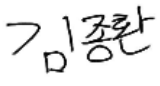
SPECIFICATION

Surface Acoustic Wave Filter

USER	
USER PART No.	
WISOL PART No.	SFDG45EA402
DOC. No.	SMS-51-L-SFT-FX-111
DATE	Oct 27, 2017
REVISION	000

WISOL					
ISSUED BY	Kim, Jong-Hwan 	APPROVED BY (R&D)	Byun, Kyung-Su 	APPROVED BY (QC)	Hong, Sang-Dea 
User					
ISSUED BY		CHECKED BY		APPROVED BY	

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

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1. REVISION HISTORY

000	Oct 27, 2017	All Page	Make specification

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2. DEFINITION

2-1. PART No.

S F D G 4 5 E A 4 0 2

① ② ③ ④ ⑤ ⑥

No.	EXPLANATION
①	SAW Filter
②	Design Type
③	Center Frequency : 2442.0MHz(2401 ~ 2483)
④	Input:50ohm,Output:50ohm
⑤	Package size: 1.1×0.9mm^2
⑥	Design Revision (02 : Molding Type)

2-2. APPLICATION : Wi-Fi B7/B40 Co-existence

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.

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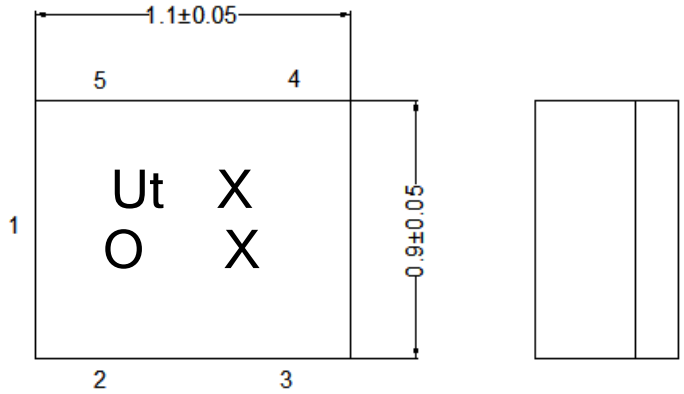
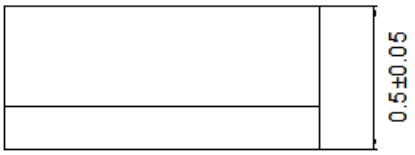
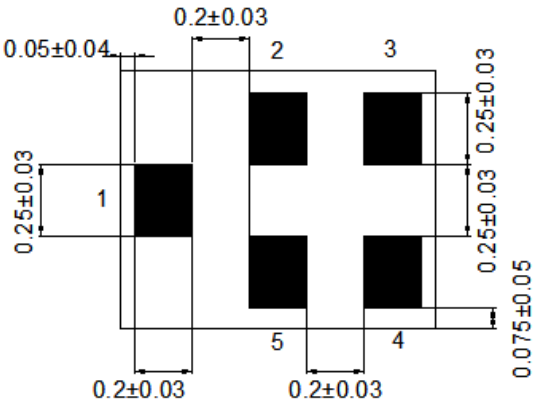
4. OUTLINE DRAWING & DIMENSIONS

[Unit: mm]







No.	Function
2,3,5	Ground
1	Unbalanced Input
4	Unbalanced Output

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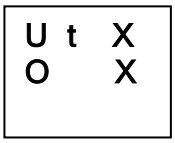
5. MARKING



5-1. U t X X X

- The 1st 2nd character 'Ut' indicates the model name of SAW Filter SFDG45EA402.
- The 3rd character 'X' indicates the year and the month of manufacture..

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

※ This rotates by the 3 years.

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

5-2. ○

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

5-3. Marking : Laser Marking

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6. PERFORMANCE

6-1. MAXIMUM RATINGS

CHARACTERISTICS	RATINGS	UNITS	NOTES
DC Permissive Voltage	5	V	
Maximum Input Power	24	dBm	
Operating Temperature Range	−30 ~ +85	℃	
Storage Temperature Range	−40 ~ +85	℃	

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6-2. ELECTRICAL CHARACTERISTICS

6-2-1. TABLE

Ta = －30 ~ +85℃

Item	FREQUENCY RANGE [MHz]	UNIT	SPECIFICATION			Note
			Min.	Typ. (25degC)	Max.	
Insertion Loss	2401 ~ 2483 (ch1~ch13) 2406~2478 (ch2~ch12)	dB_{INT}	-	1.4 1.2	2.3 2.1	Ch1~13 18MHz BW Ch2~12 18MHz BW
Inband Ripple	2401 ~ 2483	dB	-	1.2	3.7	Any 18MHz
Input VSWR	2403 ~ 2481	-	-	1.6	2.2	
Output VSWR	2403 ~ 2481	-	-	1.6	2.2	
Attenuation	10 ~ 1559	dB	24	27	-	
	1559 ~ 1606	dB	24	27	-	
	1710 ~ 1785	dB	23	26	-	
	1805 ~ 1880	dB	23	26	-	
	1850 ~ 1990	dB	23	26	-	
	2110 ~ 2170	dB	24	27	-	
	2302.5 ~ 2367.5	dB_{INT}	27	31	-	Any 4.5MHz
	2370.5 ~ 2377.5	dB_{INT}	6	37	-	Any 4.5MHz
	2496 ~ 2501	dB_{INT}	5	27	-	+23 to +27deg.C, Any 4.5MHz
	2500 ~ 2505	dB_{INT}	28	37	-	+23 to +27deg.C, Any 4.5MHz
	2500 ~ 2505	dB_{INT}	8	37	-	Any 4.5MHz
	2507.5 ~ 2687.5	dB_{INT}	26	30	-	Any 4.5MHz
	2555 ~ 2655	dB	27	31	-	
	2620 ~ 2690	dB	26	30	-	
	2690 ~ 6000	dB	26	29		
Termination Impedance		Input: Unbalanced 50 Ohm // 11 nH Output: Unbalanced 50Ohm // 7 nH				

