



# SPECIFICATION

## Surface Acoustic Wave Filter

USER

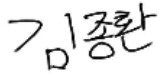


USER PART No.

WISOL PART No. **SFDG35CQC02**

DOC. No.

DATE March 13, 2018

REVISION 000

WISOL					
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## 1. REVISION HISTORY

000	March 13, 2018	All Page	Make specification
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## 2. DEFINITION

2-1. PART No.

**S F D G 35 C QC 02**

①      ②      ③      ④      ⑤      ⑥

No.	EXPLANATION
①	SAW Filter
②	Design Type
③	Center Frequency :2400MHz(2150 ~ 2600)
④	Input:50ohm,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 Filter

## 3. PRECAUTIONS

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

3-2. This is a hermetic device.

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

3-3. Ultrasonic cleaning shall be avoided.

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

3-5. This is an electrostatic sensitive device.

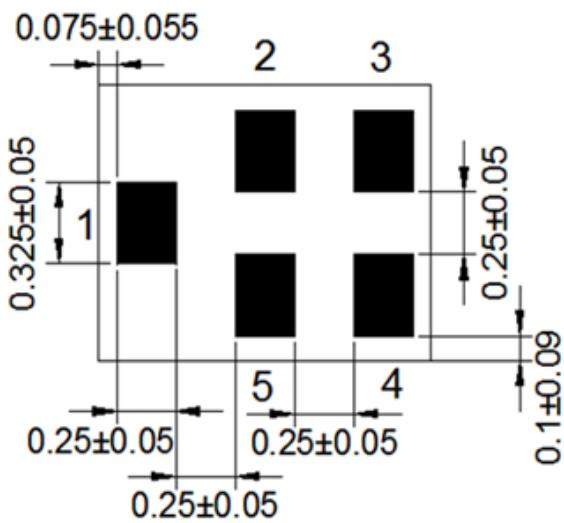
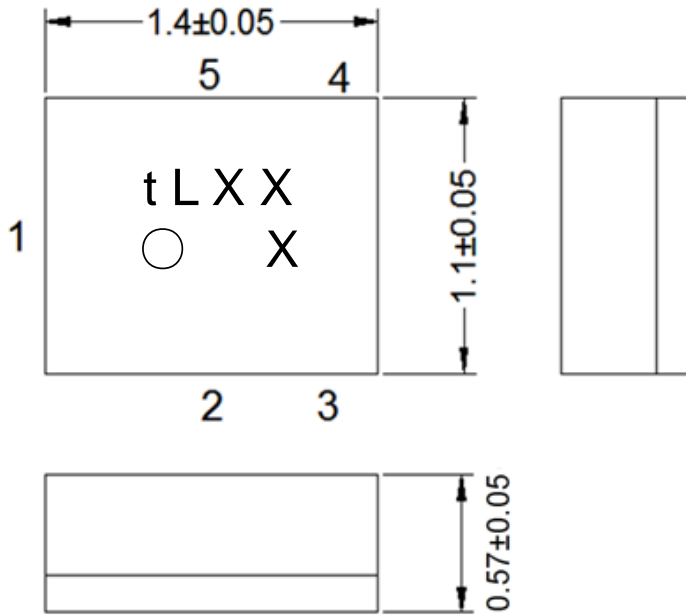
Please avoid static voltage during operation and storage.

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

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

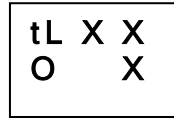
4. OUTLINE DRAWING & DIMENSIONS

[Unit: mm]



No.	Function
2, 3, 5	Ground
1	Unbalanced Input (Tx)
4	Unbalanced Output (ANT)

## 5. MARKING



### 5-1. A R X X X

- The 1<sup>st</sup> 2<sup>nd</sup> character 't L' indicates the model name of SAW Filter SFDG35CQC02.
- 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. ○

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

### 5-3. Marking : Laser Marking

## 6. PERFORMANCE

### 6-1. MAXIMUM RATINGS

CHARACTERISTICS	RATINGS	UNITS
DC Permissive Voltage	5	V
Maximum Input Power	28	dBm
Operating Temperature Range	- 30 ~ +85	°C
Storage Temperature Range	- 40 ~ +85	°C

