



# SPECIFICATION

## Surface Acoustic Wave Filter

USER

USER PART No.

WISOL PART No. **SFDG35AQ102**

DOC. No. **SMS-51-L-SFT FN-76**

DATE June 14, 2017

REVISION 000

WISOL					
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## 1. REVISION HISTORY

000	June 14, 2017	All Page	Make specification
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## 2. DEFINITION

2-1. PART No.

**S F D G 3 5 A Q 1 0 2**

①      ②      ③      ④      ⑤      ⑥

No.	EXPLANATION
①	SAW Filter
②	Design Type
③	Center Frequency: 2350MHz (2300~2400MHz)
④	Unbalanced filter, output 50ohm
⑤	Package size: 1.4×1.1mm <sup>2</sup>
⑥	Design Revision (02 : Molding Type)

2-2. APPLICATION: LTE BAND 40 TRx

## 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.

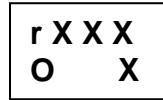
Please avoid static voltage during operation and storage.

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.



## 5. MARKING



### 5-1. rXXX

- The 1<sup>st</sup> 2<sup>nd</sup> character 'rX' indicates the model name of SAW Filter SFDG35AQ102.
- 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
2017	1	2	3	4	5	6	7	8	9	A	B	C
2018	D	E	F	G	H	I	J	K	L	M	N	O
2019	P	Q	R	S	T	U	V	W	X	Y	Z	a
2020	1	2	3	4	5	6	7	8	9	A	B	C

※ This rotates by the 3 years.

- The 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
  - o : China

### 5-3. Marking : Laser Marking

## 6. PERFORMANCE

### 6-1. MAXIMUM RATINGS

CHARACTERISTICS	RATINGS	UNITS	NOTES
DC Permissive Voltage	5	V	
Input Power	29	dbm	55 °C, 5000 h
Operating Temperature Range	- 30 ~ +85	°C	
Storage Temperature Range	- 40 ~ +85	°C	

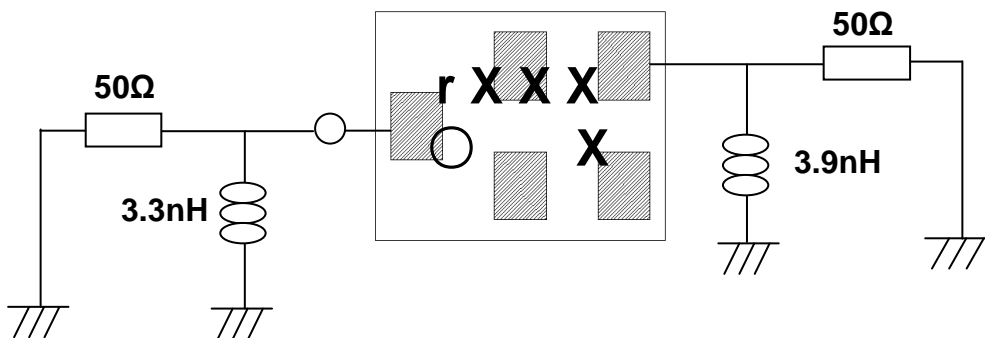
6-2. ELECTRICAL CHARACTERISTICS

6-2-1. TABLE

Ta = - 30 ~ +85°C

Item	CONDITION [MHz]	UNIT	RATING			Notes
			Min.	Typ.(25°C)	Max.	
Insertion Loss(*1)	2300 ~ 2400	dB	-	1.8	2.8	
Ripple Deviation	2300 ~ 2400	dB	-	0.7	1.9	
VSWR	2300 ~ 2400	-	-	1.9	2.4	
Absolute Attenuation	100 ~ 1574	dB	28	34	-	
	1574 ~ 1577	dB	28	34	-	
	1577 ~ 1680	dB	28	33	-	
	1845 ~ 1880	dB	25	30	-	
	2110 ~ 2170	dB	25	30	-	
	2460 ~ 2485	dB	35	48	-	
	2485 ~ 2500	dB	35	47	-	
	2500 ~ 3000	dB	25	29	-	
	4600 ~ 4800	dB	35	42	-	
6900 ~ 7200	dB	28	36	-		
Termination Impedance : Tx / ANT			50Ω (//3.3[nH]) / 50Ω (//3.9[nH])			