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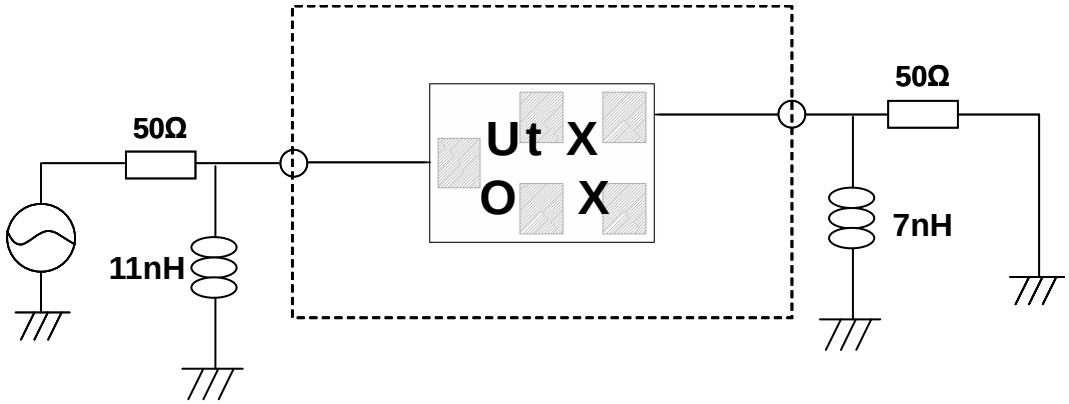
6-2-2. TEST FIXTURE



[X–Ray Top View]

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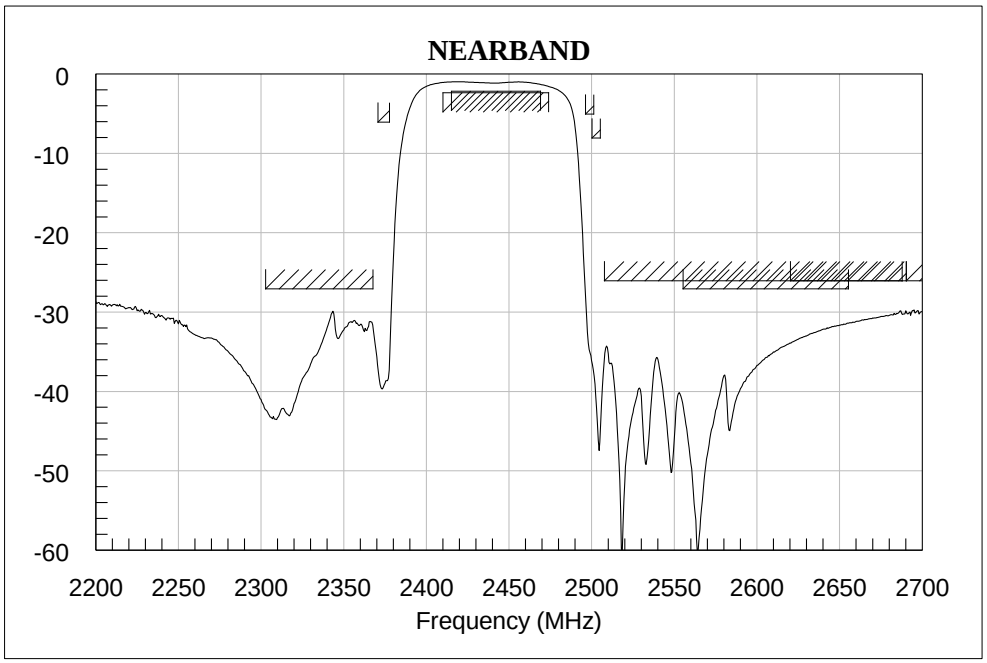
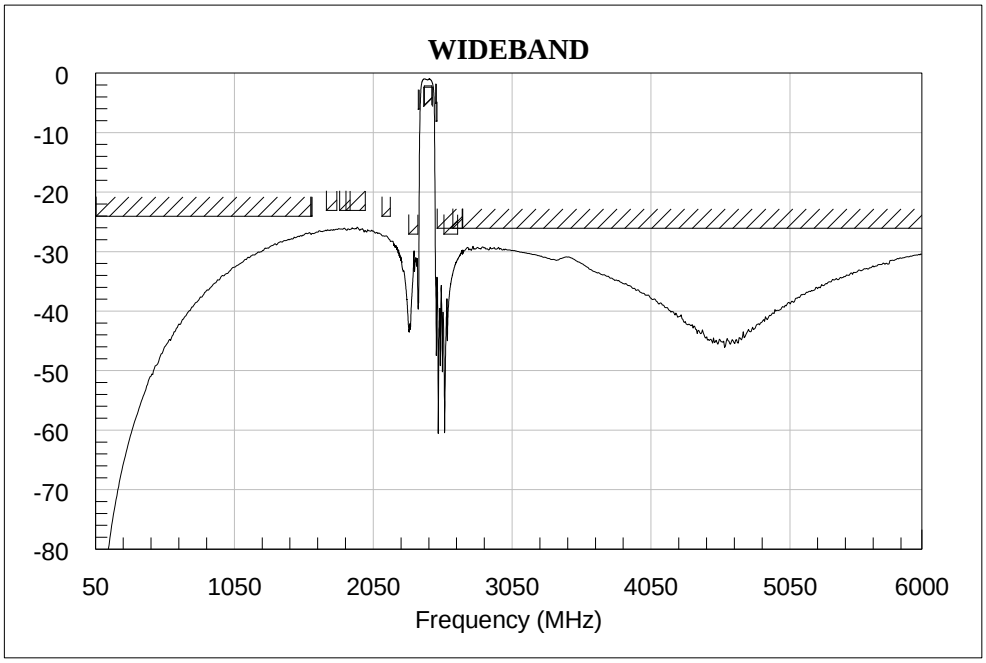
6-2-3. GRAPH