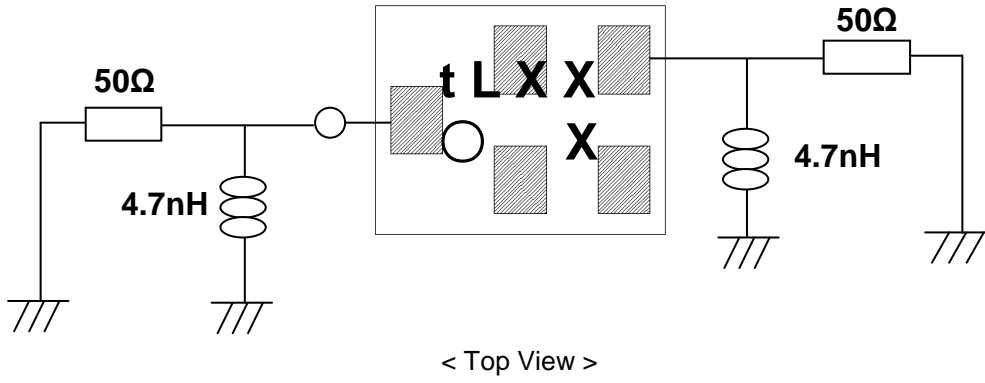
6-2. ELECTRICAL CHARACTERISTICS  
6-2-1. TABLE

Ta = - 30 ~ +85°C

\*1 PCB loss is de-embedded

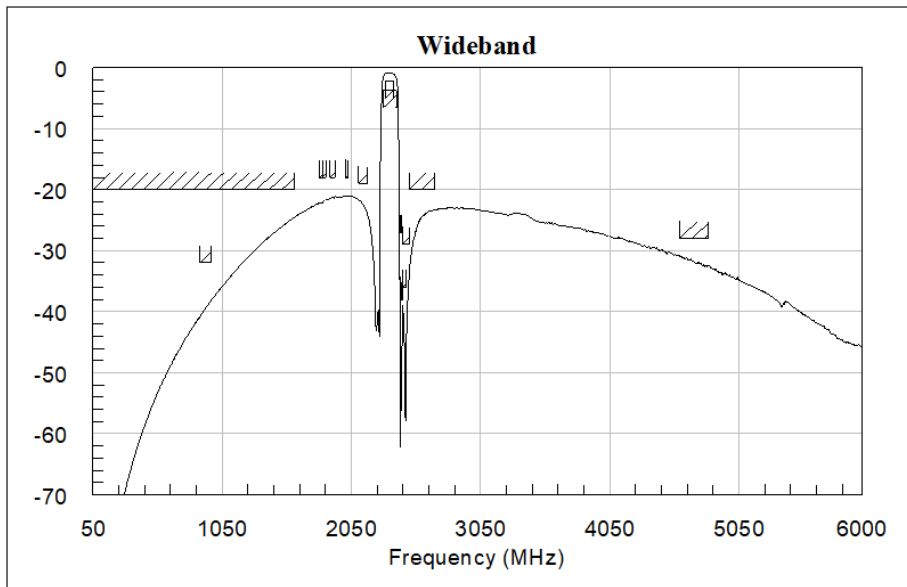
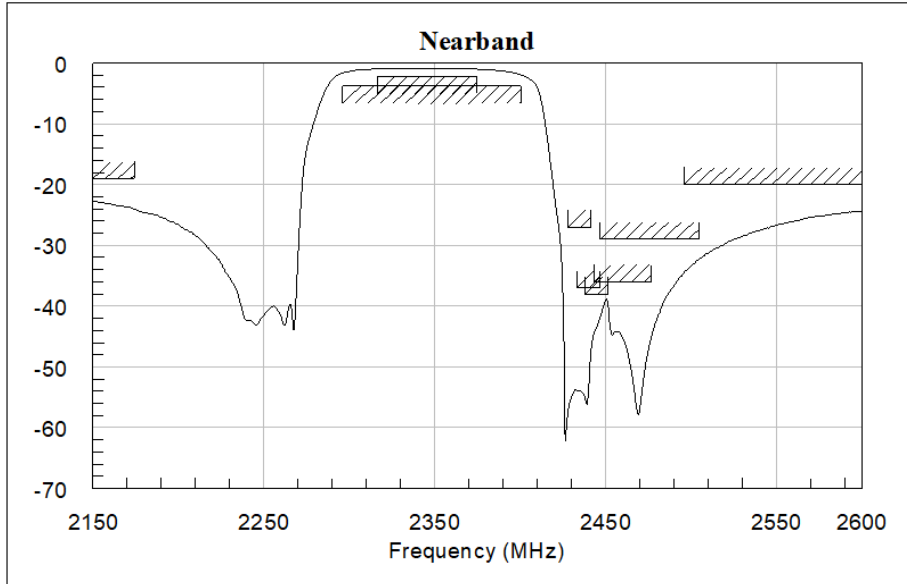
Item	CONDITION [MHz]	UNIT	RATING			Notes
			Min.	Typ.(25°C)	Max.	
Insertion Loss(*1)	2300 ~ 2400	dB	-	2.1	3.8	+25 to +85degC
	2300 ~ 2400	dB	-	2.1	4.5	-20 to 25degC
	2300 ~ 2400	dB	-	2.1	3.5	+23 to +27degC
	2320 ~ 2370	dB	-	1.1	2.2	
	2320 ~ 2370	dB	-	1.1	2.0	+23 to 27degC
Ripple Deviation	2300 ~ 2400	dB	-	1.1	3.7	
	2300 ~ 2400	dB		1.1	2.5	+23 to 27degC
VSWR	2300 ~ 2400	-	-	1.7	2.0	
Absolute Attenuation	10 ~ 1605.89	dB	20	24	-	
	880 ~ 960	dB	32	36	-	
	1805 ~ 1830	dB	18	22	-	
	1830 ~ 1850	dB	18	22	-	
	1880 ~ 1920	dB	18	22	-	
	2010 ~ 2025	dB	18	22	-	
	2110 ~ 2170	dB	19	23	-	
	2423 ~ 2441 (2432~2437)	dB <sub>INT</sub> (dB)	27 (27)	51	-	Ch5, +25 to +85degC
	2423 ~ 2441 (2432~2437)	dB <sub>INT</sub> (dB)	20 (20)	51	-	Ch5, -20 to +25degC
	2428 ~ 2446 (2437~2442)	dB <sub>INT</sub> (dB)	30 (30)	48	-	Ch6
	2428 ~ 2446 (2437~2442)	dB <sub>INT</sub> (dB)	37 (37)	48	-	Ch6, +23 to +27degC
	2433 ~ 2451 (2442~2447)	dB <sub>INT</sub> (dB)	37 (37)	44	-	Ch7
	2433 ~ 2451 (2442~2447)	dB <sub>INT</sub> (dB)	38 (38)	44	-	Ch7, +23 to +25deg
	2438 ~ 2481 (2447~2472)	dB <sub>INT</sub> (dB)	36 (36)	43	-	Ch8-13
	2481 ~ 2500	dB	29	33	-	B7/B38
2500 ~ 2690	dB	20	24	-		
4600 ~ 4800	dB	28	32	-		
Termination Impedance : Tx / ANT			50Ω (//4.7[nH]) / 50Ω (//4.7[nH])			

