



SPECIFICATION

Surface Acoustic Wave Filter

USER

USER PART No.

WISOL PART No. **SFXG47AYM02**

DOC. No. SMS-51-L-SFT-FS-49

DATE Nov 23, 2016

REVISION 000

WISOL					
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1. REVISION HISTORY

000	Nov 23, 2016	All Page	Make specification
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2. DEFINITION

2-1. PART No.

SFXG47AYM02

① ② ③ ④ ⑤ ⑥

No.	EXPLANATION	
①	SAW Filter	
②	Design Type	
③	Center Frequency:	Tx 1747.5MHz (1710~1785MHz)
④	Input / Output : 50ohm / 50ohm	
⑤	Package size: 1.8×1.4mm ²	
⑥	Design Revision (02 : Molding Type)	

2-2. APPLICATION : LTE B3 Duplexer

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.

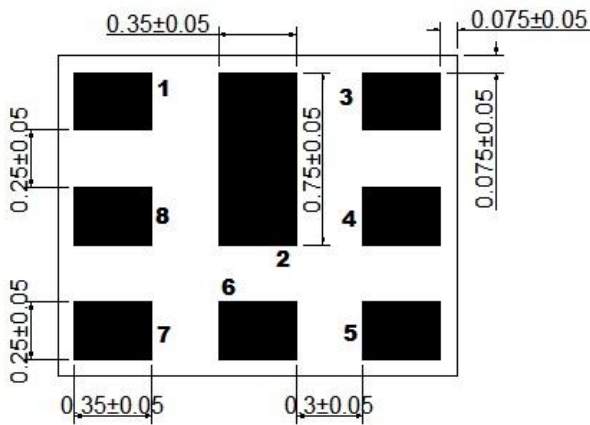
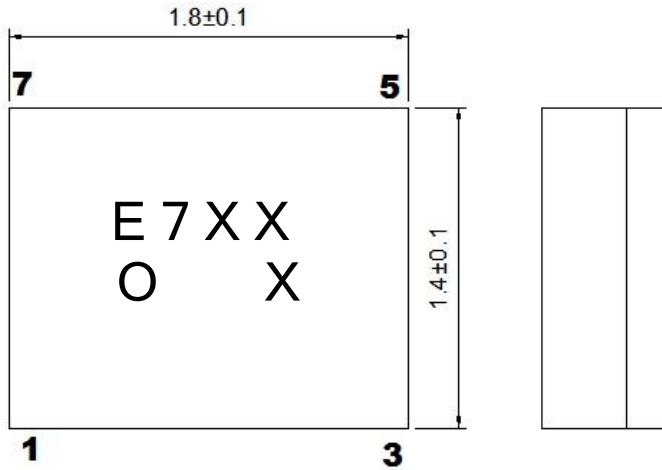
Please avoid static voltage during operation and storage.

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
1	Rx Output
3	Tx Input
6	Antenna
2, 4, 5, 7, 8	GND

5. MARKING



5-1. E 7 X X X

- The 1st, 2nd character 'E7' indicates the model name of SAW Filter “SFXG47AYM02” .
- 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
2014	1	2	3	4	5	6	7	8	9	A	B	C
2015	D	E	F	G	H	I	J	K	L	M	N	O
2016	P	Q	R	S	T	U	V	W	X	Y	Z	a
2017	1	2	3	4	5	6	7	8	9	A	B	C

※ This rotates by the 3 years.

- The 4th, 5th 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

6. PERFORMANCE

6-1. MAXIMUM RATINGS

CHARACTERISTICS	RATINGS	UNITS
DC Permissive Voltage	5	V
Maximum Input Power	0.8	W
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.

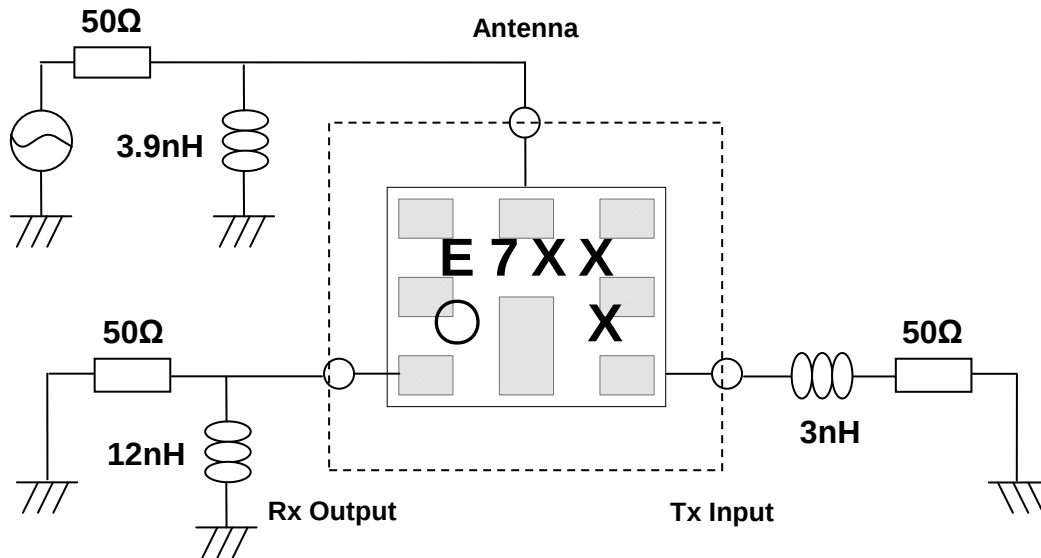
*2. Averaged value of linear s-parameter over 5MHz

Item	CONDITION [MHz]	UNIT	RATING			
			Min.	Typ.(25℃)	Max.	
TX → ANTENNA						
Insertion Loss(*1)	1710.24 ~ 1784.76	dB	-	2.2	3.2	
	1712.5 ~ 1782.5	dB _{INT}	-	1.9	2.8	α _{LTE} (*2)
VSWR	1710.24 ~ 1784.76	-	-	1.7	2.3	
Absolute Attenuation	10 ~ 1565.5	dB	26	30	-	
	1565.42 ~ 1585.42	dB	30	34	-	
	1597.55 ~ 1605.89	dB	33	37	-	
	1805.24 ~ 1879.76	dB	35	45	-	
	1807.5 ~ 1877.5	dB _{INT}	40	45	-	α _{LTE} (*2)
	1920 ~ 1980	dB	25	32	-	
	2110 ~ 2170	dB	27	34	-	
	2400 ~ 2500	dB	27	35	-	
	2620 ~ 2690	dB	27	36	-	
	3420 ~ 3570	dB	20	29	-	
	5130 ~ 5355	dB	15	22	-	
Termination Impedance : INPUT / ANTENNA			50Ω + 3[nH] /50Ω // 3.9[nH]			
ANTENNA → RX						
Insertion Loss(*1)	1805.24 ~ 1879.76	dB	-	2.5	3.5	Ta= - 20~ + 85℃
		dB	-	2.5	3.7	Ta= - 30~ + 85℃
	1807.5 ~ 1877.5	dB _{INT}	-	2.2	3.3	α _{LTE} (*2)
VSWR	1805.24 ~ 1879.76	-	-	1.8	2.3	
Absolute Attenuation	10 ~ 1710	dB	38	43	-	
	1615 ~ 1690	dB	38	45	-	
	1710.24 ~ 1784.76	dB	40	48	-	
	1712.5 ~ 1782.5	dB _{INT}	40	48	-	α _{LTE} (*2)
	2400 ~ 2500	dB	30	40	-	
	2500 ~ 2570	dB	30	40	-	
	2570 ~ 3515	dB	30	38	-	
	3515 ~ 3760	dB	30	45	-	