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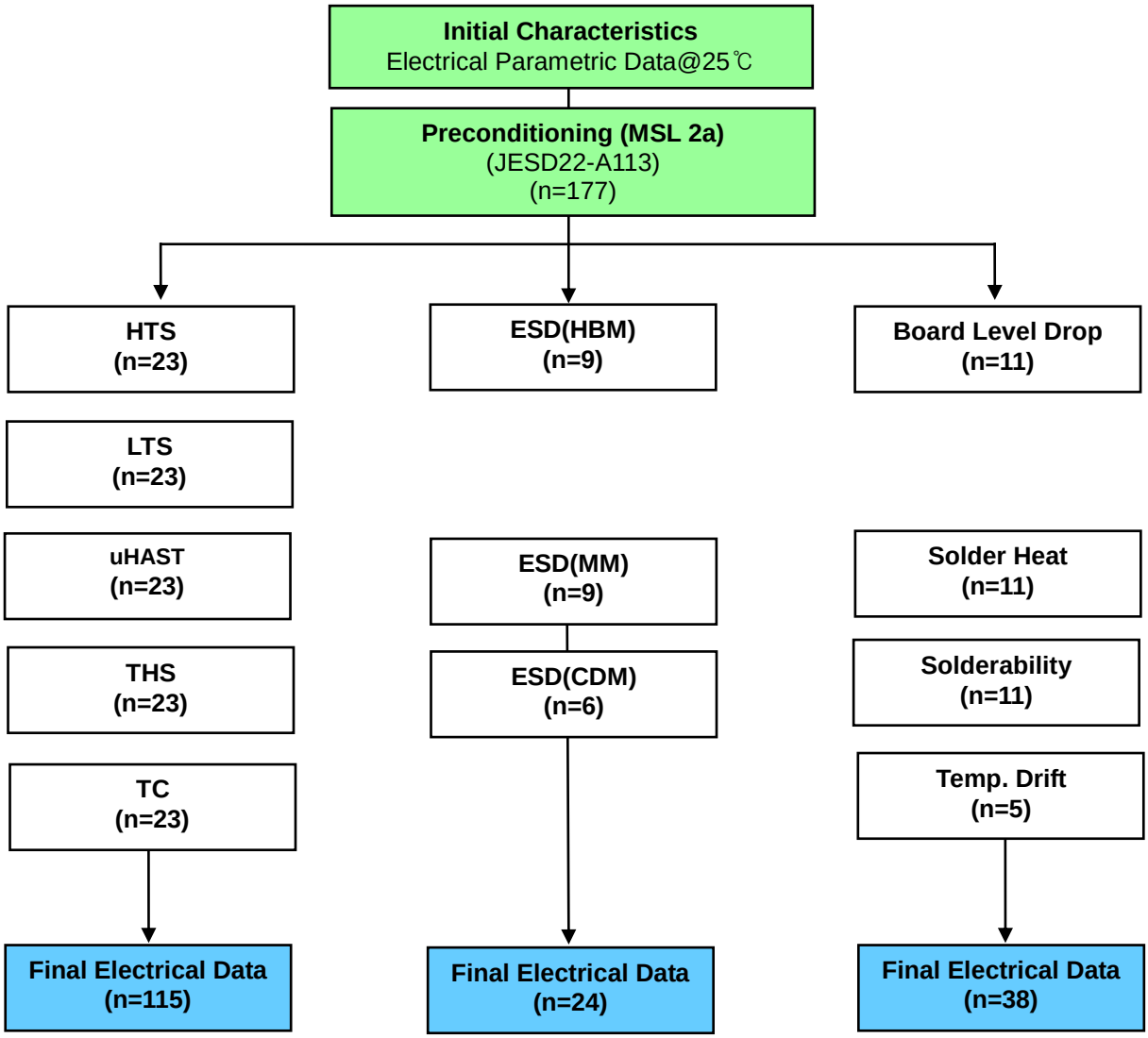
7. RELIABILITY