6-2-2. TEST FIXTURE



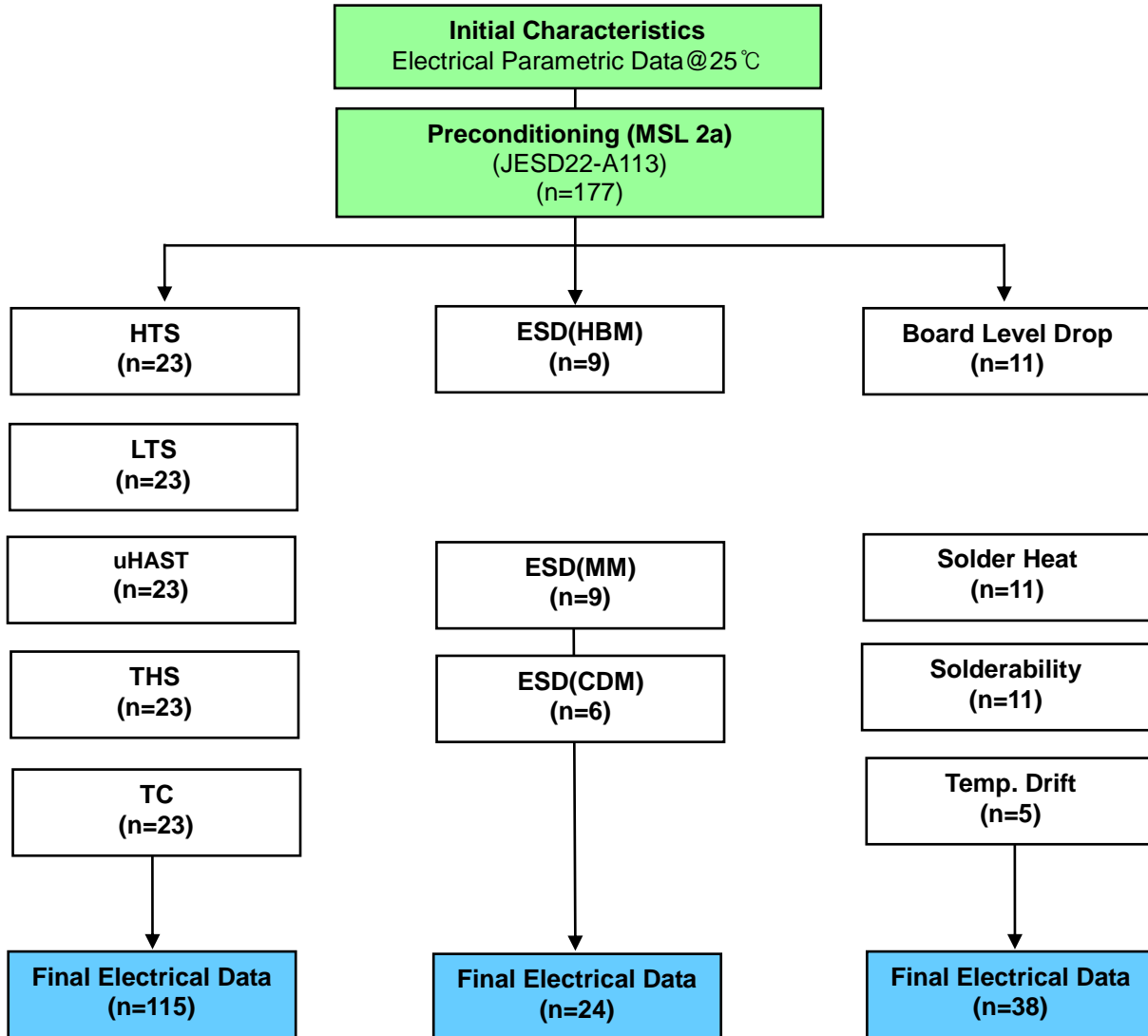


6-2-3. GRAPH



## 7. RELIABILITY

### 7-1. ENGINEERING SAMPLE FLOW CHART



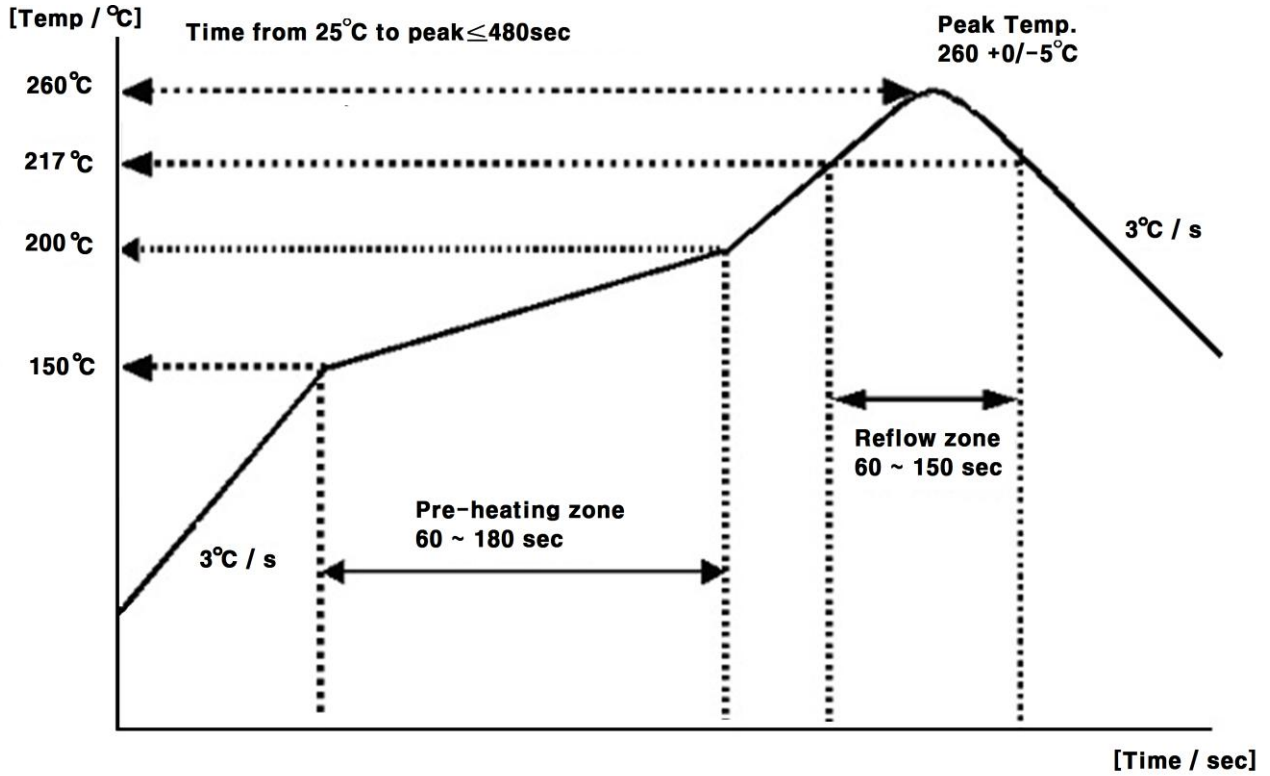
7-2. TEST ITEM & CONDITION

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

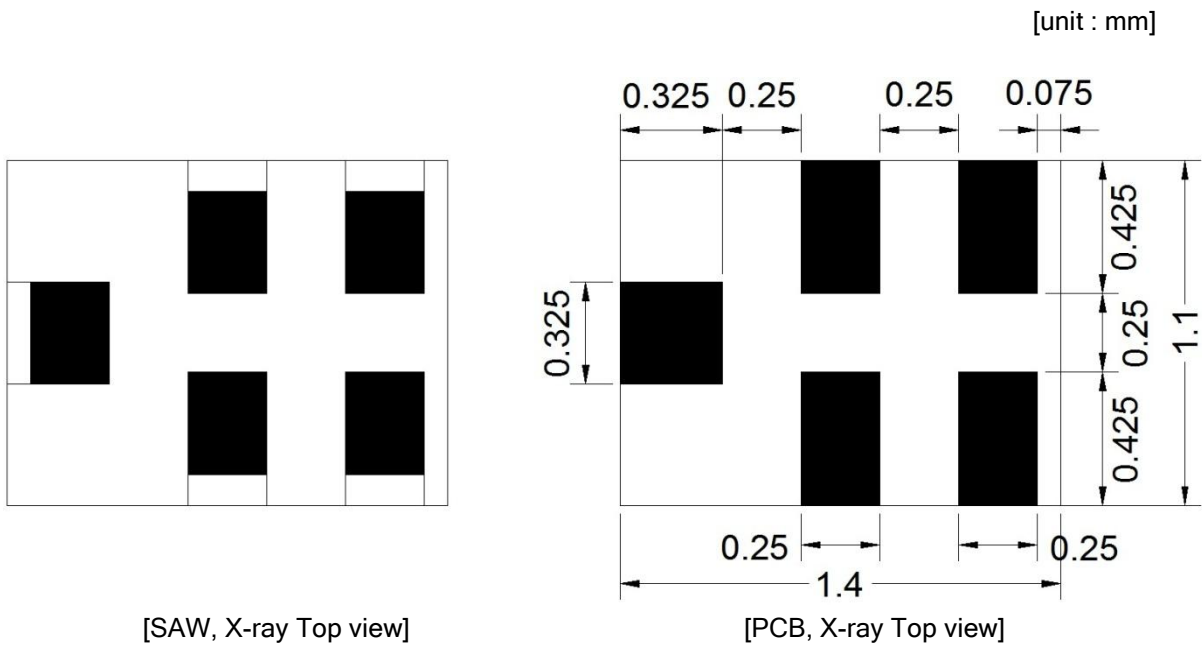


TEST ITEM	REMARK	TEST CONDITION	Duration
HTS (High Temperature Storage)	JESD22-A103	condition A 125(-0/+10)°C	1000hr
LTS (Low Temperature Storage)	JESD22-A119	A -40(-10/+0)°C	1000hr
uHAST (Unbiased HAST)	JESD22-A118	130°C /85% /33.3psi	96hr
THS (Temperature Humidity Storage)	JESD22-A101	85°C /85% RH	1000hr
TC (Temperature Cycle)	JESD22-A104	Condition B (-55°C /125°C)	500cycle
ESD(HBM)	JESD22-A114	250V or above	-
ESD(MM)	JESD22-A115	No spec but need data	-
ESD(CDM)	JESD22-C101	1.0KV or above	-
Board Level Drop Test	-	120cm(12times), 152cm(19times) total(31times) Steel floor	
Solder Heat Resistance	JESD22-B106C	260°C / 10sec Solder Pore Dipping	10sec
Solderability	JESD22-B102E	235°C/ 3sec Solder Pore Dipping	3sec
Temp Drift		-40°C → +25°C → +125°C	Per Conditions 2HR

### 8. REFLOW CONDITION



### 9. RECOMMENDED PCB DIMENSIONS



## 10. CAUTION

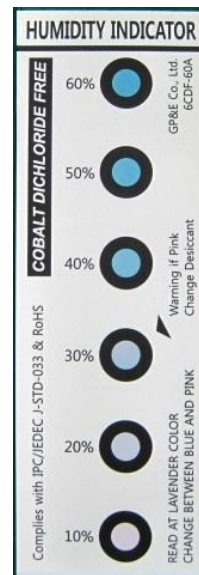
### Moisture Sensitivity Device Caution (MSL LEVEL=2a)

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)