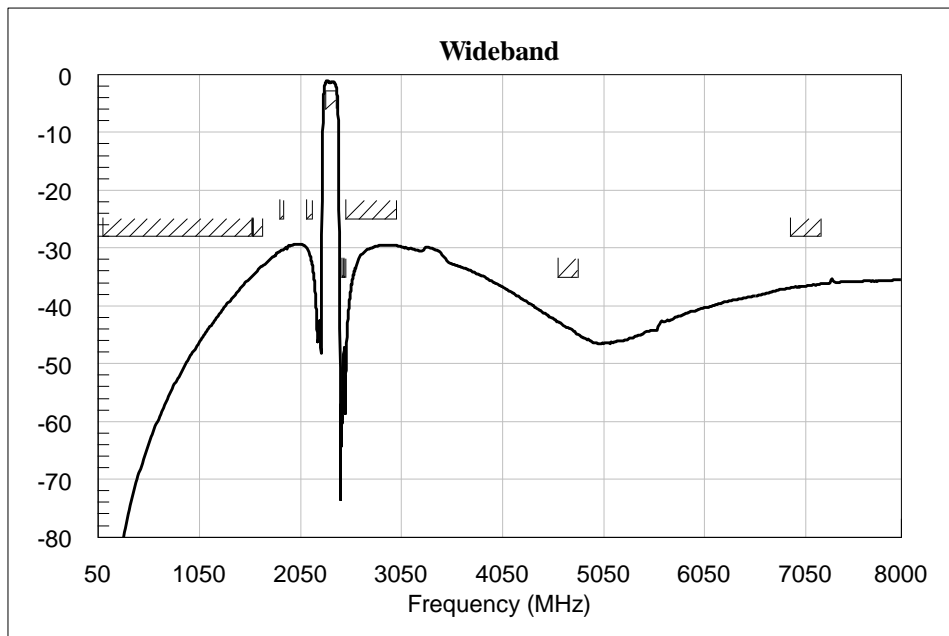
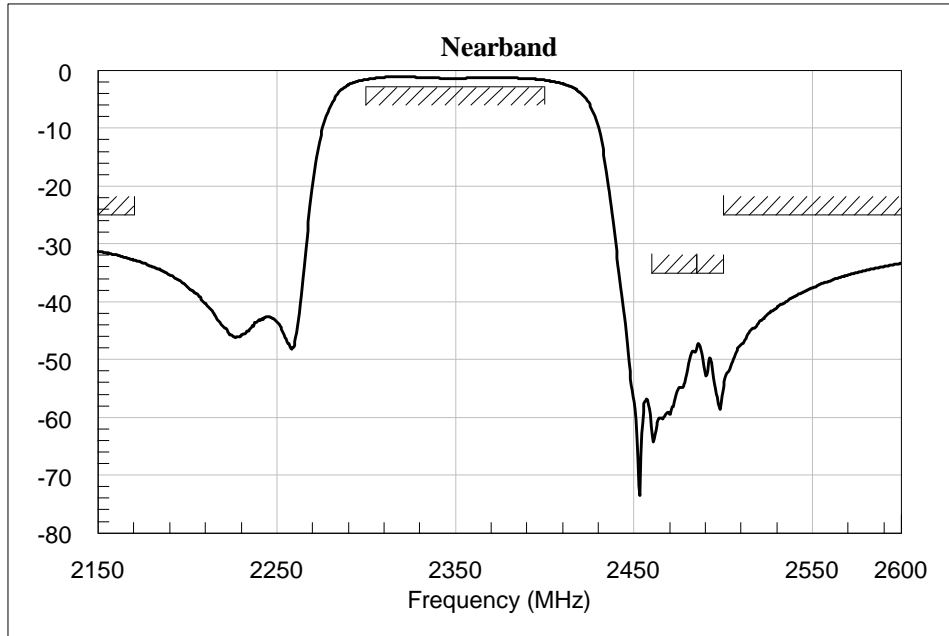
6-2-2. TEST FIXTURE