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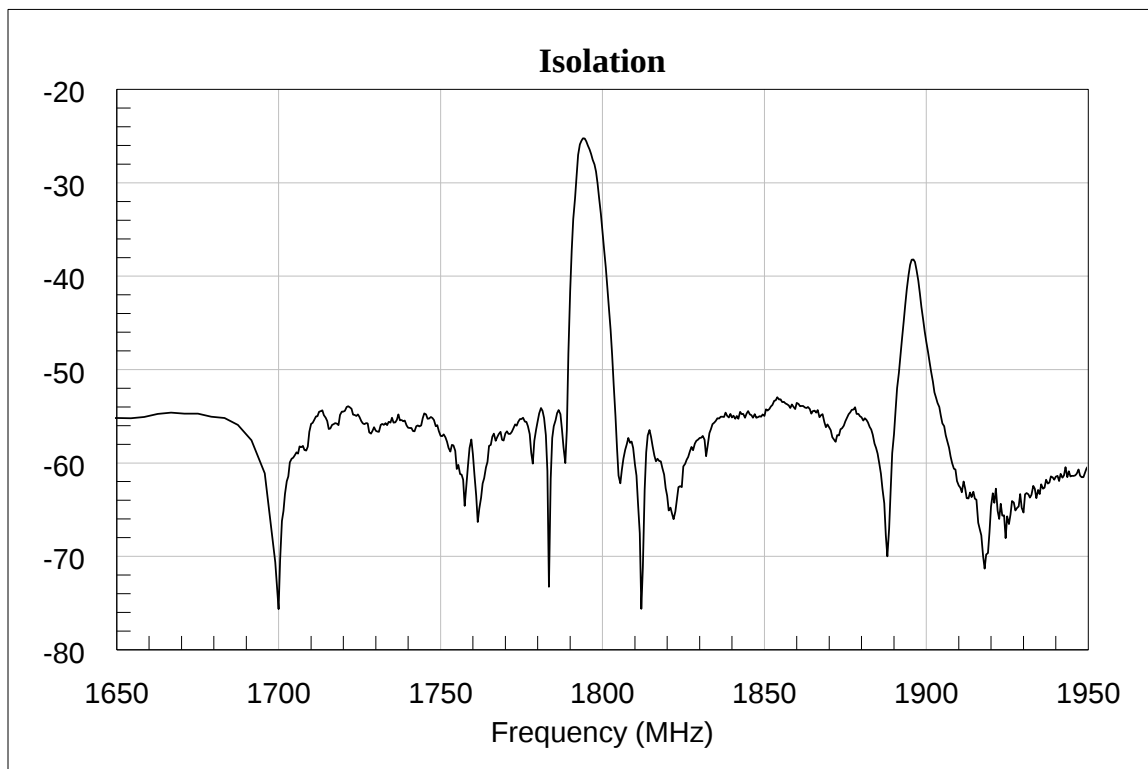
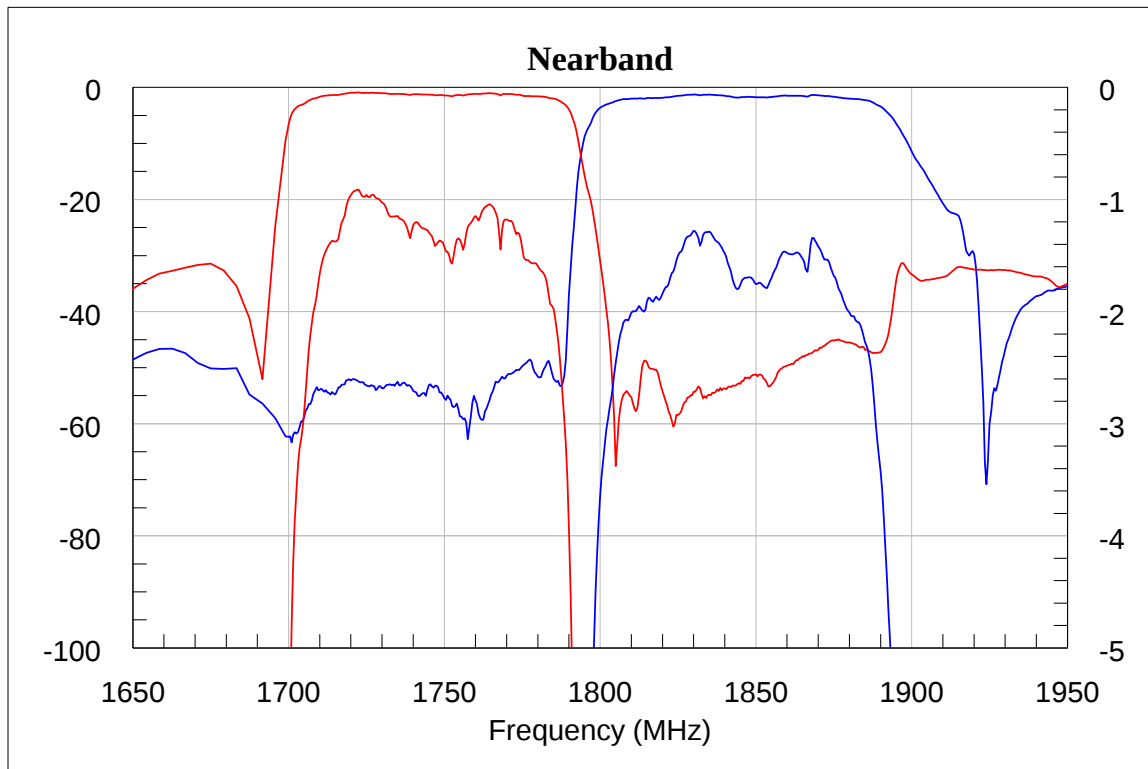
Termination Impedance : ANTENNA / OUTPUT			50Ω // 3.9[nH] /50Ω // 12[nH]			
TX → RX						
Isolation between Rx and Tx	1710.24 ~ 1784.76	dB	51	54	-	
	1712.5 ~ 1782.5	dB _{INT}	51	54	-	α _{LTE} (*2)
	1805.24 ~ 1879.76	dB	44	53	-	Ta= − 20~ + 85℃
		dB	42	53	-	Ta= − 30~ + 85℃
	1807.5 ~ 1877.5	dB _{INT}	49	53	-	α _{LTE} (*2)