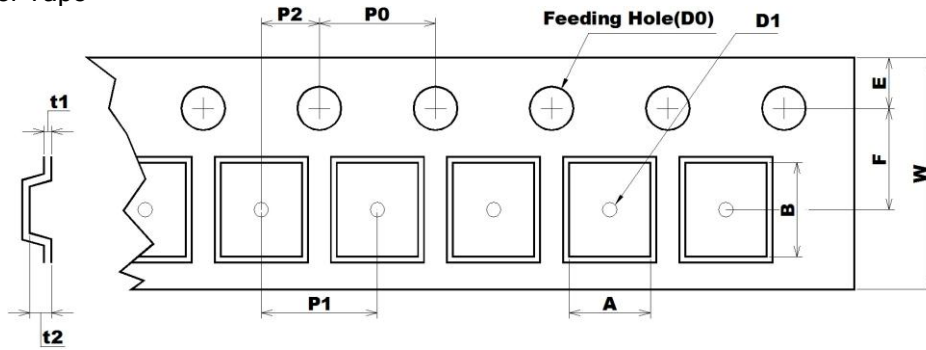


10 to 60% RH

### 11. PACKING

#### 11-1. DIMENSIONS

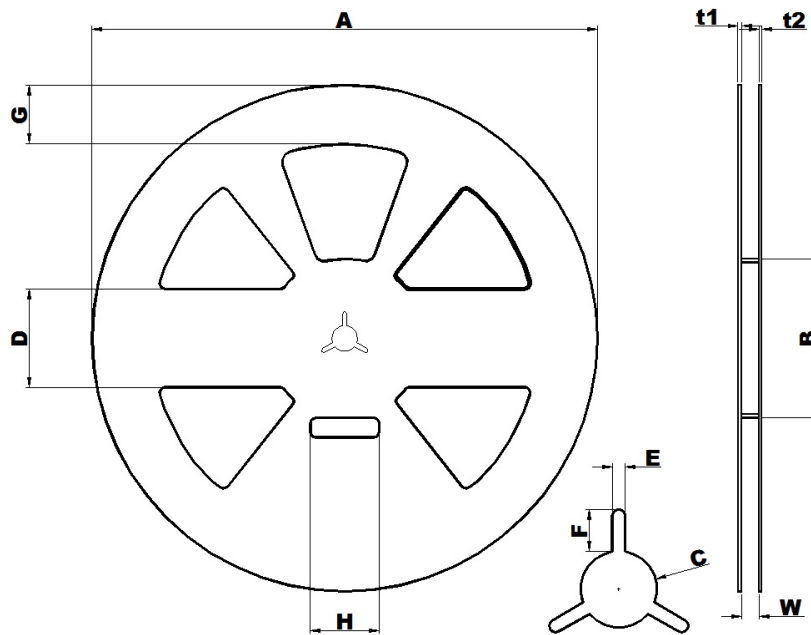
- Carrier Tape



[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

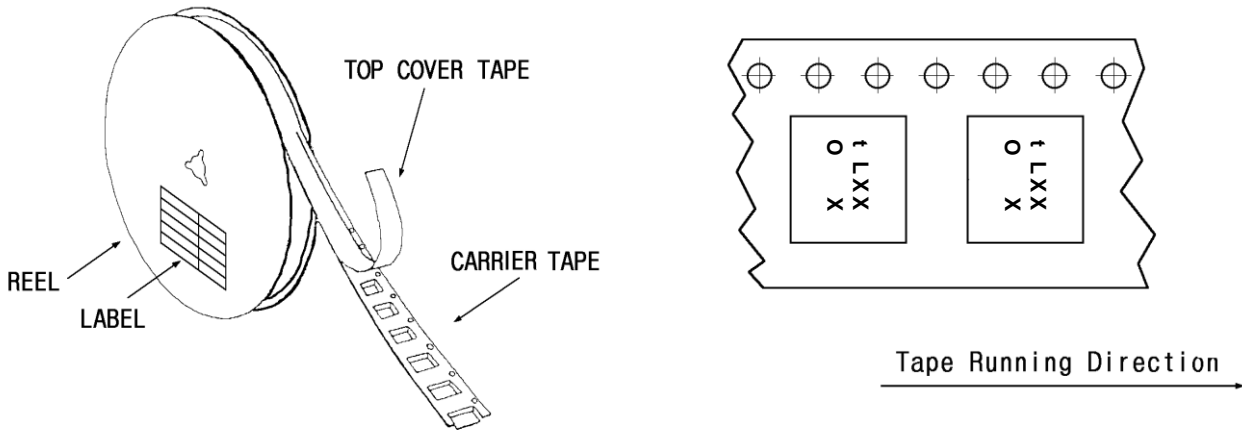
- The product shall be packed properly not to damaged during transportation and storage.

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.

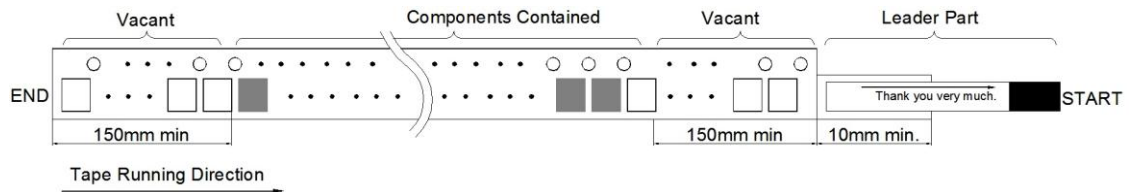


11-3-2. BARCODE LABEL



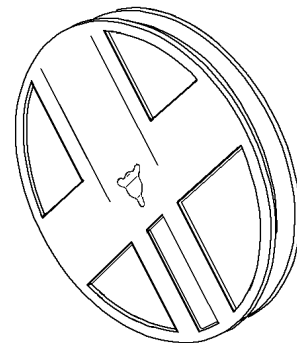
①	MODEL NAME BARCODE
②	Model Name
③	Reel number
④	Quantity / Marking