7-1. ENGINEERING SAMPLE FLOW CHART



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7-2. TEST ITEM & CONDITION

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

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

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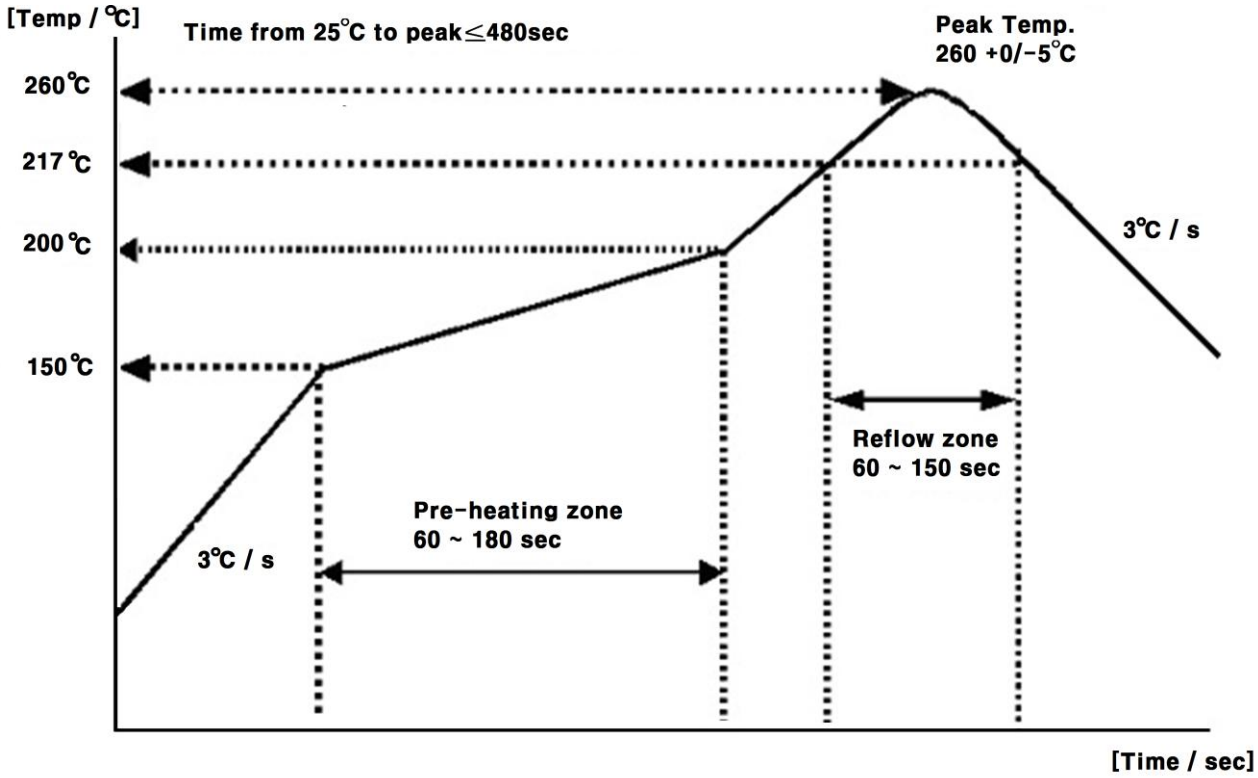
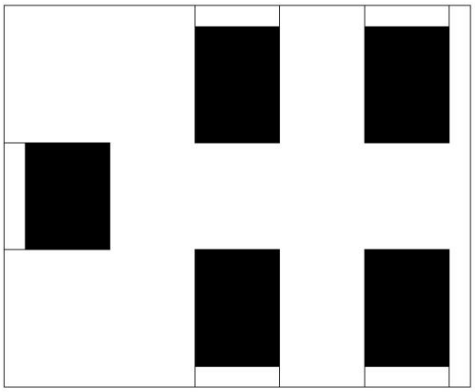
8. REFLOW CONDITION

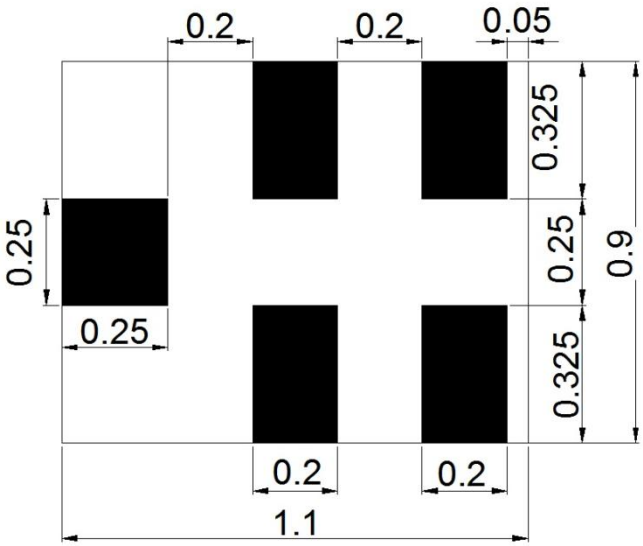


9. RECOMMENDED PCB DIMENSIONS

[unit : mm]