< X-ray Top View >

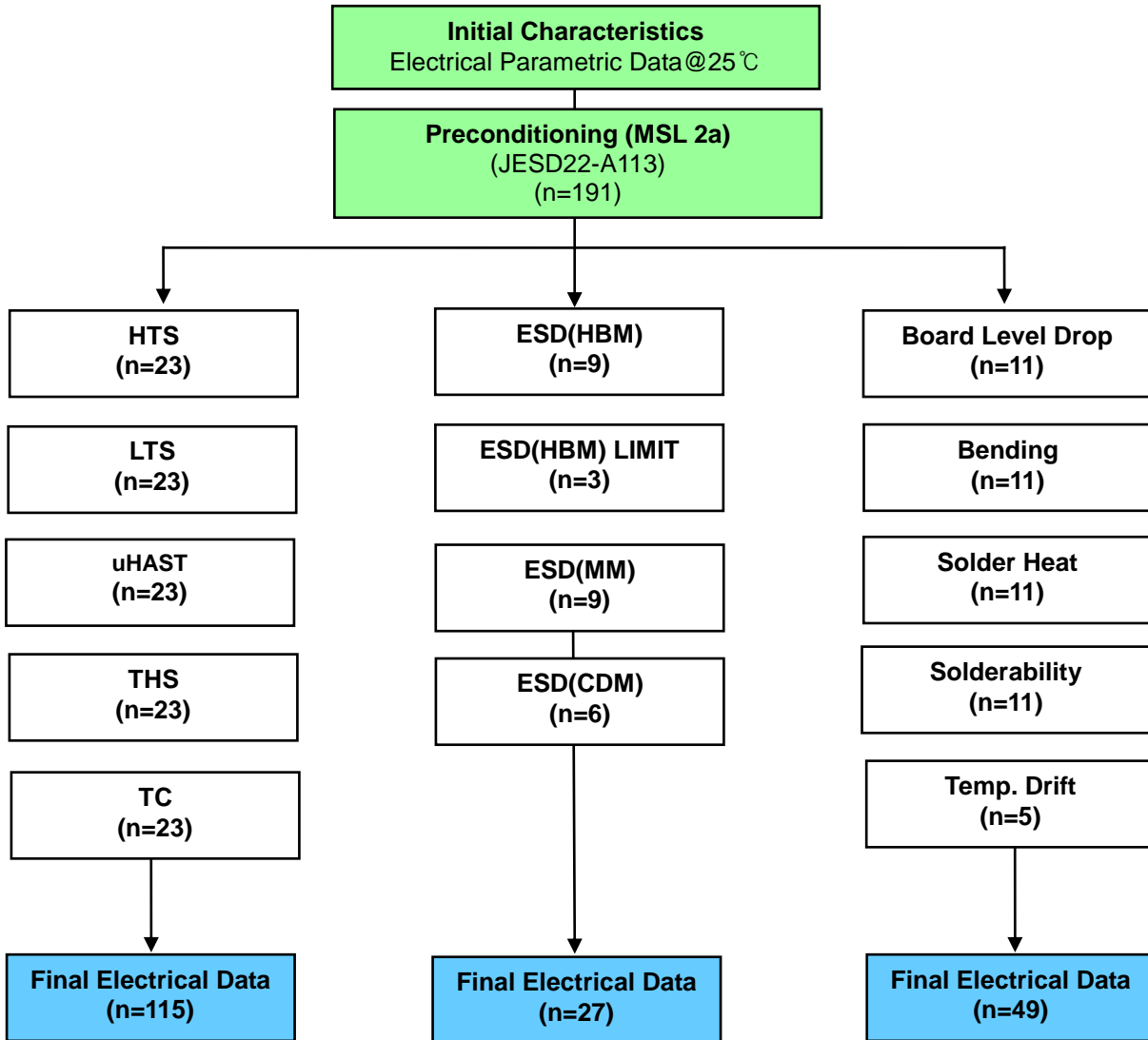


6-2-3. GRAPH



7. RELIABILITY

7-1. ENGINEERING SAMPLE FLOW CHART



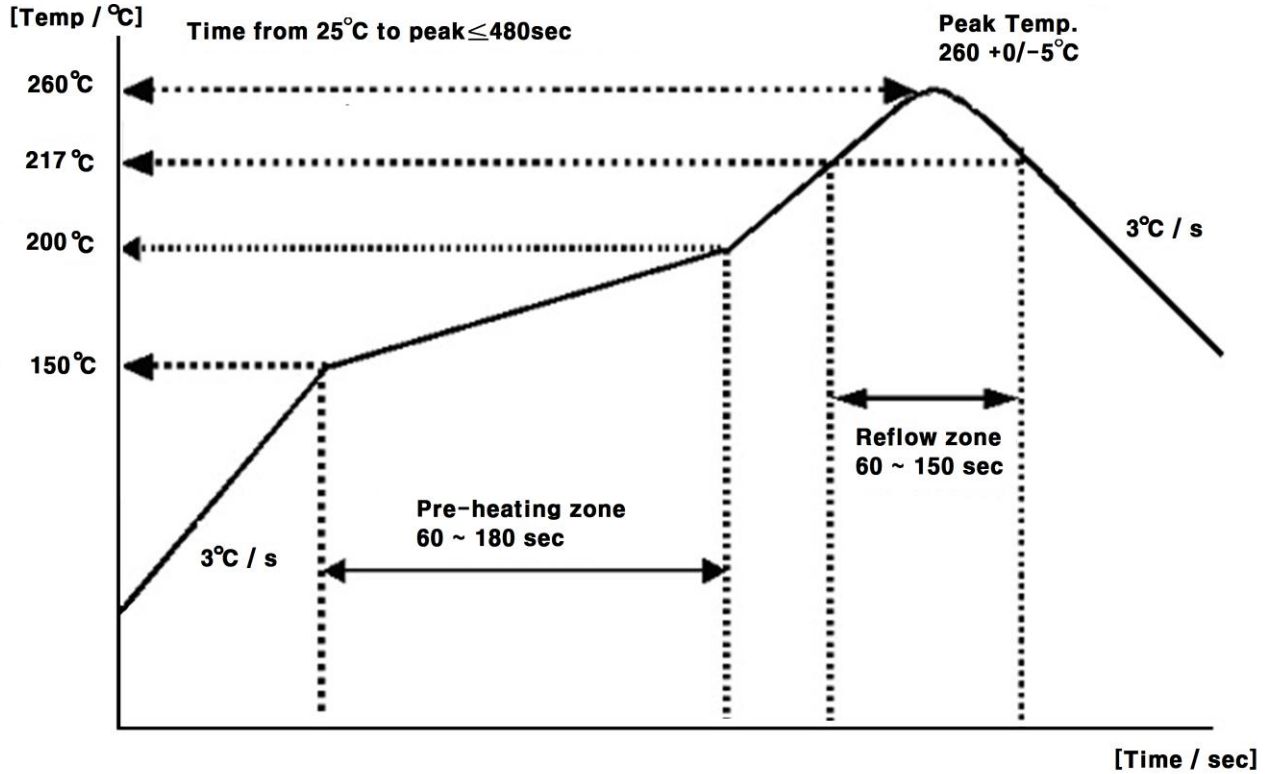
**7-2. TEST ITEM & CONDITION**

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

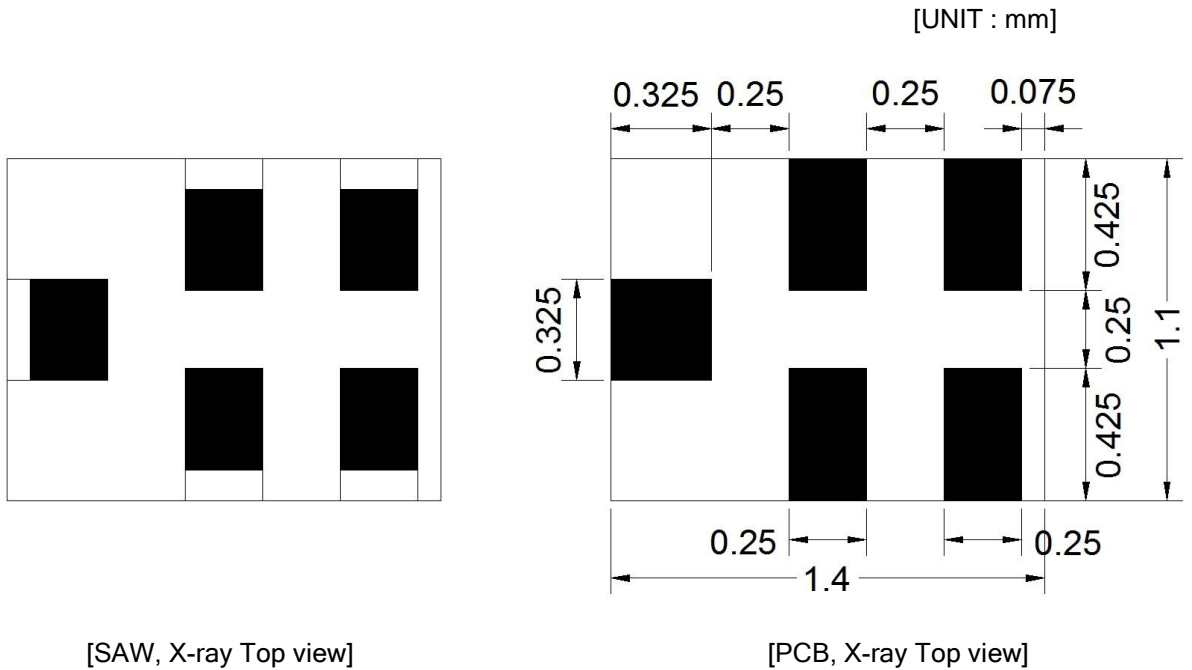


TEST ITEM	REMARK	TEST CONDITION	Duration
HTS (High Temperature Storage)	JESD22-A103	condition A 125(-0/+10)°C	1000hr
LTS (Low Temperature Storage)	JESD22-A119	A -40(-10/+0)°C	1000hr
uHAST (Unbiased HAST)	JESD22-A118	130°C /85% /33.3psi	96hr
THS (Temperature Humidity Storage)	JESD22-A101	85°C /85% RH	1000hr
TC (Temperature Cycle)	JESD22-A104	Condition G (-40°C /125°C)	1000cycle
ESD(HBM)	JESD22-A114	250V or above	-
ESD(HBM) LIMIT	-	300V or above	-
ESD(MM)	JESD22-A115	No spec but need data	-
ESD(CDM)	JESD22-C101	500V or above	-
Board Level Drop Test	JESD22-B111	1500G Duration 0.5ms	150cycle
Bending Test		0.5mm/sec 3times (1mm distance)	
Solder Heat Resistance		260°C	10sec
Solderability		235°C	3sec
Temp Drift		-40°C → +25°C → +125°C	Per conditions 2HR

8. REFLOW CONDITION



9. RECOMMENDED PCB DIMENSIONS



## 10. CAUTION

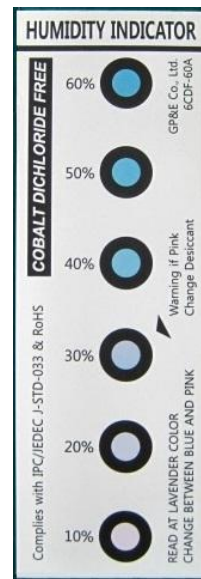
### Moisture Sensitivity Device Caution (MSL LEVEL=2a)