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

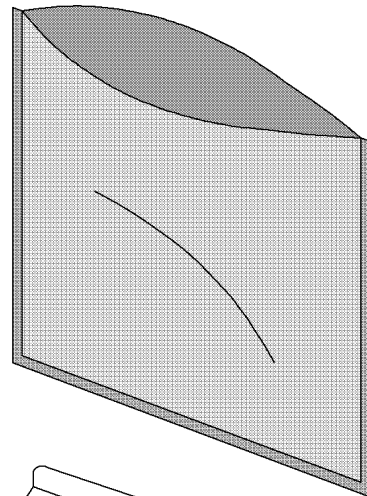


11-4. INNER BOX(Reel Packing) STRUCTURE

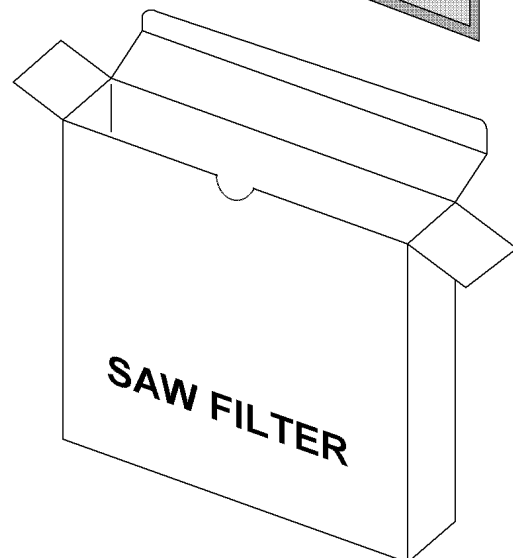
Material: Polycarbonate



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



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

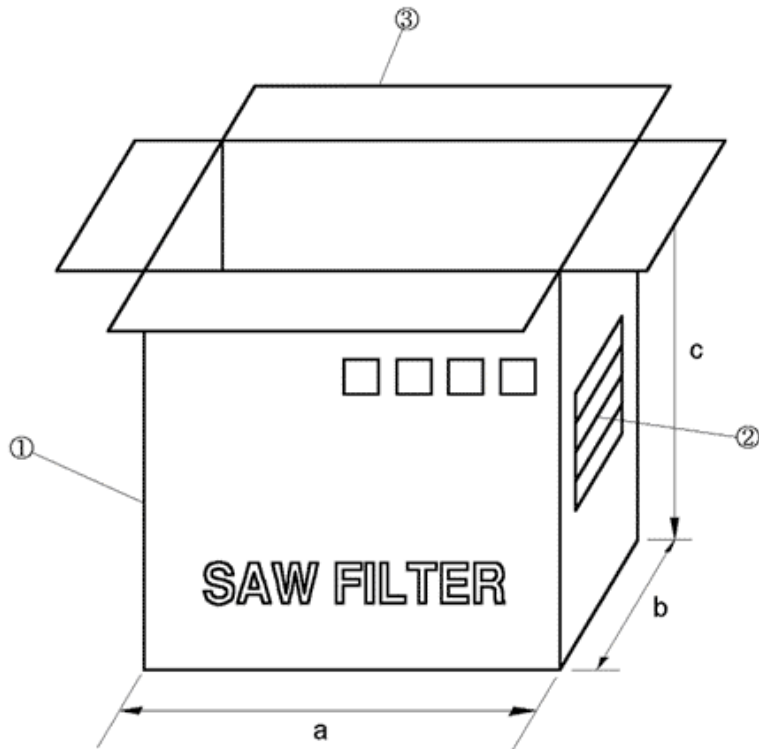




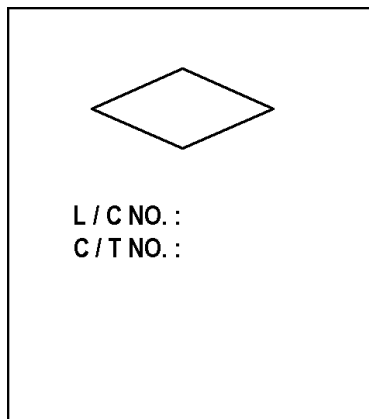
11-5. OUTER BOX STRUCTURE

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	. .

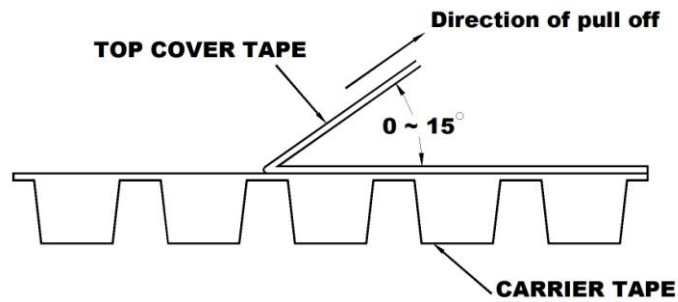
- SIDE is the same as front side.

## 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-CTSAYAA17-25974

Issued Date : 2017. 05. 10

Page 1 of 8


WISOL CO., LTD.  
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Korea



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

SGS File No. : AYAA17-25974  
Product Name : SAW FILTER  
Item No./Part No. : N/A  
Buyer(s) : SAMSUNG  
Received Date : 2017. 05. 02  
Test Period : 2017. 05. 02 to 2017. 05. 10  