[SAW, X-ray Top view]



[PCB, X-ray Top view]

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10. CAUTION

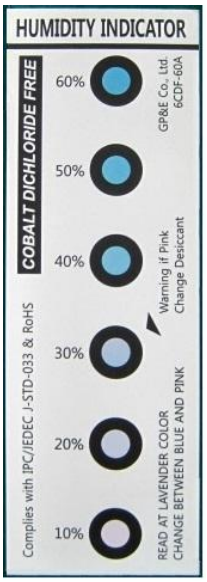
Moisture Sensitivity Device Caution (MSL LEVEL=2a)

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

Note : Level and body temperature defined by IPC/JEDEC J-STD-020

Aluminum Pack (310mmX370mm)

HIC(Humidity Indication Card)



10 to 60% RH

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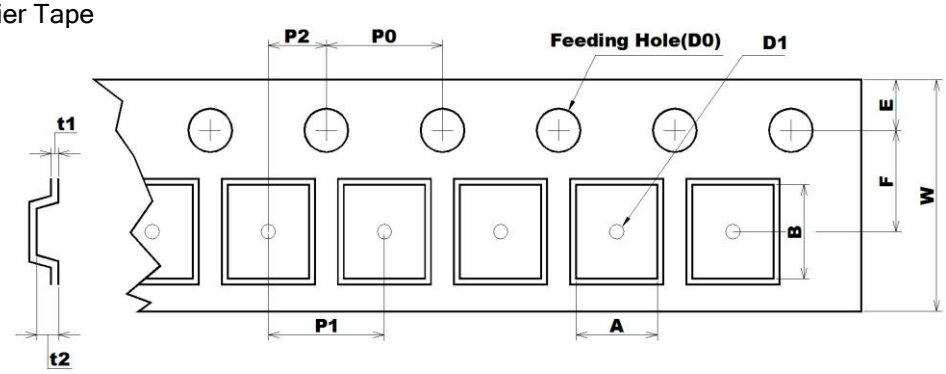
11. PACKING

11-1. DIMENSIONS

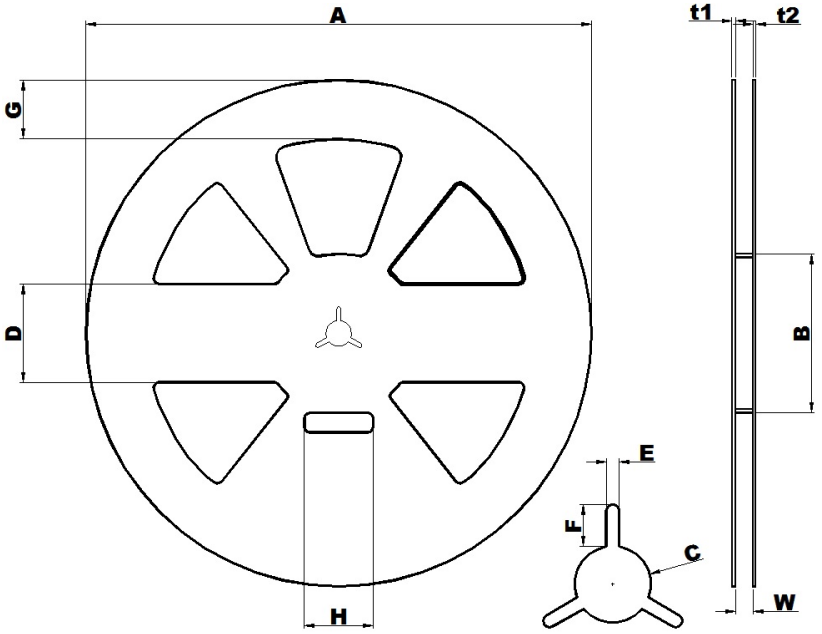
- Carrier Tape



[Unit: mm]

A	B	D0	D1	E	F	P0	P1	P2	t1	t2	W
1.08 ±0.05	1.23 ±0.05	Ø1.50 ±0.10	Ø0.50 ±0.01	1.75 ±0.10	3.50 ±0.05	4.00 ±0.05	4.00 ±0.05	2.00 ±0.05	0.23 ±0.05	0.70 ±0.05	8.00 ±0.30
		−0.05		−0.10	−0.05	−0.05	−0.05	−0.05	−0.05	−0.05	−0.10

- Reel



[Unit: mm]