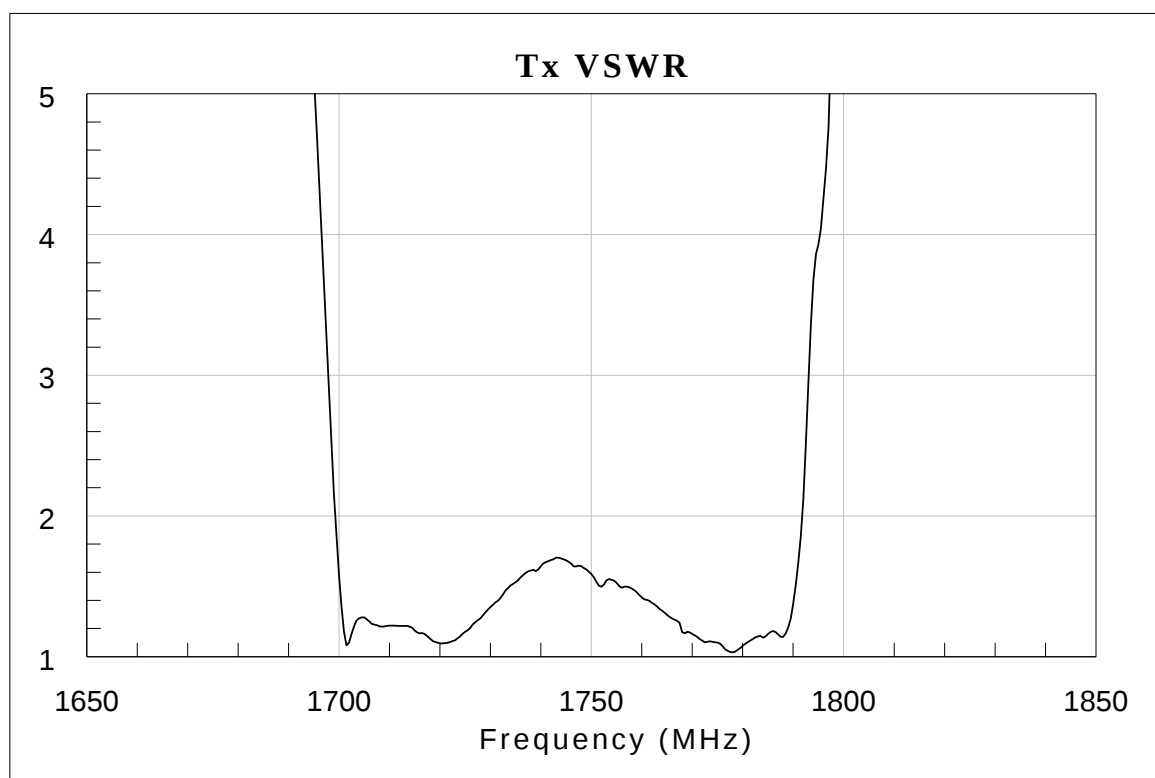
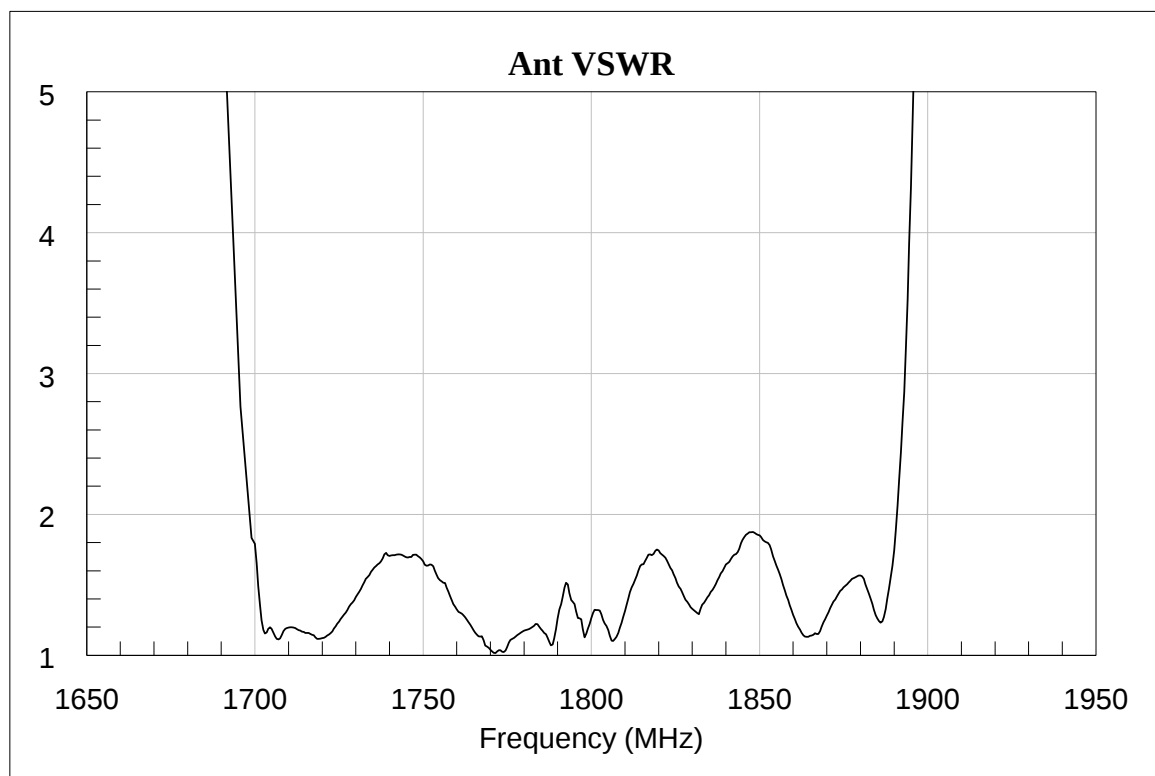
6-2-2. TEST FIXTURE

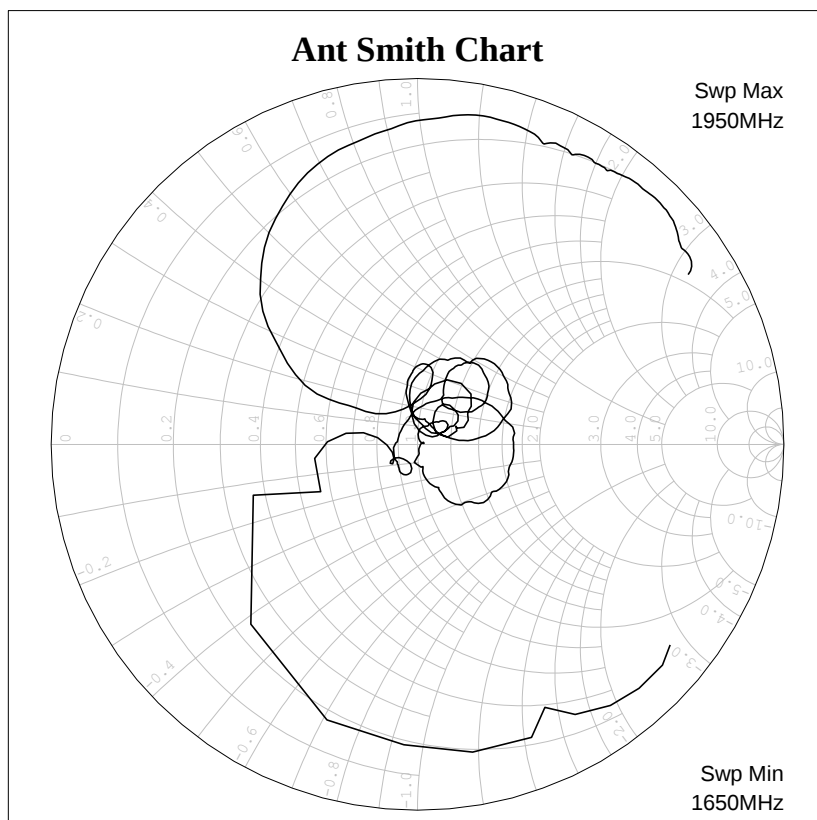
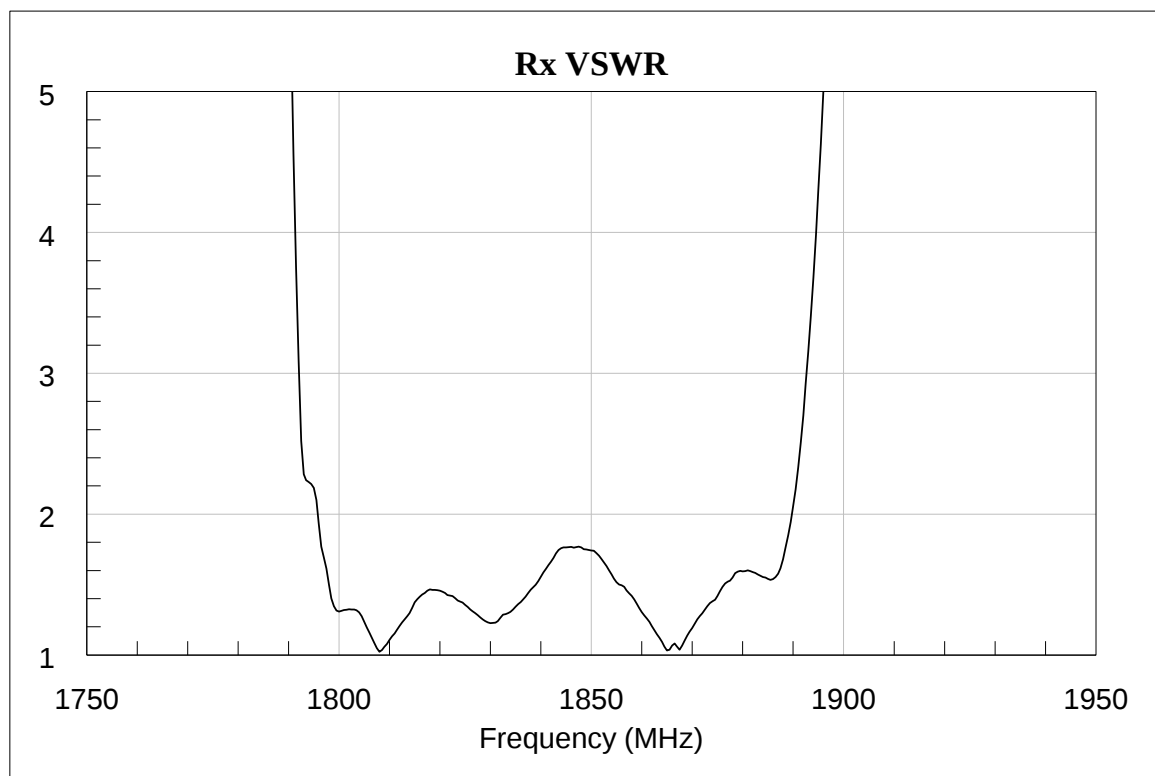