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)

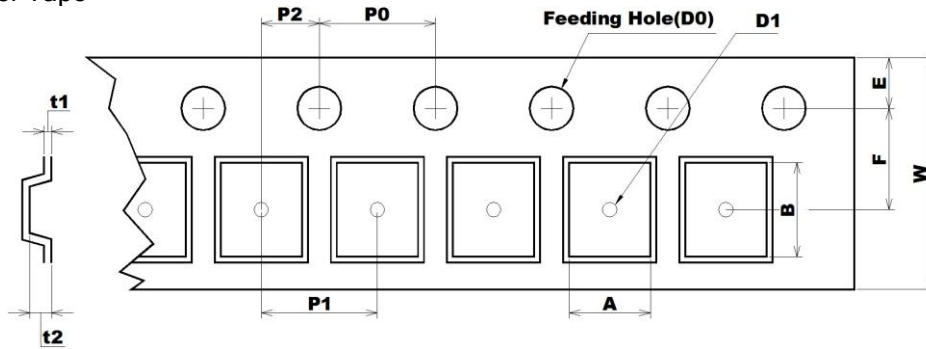


10 to 60% RH

11. PACKING

11-1. DIMENSIONS

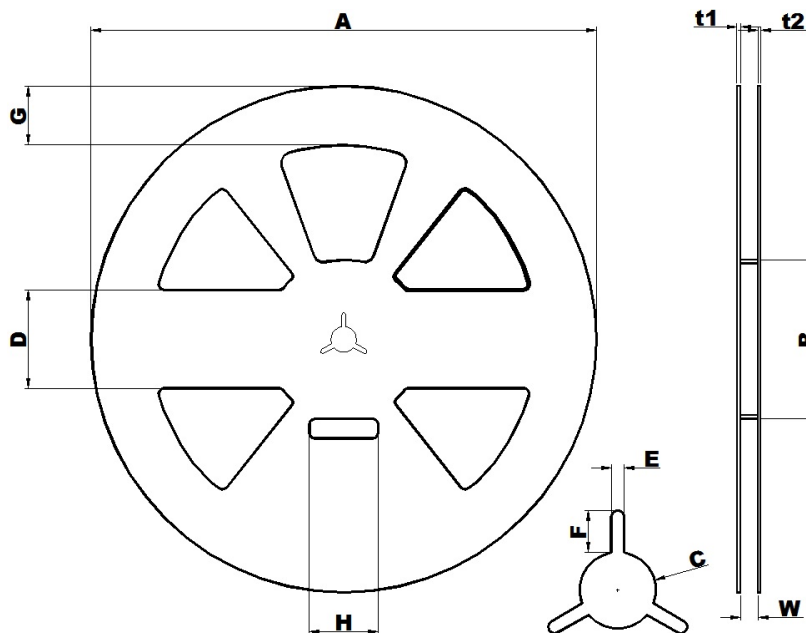
- Carrier Tape



[Unit: mm]

A	B	D0	D1	E	F	P0	P1	P2	t1	t2	W
1.30	1.60	Ø1.50	Ø0.60	1.75	3.50	4.00	4.00	2.00	0.25	0.70	8.00
0.05	0.05	0.10	MIN	0.10	0.05	0.10	0.10	0.05	0.05	0.05	0.10
-0.05	-0.05	0.00	-	-0.10	-0.05	-0.10	-0.10	-0.05	-0.05	-0.05	-0.10

- Reel



[Unit: mm]

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

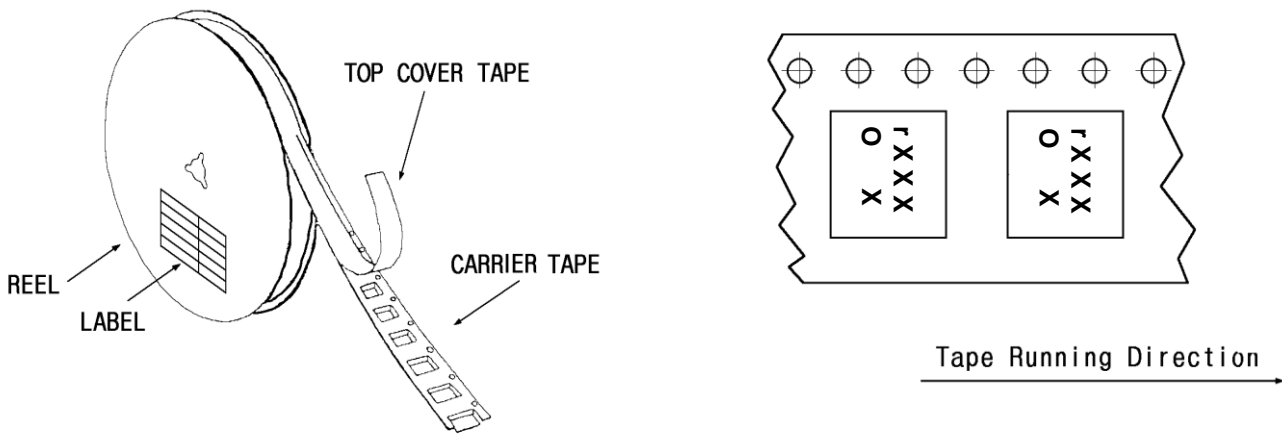
- The product shall be packed properly not to damaged during transportation and storage.