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-CTSAYAA17-25974

Issued Date : 2017. 05. 10

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Sample No. : AYAA17-25974.001  
 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 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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F401 Version3

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**Test Report** No. F690101/LF-CTSAYAA17-25974

Issued Date : 2017. 05. 10

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Sample No. : AYAA17-25974.001  
 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
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (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) \* = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.  
 b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.  
 c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.

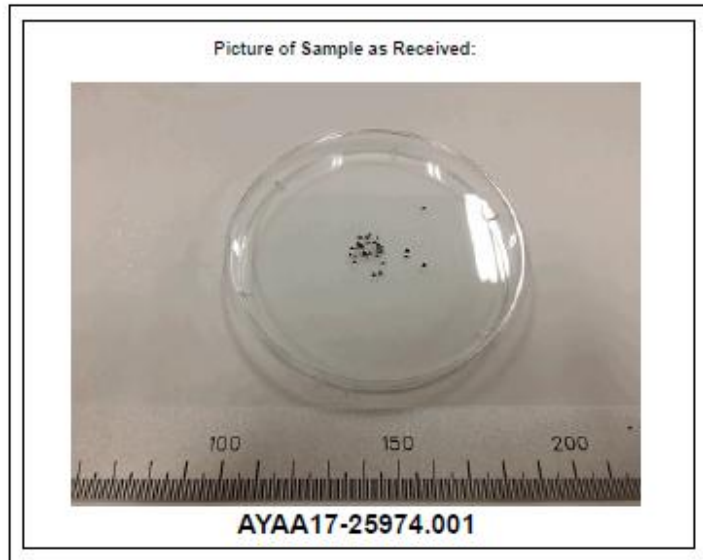
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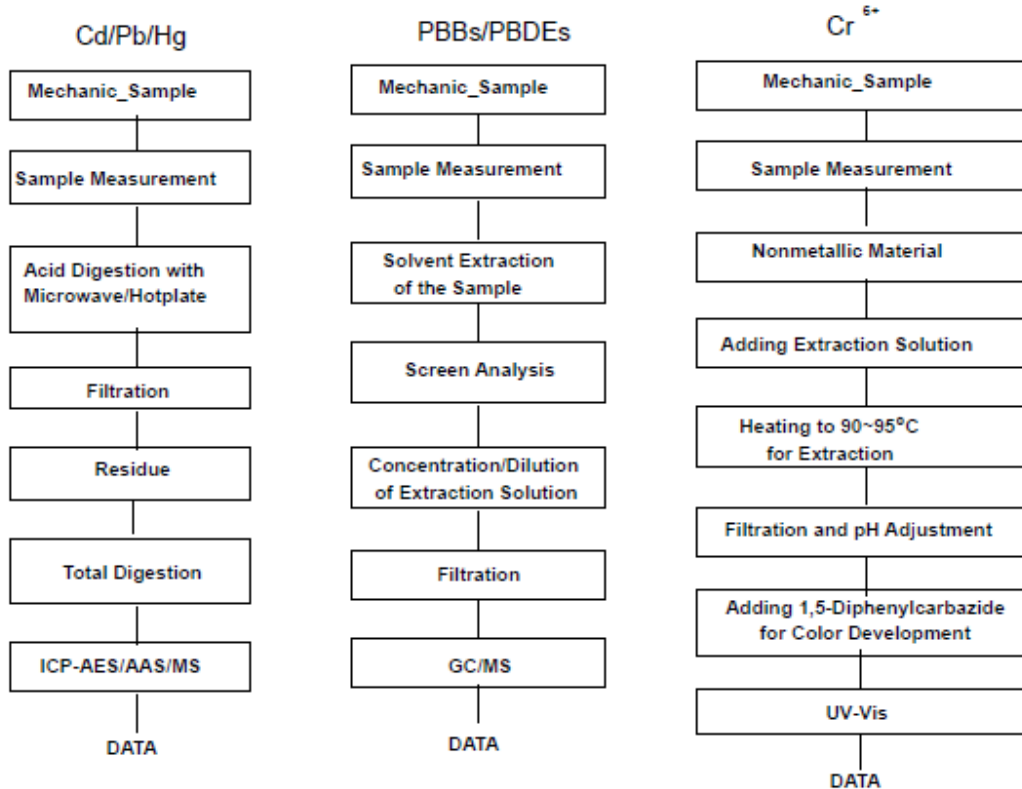