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

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

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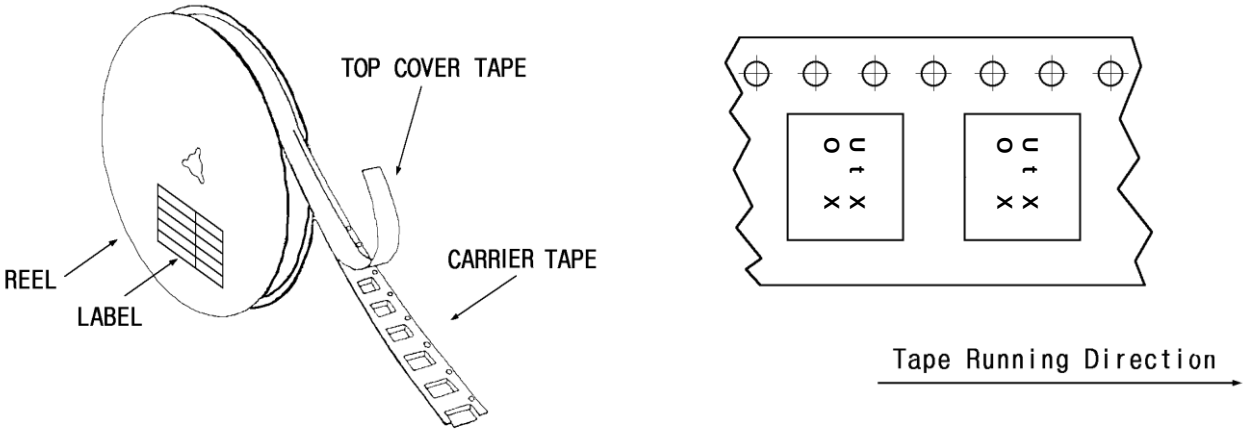
11-2. REELING QUANTITY
10 inch reel : 10,000 pcs/reel

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

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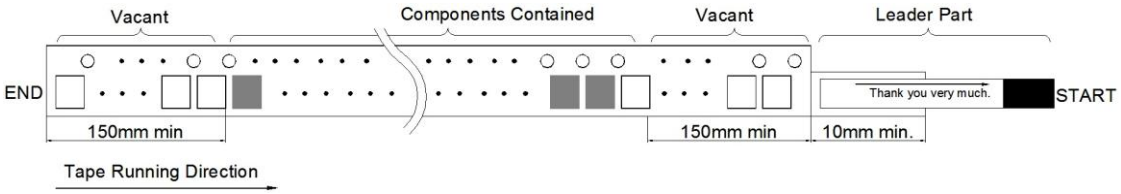
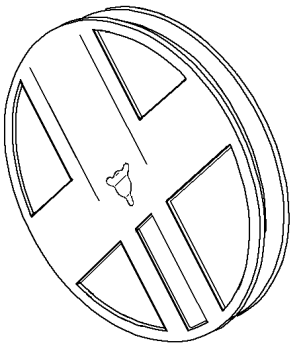
1-3-3. Leader part and vacant position specifications.