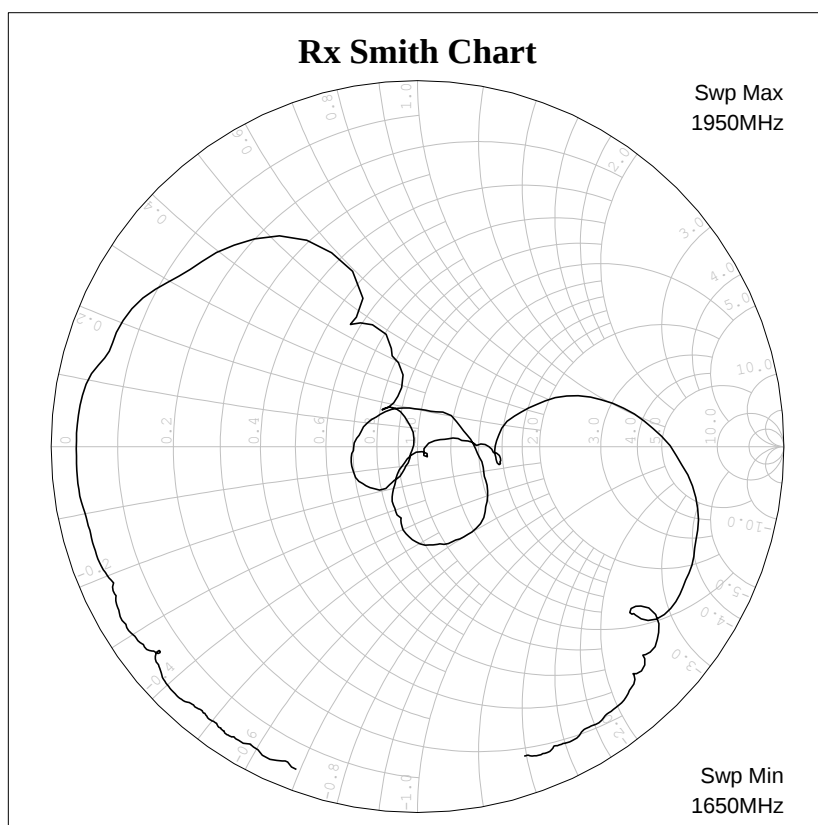
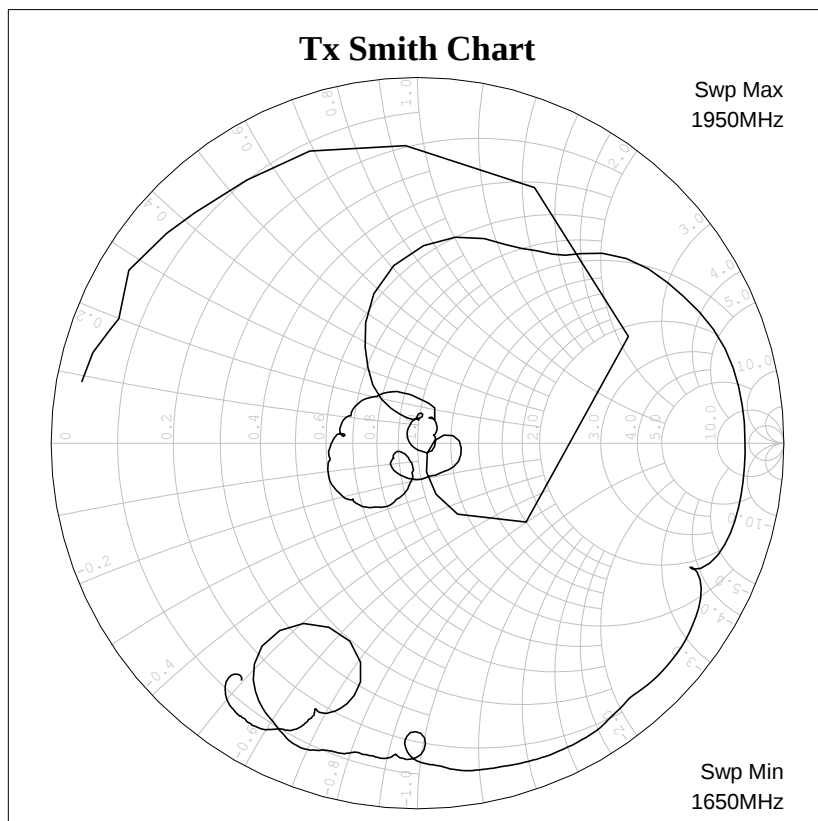
< X-ray Top View >