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.

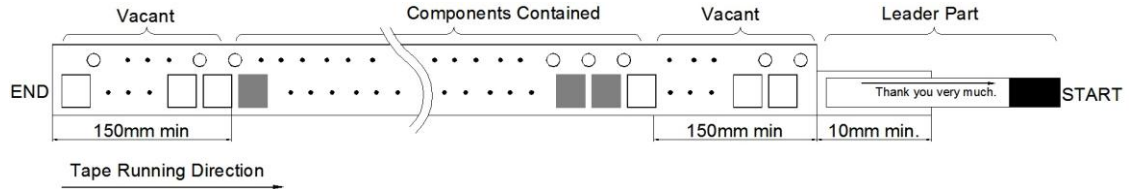


11-3-2. BAR CODE LABEL



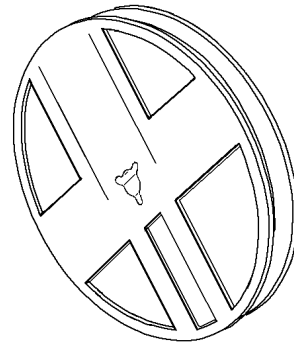
①	MODEL NAME BARCODE
②	Model Name
③	Reel number
④	Quantity / Marking

11-3-3. Leader part and vacant position specifications.