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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



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

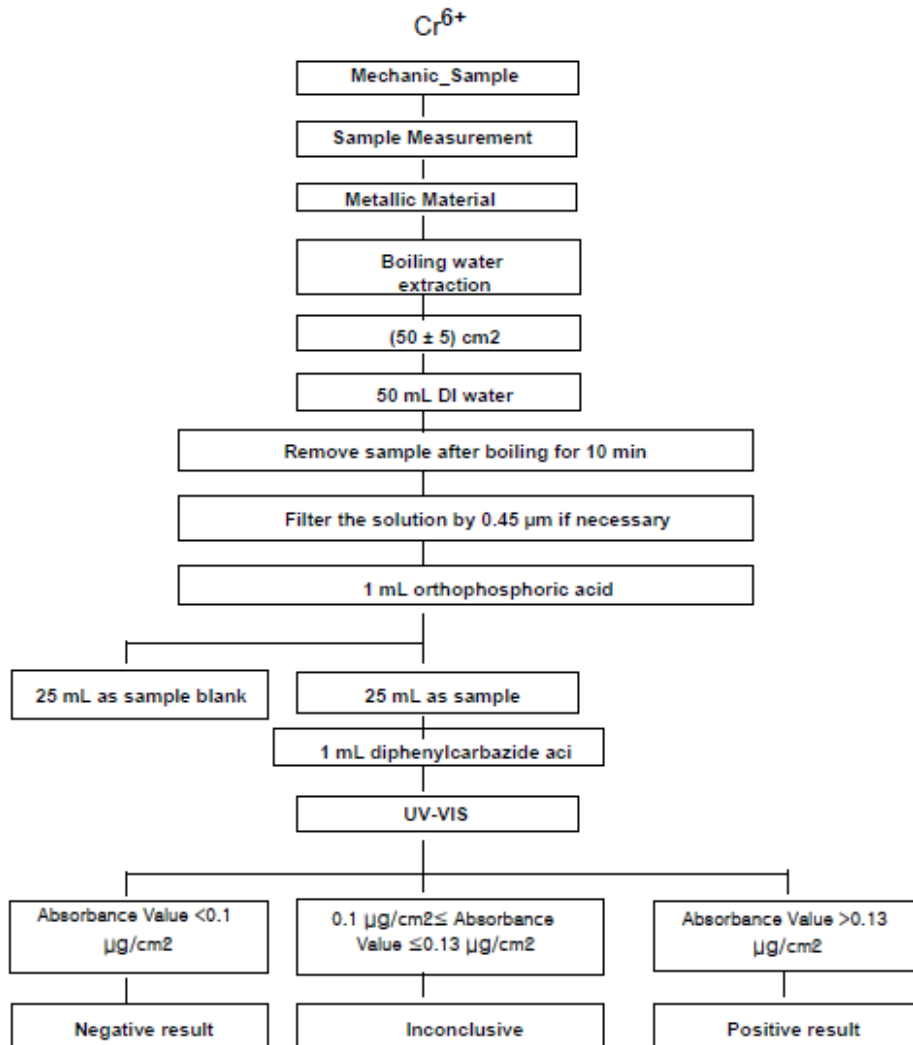
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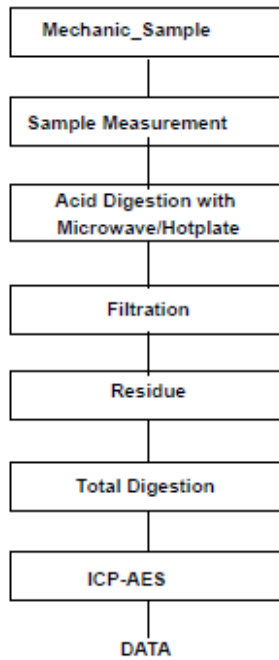
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Flow Chart for Inorganic Elements Testing

Inorganic Elements



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