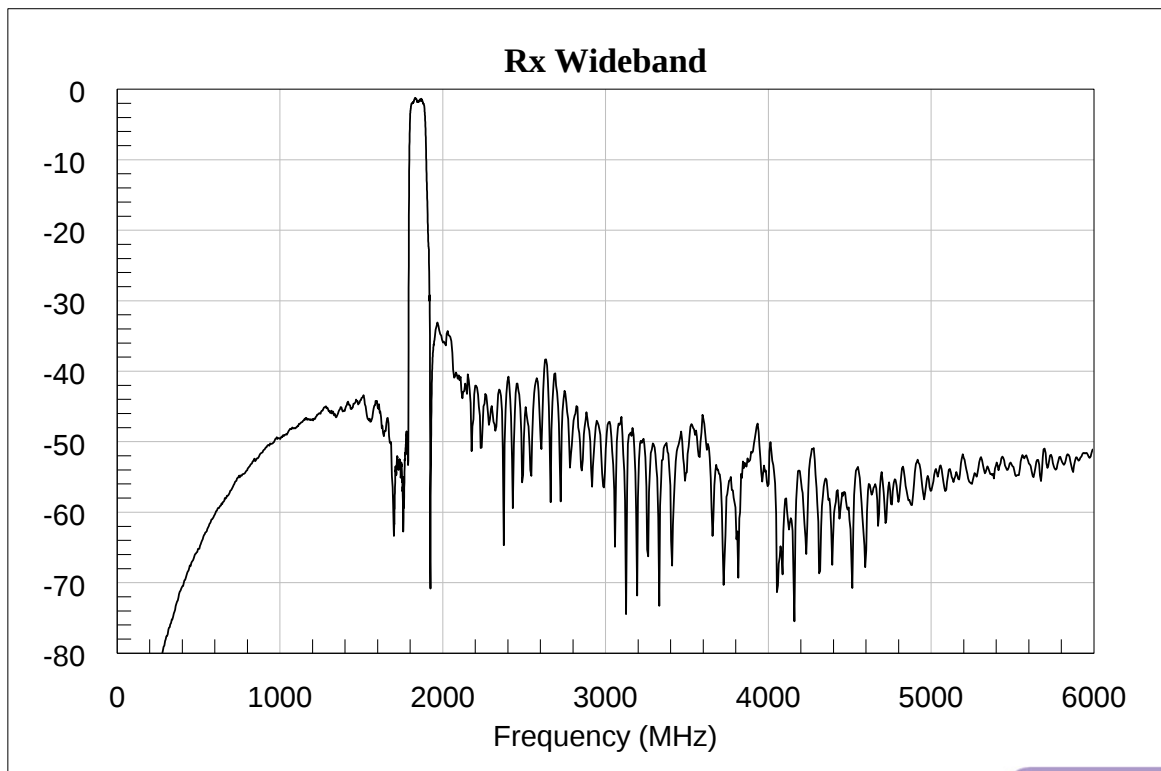
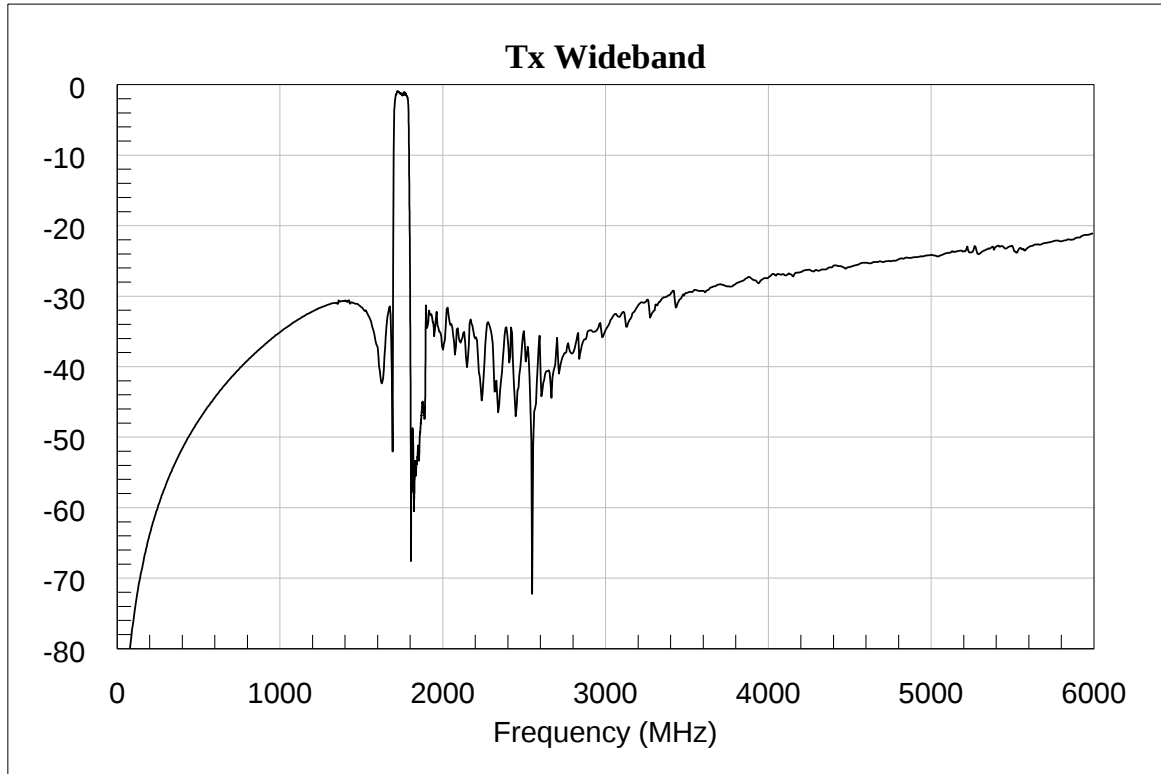
6-2-3. GRAPH