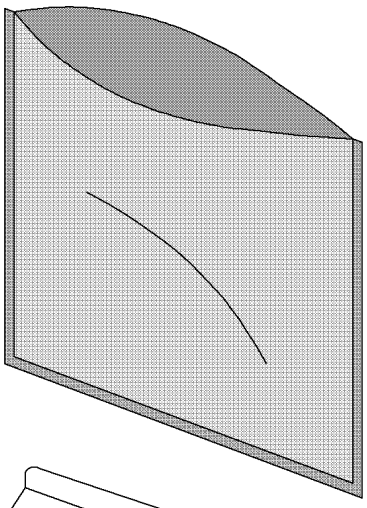


11-4. INNER BOX(Reel Packing) STRUCTURE

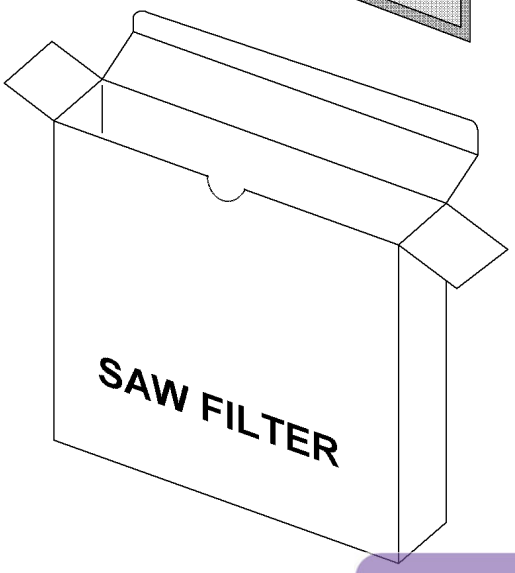
Material: Polycarbonate



Material : Polyethylene + Aluminium
Size : 310×370mm^2



Material : Paper
Size: (D)260×(W)37×(H)265mm^3



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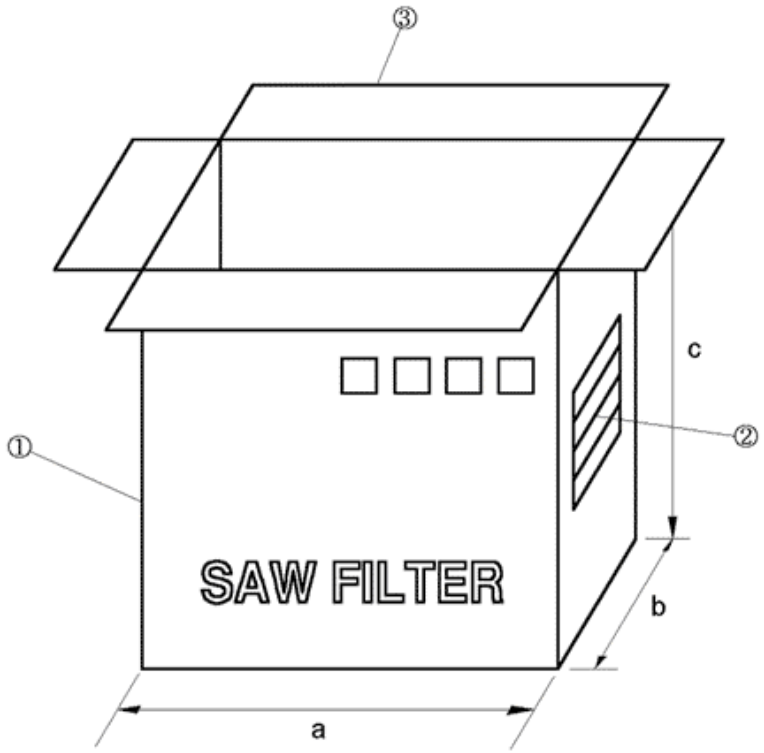
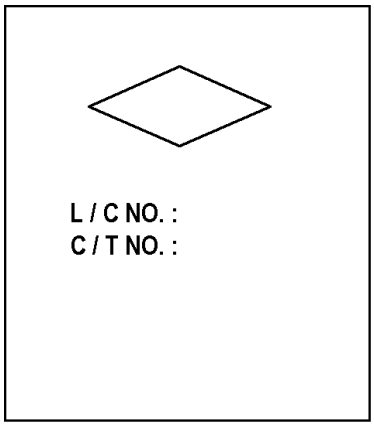
11-5. OUTER BOX STRUCTURE

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.

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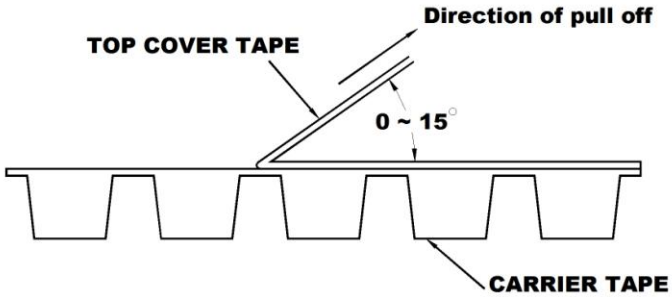
12. TAPE SPECIFICATIONS

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



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13. RoHS DATA

SGS

Test Report No. F690101/LF-CTSAYAA17-25974 Issued Date : 2017. 05. 10 Page 1 of 8

WISOL CO., LTD.
28-40, Gajangsaneopdong-ro
Osan-si, Gyeonggi-do
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 Page 2 of 8

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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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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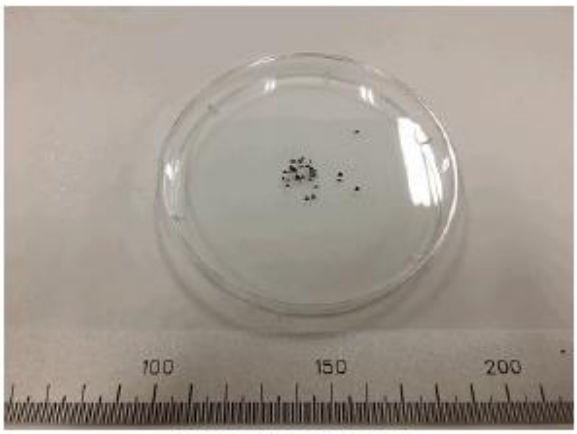
Picture of Sample as Received:



