.denovocn.com)



Test Report No. F690101/LF-CTSAYAA13-31939

Issued Date: 2013. 07. 08 Page 4 of 6

Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.  
 Section Chief : Gilsae Yi

NOTE:

- (1) N.D. = Not detected (<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = 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 cm<sup>2</sup> sample surface area.

The document is issued by the Company subject to the General Conditions of Service (attached herewith) available on request or accessible at <http://www.sgs.com/ProductsandServices/rohs> for electronic format documents subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/ProductsandServices/rohs>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clause defined therein. Any value of the document is subject to the information contained therein which is the Company's best estimate at the time of its issuance only and within the limits of Client's instructions. If any of the Company's sole responsibility is to the Client and the document does not constitute part of a transaction from accepting all their rights and obligations under the transaction documents. The document cannot be reproduced without the 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. Please reference against the results shown in this test report only to the accuracy, validity and availability of the results for the use only.

SGS Korea Co., Ltd.

322, The O valley, 555-9, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 t +82 (0)31 4808 000 f +82 (0)31 4808 050 <http://www.sgsksh.co.kr> [www.kr.sgs.com/rohs/kr](http://www.kr.sgs.com/rohs/kr)

F052 Version5

Member of the SGS Group (Société Générale de Surveillance)

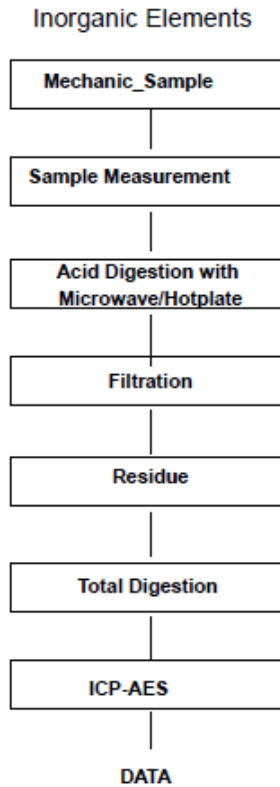
购买原装正品请认准-德方电子  
 免费服务热线: 400-655-8700  
 深圳总部电话: 0755-28187877  
 网址: [www.denovocn.com](http://www.denovocn.com)



Test Report No. F690101/LF-CTSAYAA13-31939

Issued Date: 2013. 07. 08 Page 5 of 6

Flow Chart for Inorganic Elements Testing



NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = 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 cm<sup>2</sup> sample surface area.

\* Document is issued by the Company subject to its General Conditions of Service printed hereon, available on request or accessible at <http://www.sgs.com/China-and-Confucius.asp> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/China-and-Confucius.asp>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of the 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 the Company's work responsibility is to be Client and the document does not constitute parties to a transaction from executing it, their rights and obligations under the transaction document. The document cannot be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without prior written approval of the Company, any unauthorized alteration, copying or modification of the content or appearance of the document is prohibited and Offenders may be prosecuted to the fullest extent of the law. See also terms stated in the results sheet in this test report when only the sampling sheet and each sample(s) are retained for 30 days only.

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](http://www.denovocn.com)

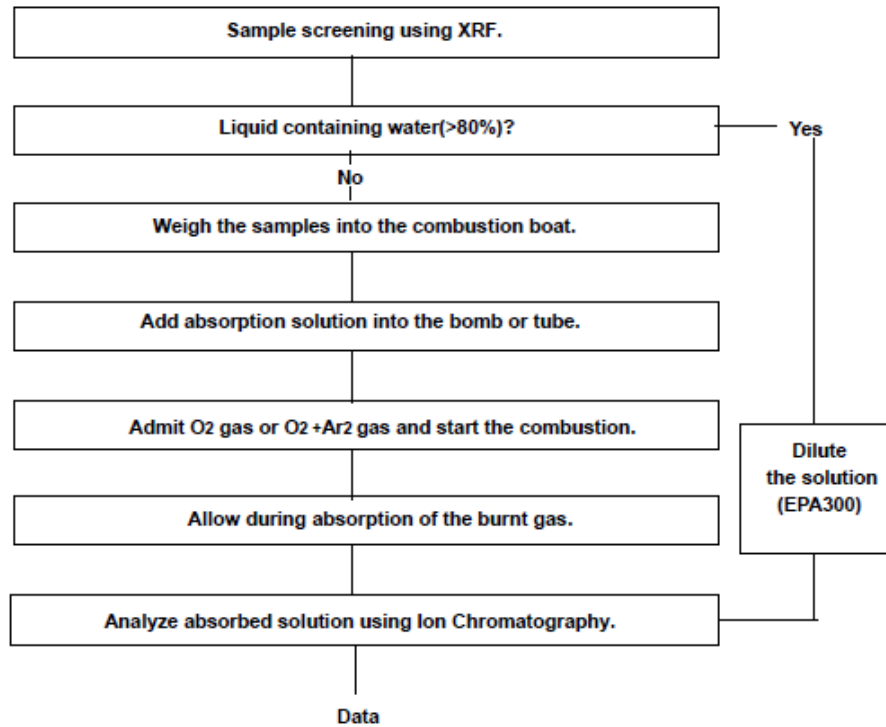




Test Report No. F690101/LF-CTSAYAA13-31939

Issued Date: 2013. 07. 08 Page 6 of 6

Flow Chart for Halogen Test



\*\*\* End \*\*\*

NOTE:

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) Negative = Undetectable / Positive = Detectable
- (6) \*\* = Qualitative analysis (No Unit)
- (7) \* = 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.

This document is issued by the Company subject to its General Conditions of Service (printed or online), available on request or accessible at <http://www.sgs.com/ChinaandCIS/Service>, and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/ChinaandCIS/Service>. 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. It is the Client's sole responsibility as to the 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. (See also below signed the results shown in the test report only refer to the samples tested and each sample) are retained for 30 days only.

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](http://www.denovocn.com)