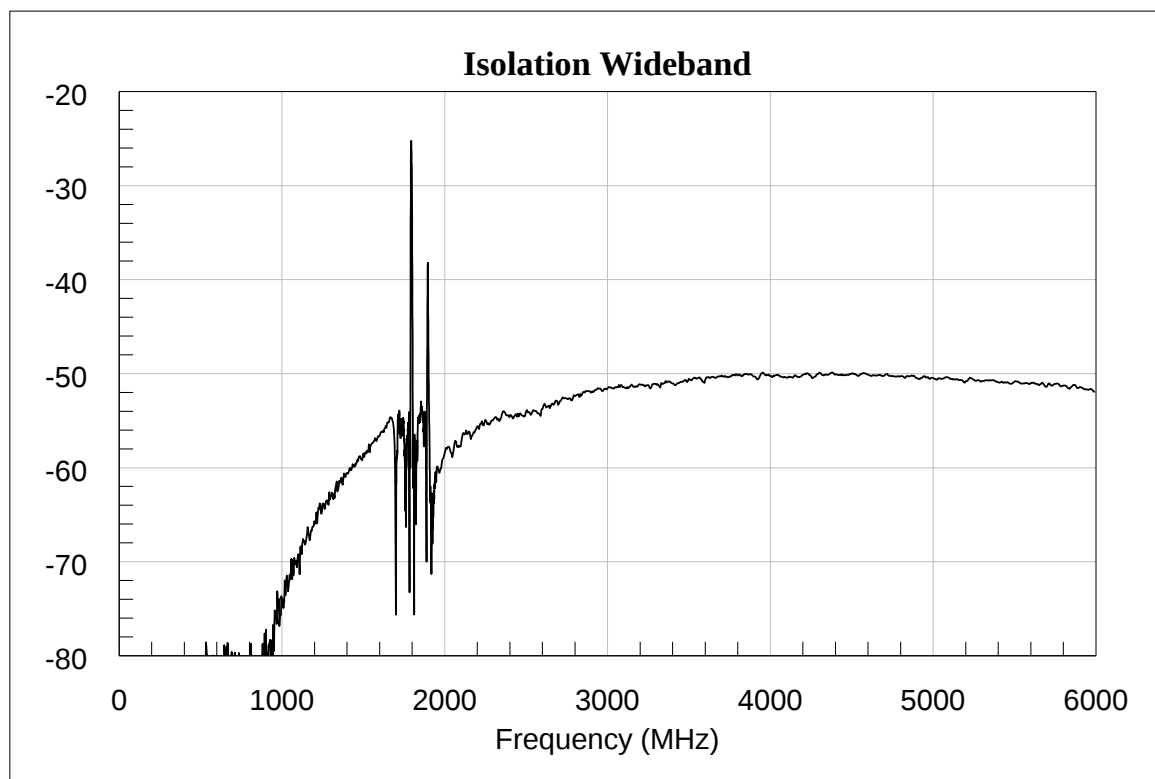






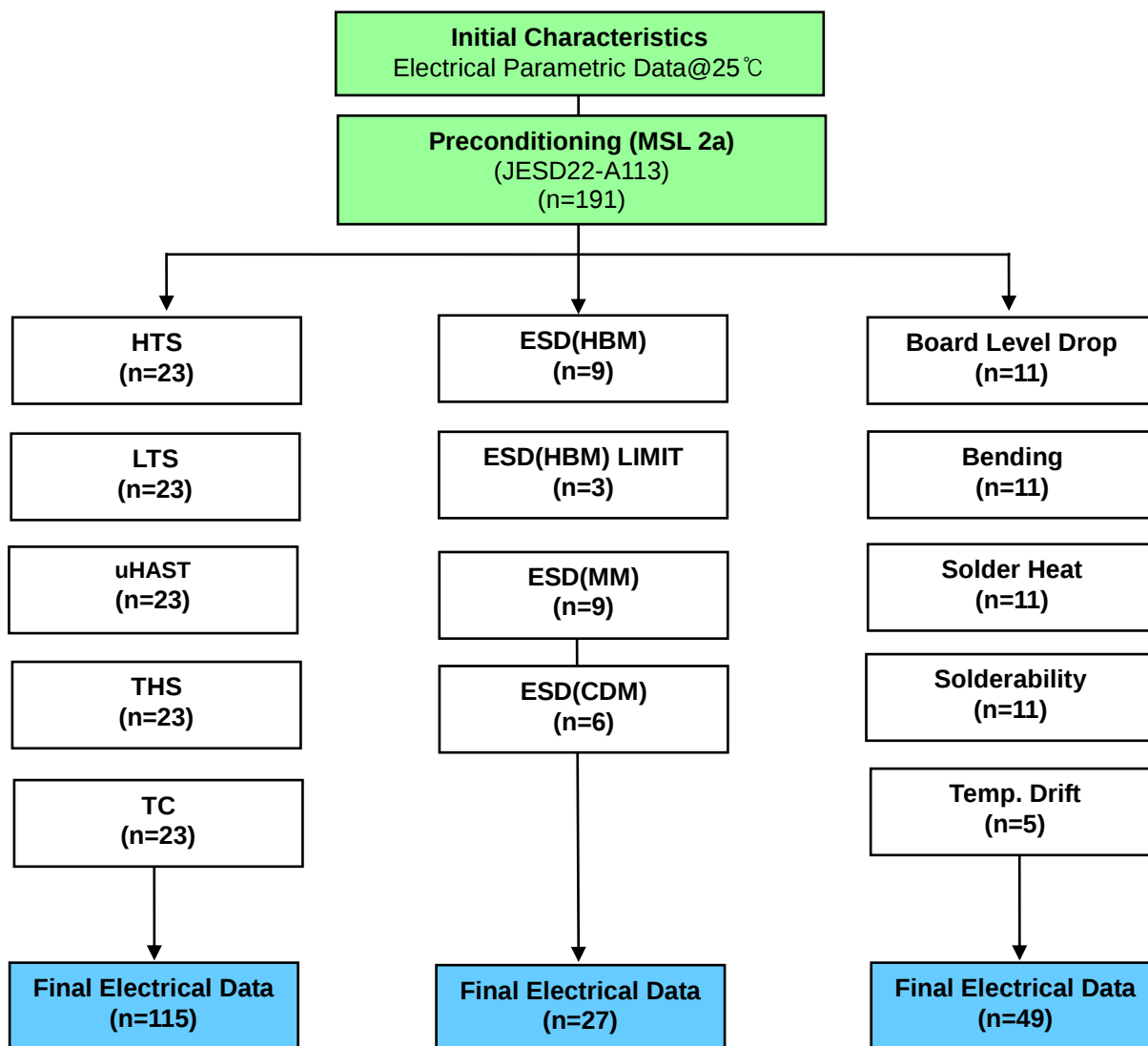






7. RELIABILITY

7-1. ENGINEERING SAMPLE FLOW CHART



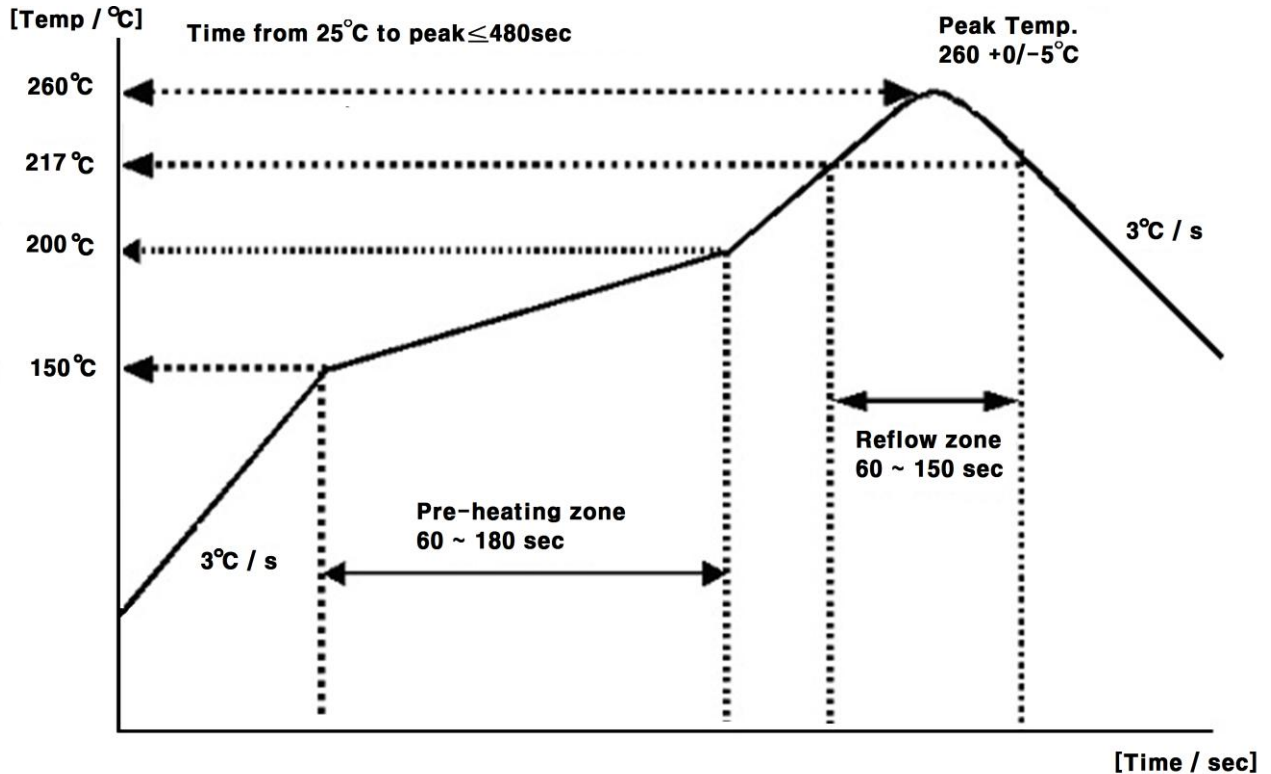
7-2. TEST ITEM & CONDITION

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



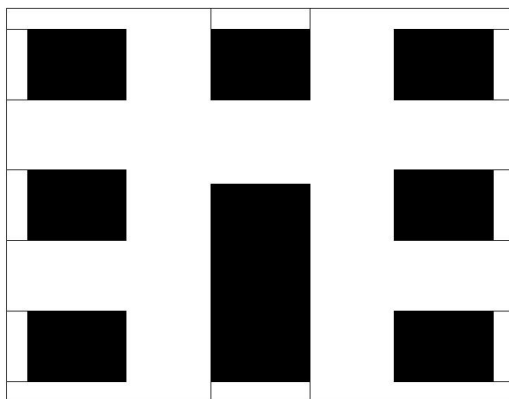
TEST ITEM	REMARK	TEST CONDITION	Duration
HTS (High Temperature Storage)	JESD22-A103	condition A 125(-0/+10)℃	1000hr
LTS (Low Temperature Storage)	JESD22-A119	A -40(-10/+0)℃	1000hr
uHAST (Unbiased HAST)	JESD22-A118	130℃ /85% /33.3psi	96hr
THS (Temperature Humidity Storage)	JESD22-A101	85℃ /85% RH	1000hr
TC (Temperature Cycle)	JESD22-A104	Condition G (-40℃ /125℃)	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℃	10sec
Solderability		235℃	3sec