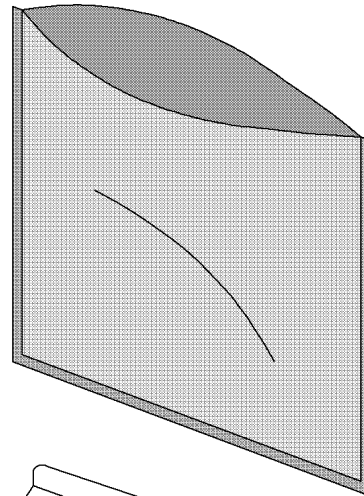


11-4. INNER BOX(Reel Packing) STRUCTURE

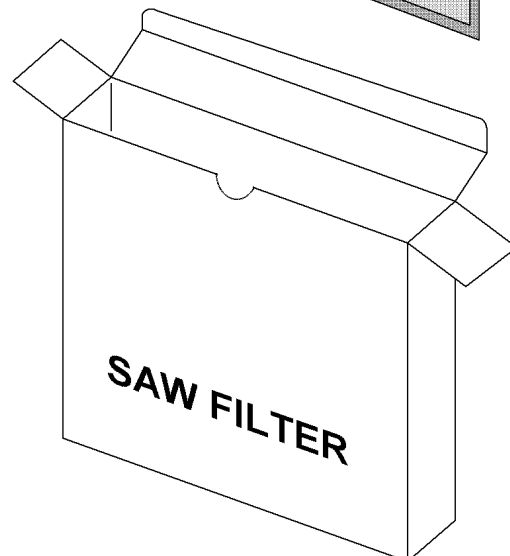
Material: Polycarbonate



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



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

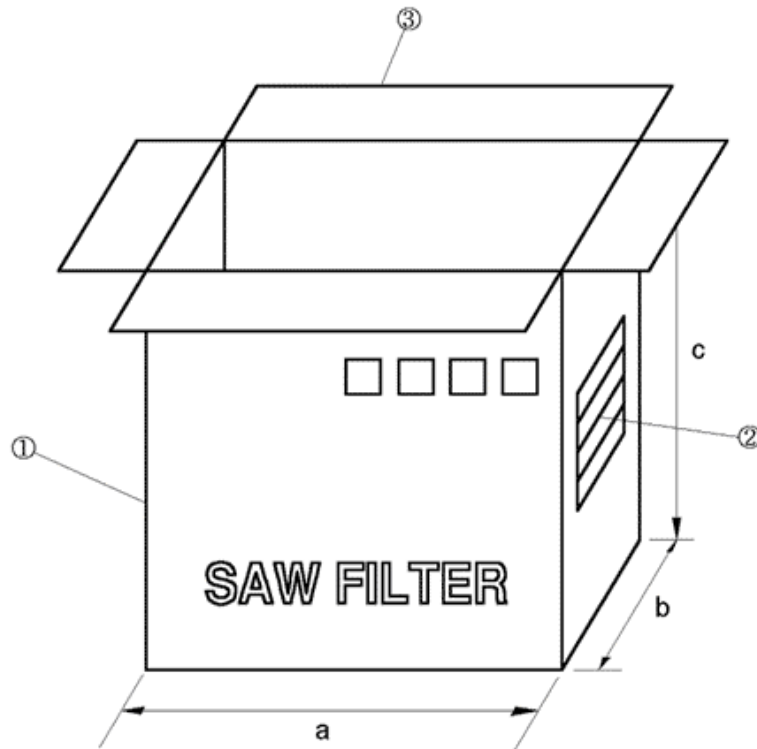




11-5. OUTER BOX STRUCTURE

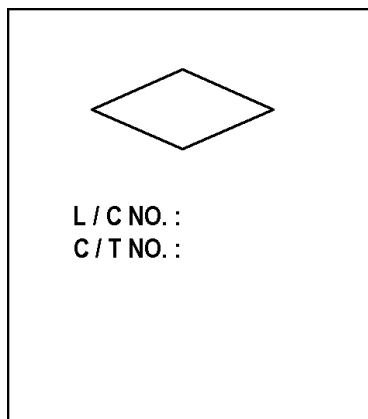
Material : Paper

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



SIDE ①

SIDE ②



MODEL	
Q'TY	EA
USER	
DATE	. .

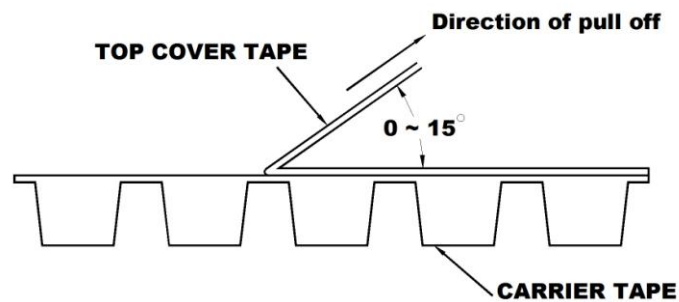
- SIDE is the same as front side.

## 12. TAPE SPECIFICATIONS

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

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

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



13. RoHS DATA



**Test Report** No. F690101/LF-CTSAYAA15-37174

Issued Date : 2015. 07. 20

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WISOL CO., LTD.  
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Osan-si, Gyeonggi-do  
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No. : AYAA15-37174  
 Product Name : SAW FILTER  
 Item No./Part No. : N/A  
 Buyer(s) : SAMSUNG  
 Received Date : 2015. 07. 15  
 Test Period : 2015. 07. 15 to 2015. 07. 20  
 Test Comments : By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.  
 Test Results : For further details, please refer to following page(s)

SGS Korea Co., Ltd.



Jeff Jang / Chemical Lab Mgr

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**Test Report** No. F690101/LF-CTSAYAA15-37174

Issued Date : 2015. 07. 20

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Sample No. : AYAA15-37174.001  
 Sample Description : SAW FILTER  
 Item No./Part No. : N/A  
 Materials : HTCC,GOLD,EPOXY,LT

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008 (Determination of Hexavalent Chromium by spot test/Colorimetric Method using 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 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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Sample No. : AYAA15-37174.001  
 Sample Description : SAW FILTER  
 Item No./Part No. : N/A  
 Materials : HTCC,GOLD,EPOXY,LT

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

**Halogen Content**

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to EN 14582, IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to EN 14582, 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 cm<sup>2</sup> sample surface area.