AYAA17-25974.001

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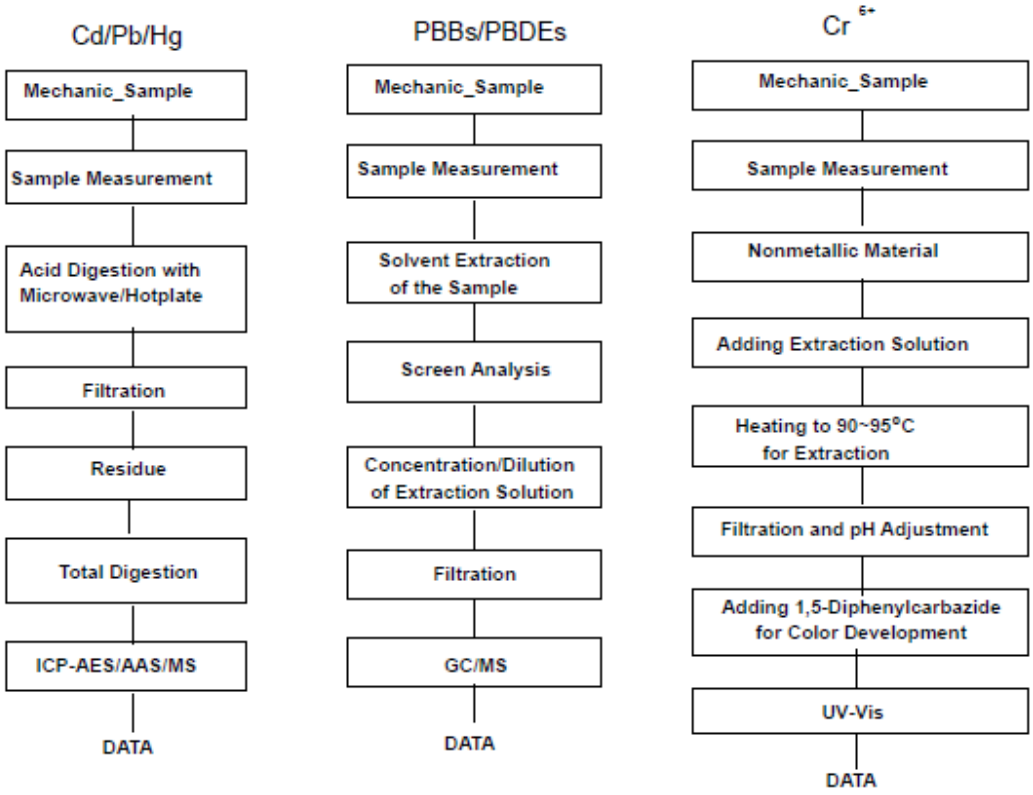
Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



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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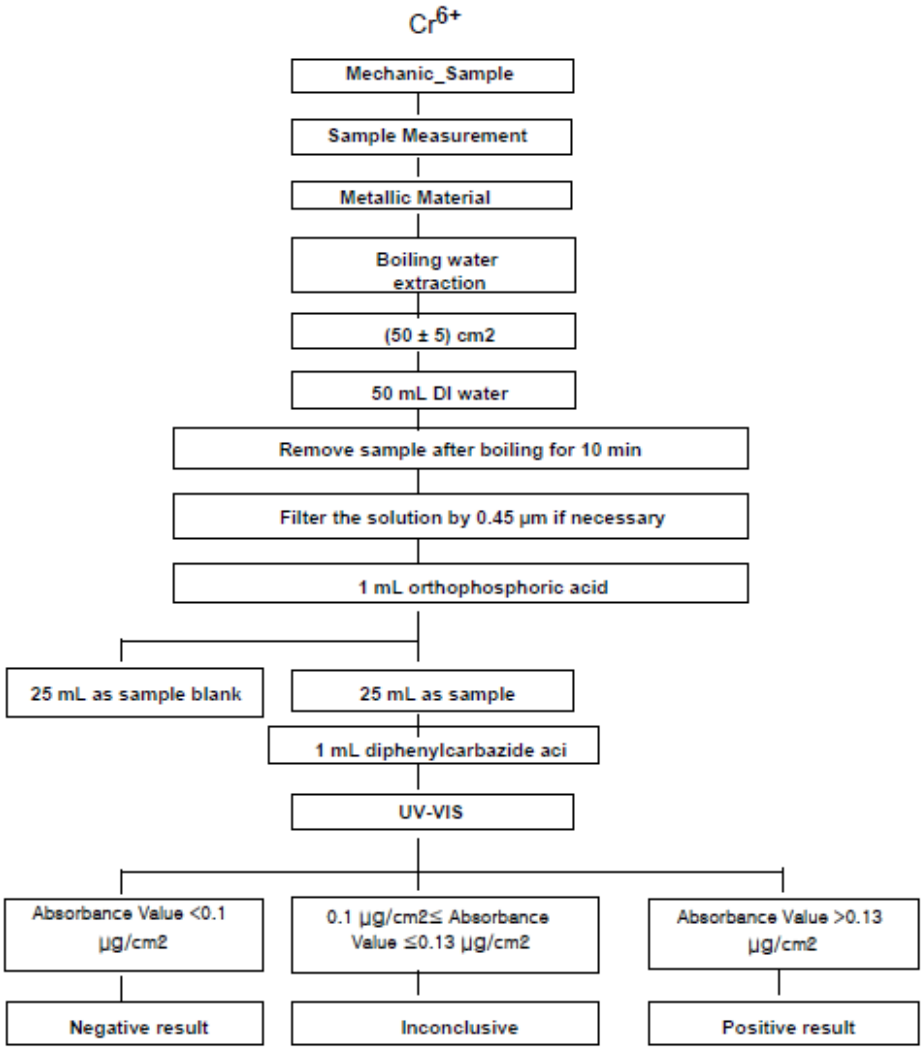

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Flow Chart for Inorganic Elements Testing

Inorganic Elements

Mechanic_Sample

↓

Sample Measurement

↓

Acid Digestion with Microwave/Hotplate

↓

Filtration

↓

Residue

↓

Total Digestion

↓

ICP-AES

↓

DATA

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

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