Temp Drift		-40℃ → +25℃ → +125℃	Per conditions 2HR

8. REFLOW CONDITION

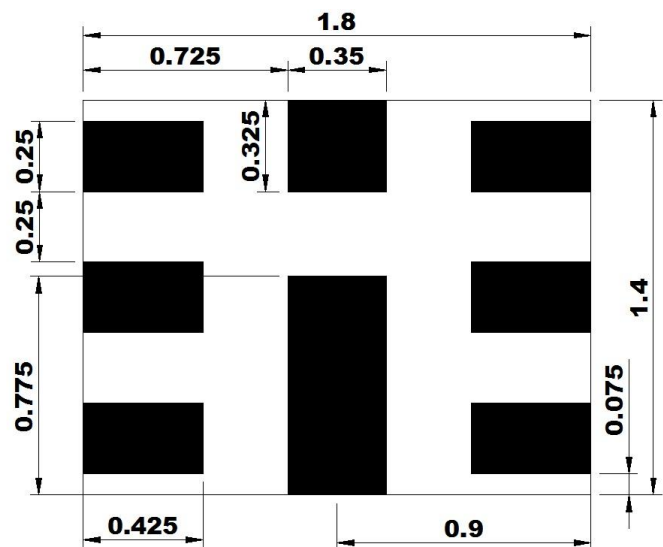


9. RECOMMENDED PCB DIMENSIONS

[UNIT : mm]



[SAW, X-ray Top View]



[PCB, X-ray Top View]

10. CAUTION

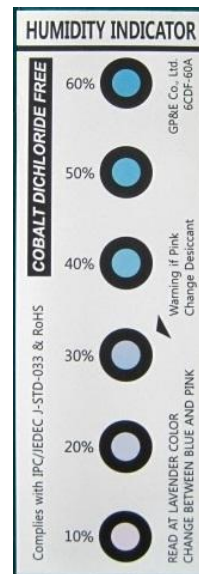
Moisture Sensitivity Device Caution (MSL LEVEL=2a)

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)

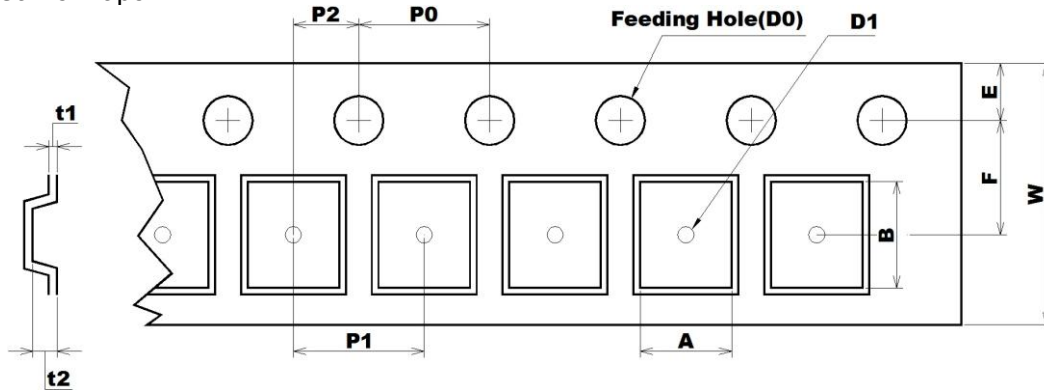


10 to 60% RH

11. PACKING

11-1. DIMENSIONS

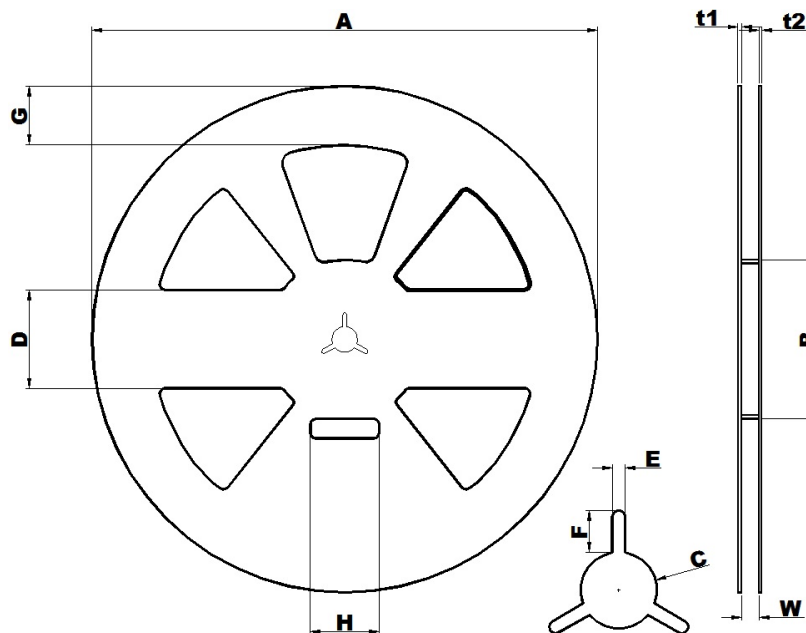
- Carrier Tape



[Unit: mm]

A	B	D0	D1	E	F	P0	P1	P2	t1	t2	W
1.60	2.00	Ø1.55	Ø1.00	1.75	3.50	4.00	4.00	2.00	0.25	0.80	8.00
0.05	0.05	0.05	MIN	0.10	0.05	0.10	0.10	0.05	0.05	0.05	0.10
-0.05	-0.05	-0.05	-	-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