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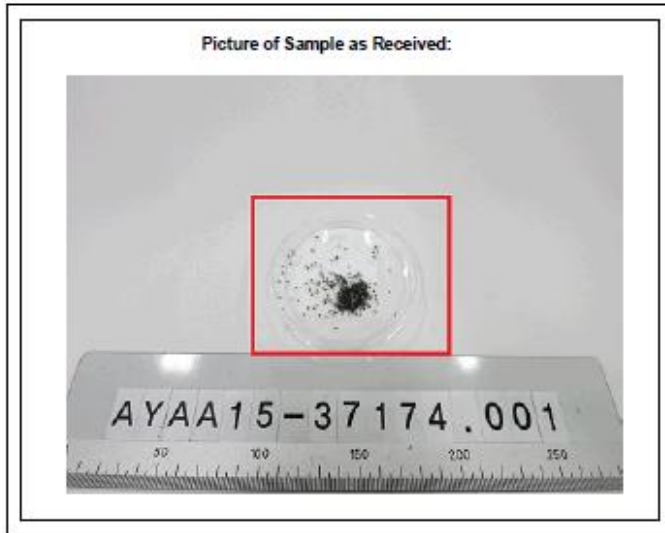
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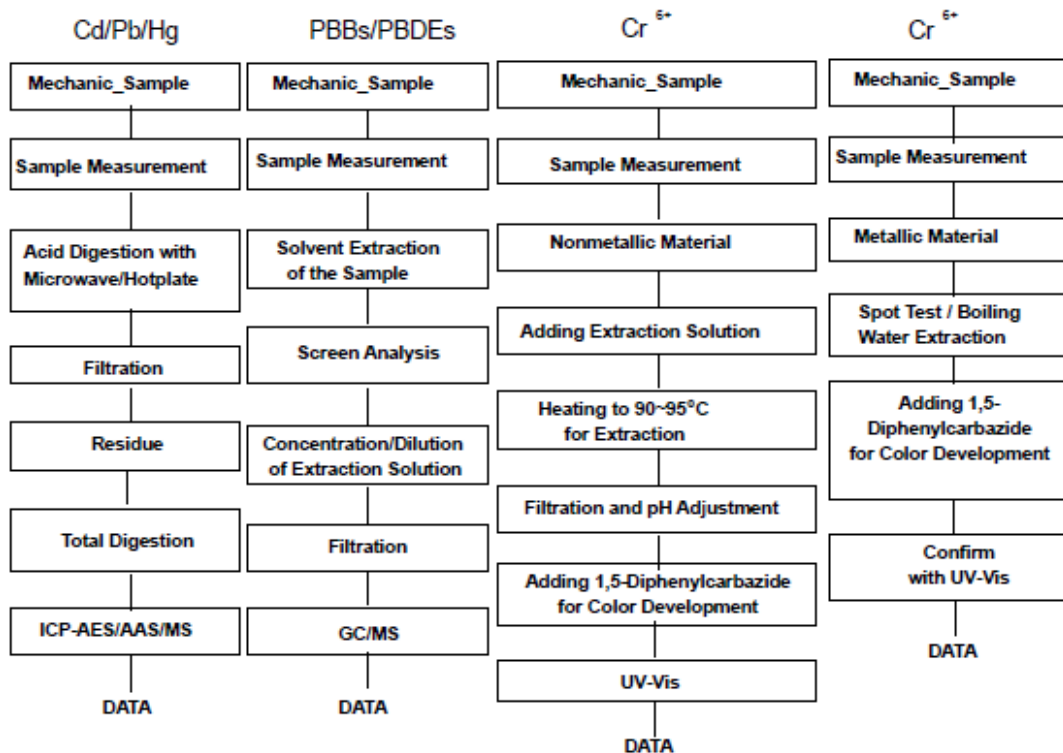


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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



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

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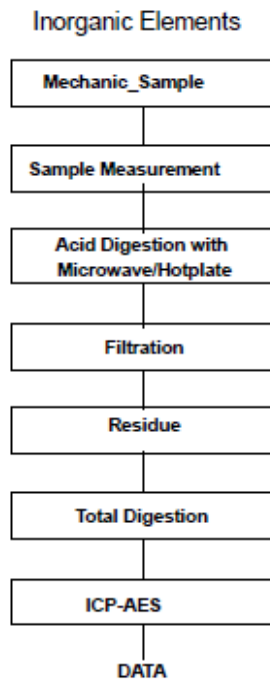


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Flow Chart for Inorganic Elements Testing



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.
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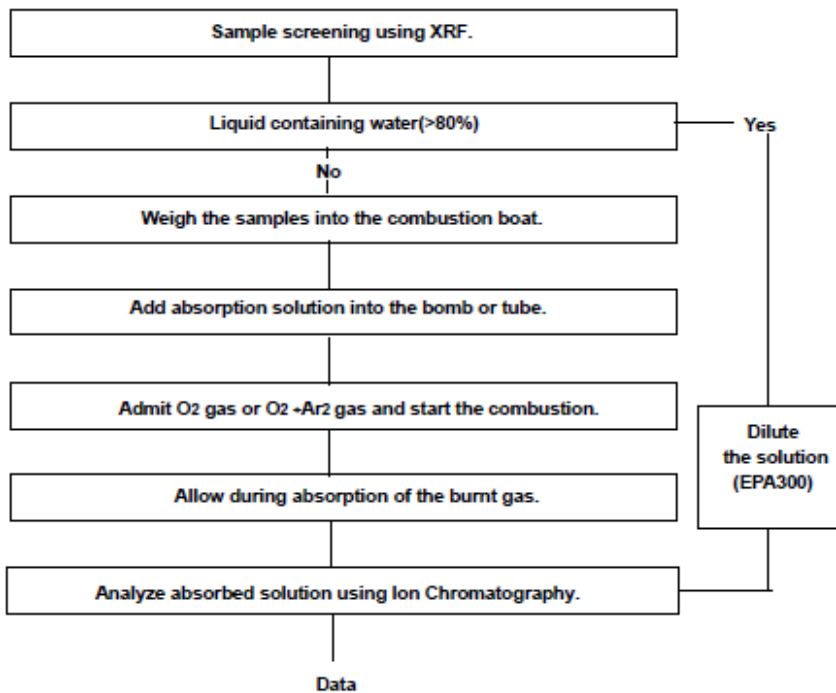


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Flow Chart for Halogen Test



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