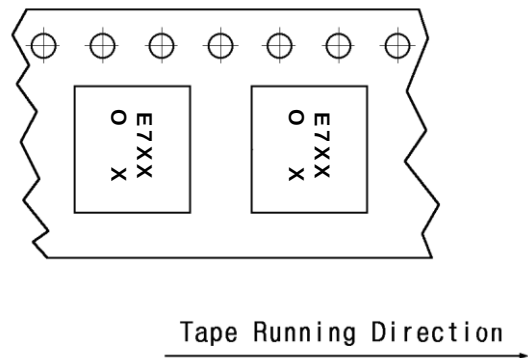
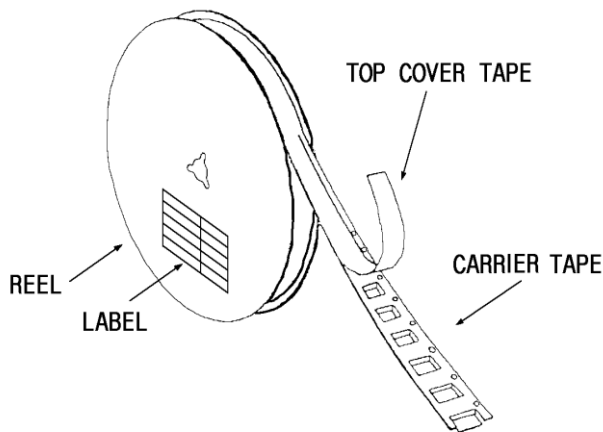
- The product shall be packed properly not to damaged during transportation and storage.

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.

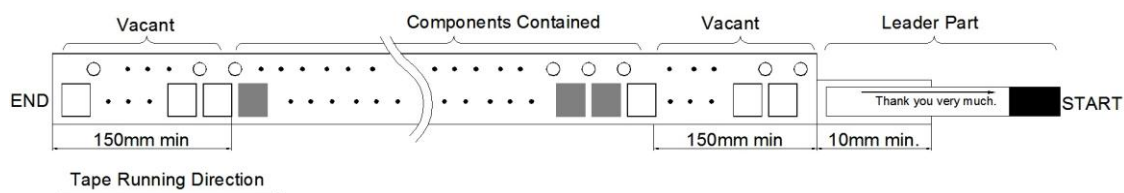


11-3-2. BAR CODE LABEL



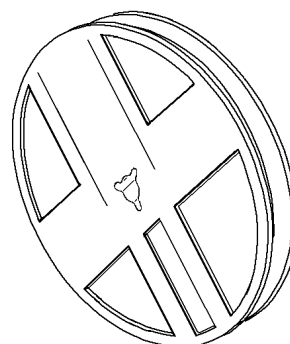
①	MODEL NAME BARCODE
②	Model Name
③	Reel number
④	Quantity / Marking

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



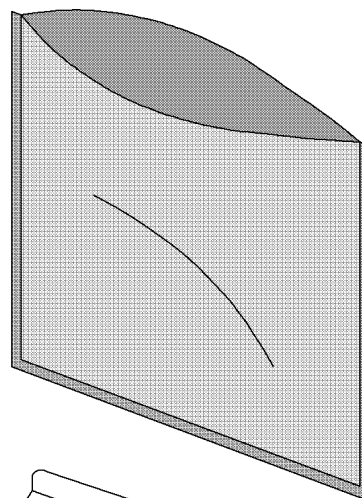
11-4. INNER BOX(Reel Packing) STRUCTURE

Material: Polycarbonate



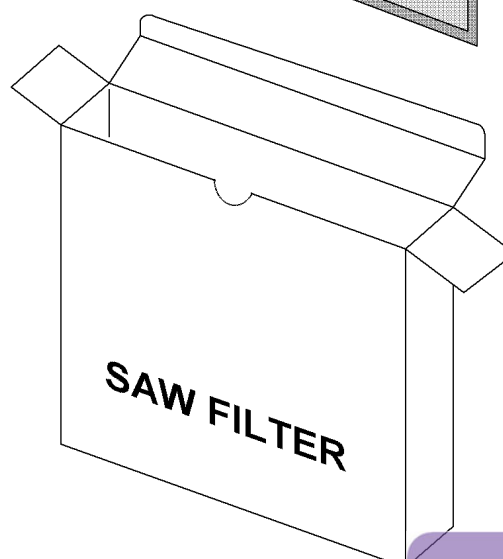
Material: Polyethylene + Aluminium

Size: $310 \times 370\text{mm}^2$



Material: Paper

Size: (D) $260 \times (W) 37 \times (H) 265\text{mm}^3$

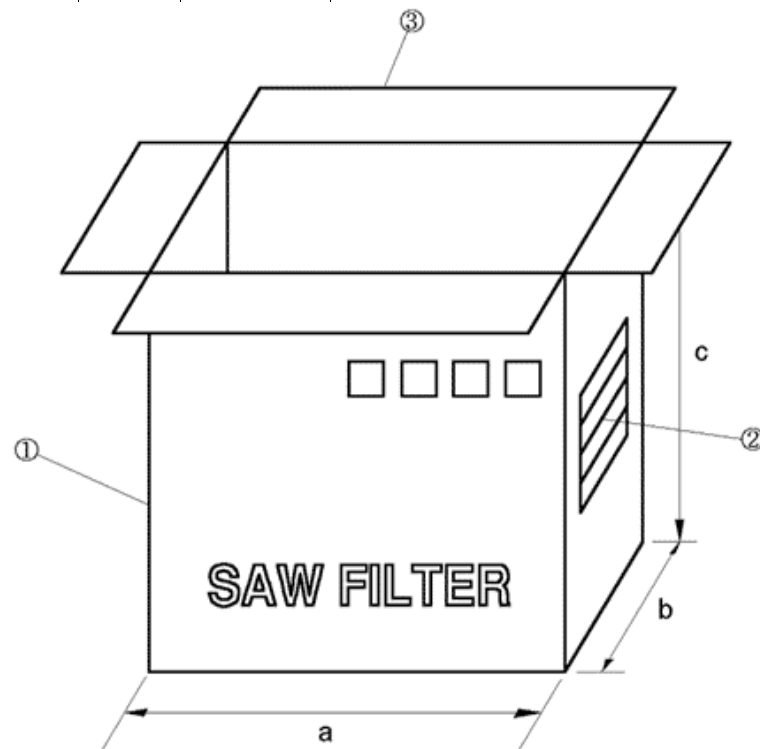


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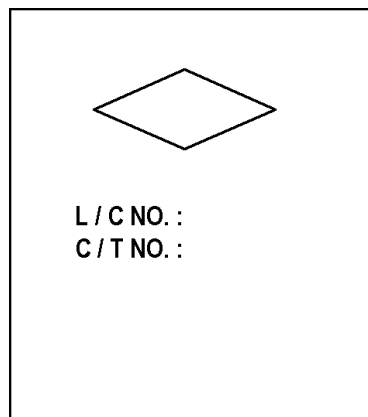
11-5. OUTER BOX STRUCTURE

Material : Paper

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



SIDE ①



- SIDE is the same as front side.

SIDE ②

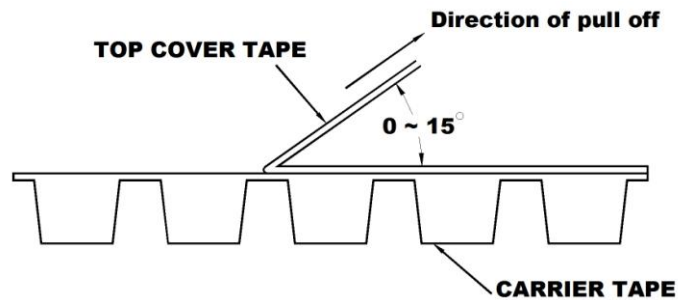
MODEL	
Q'TY	EA
USER	
DATE	. .

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.
 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.	: 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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F401 Version2

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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 cm² sample surface area.

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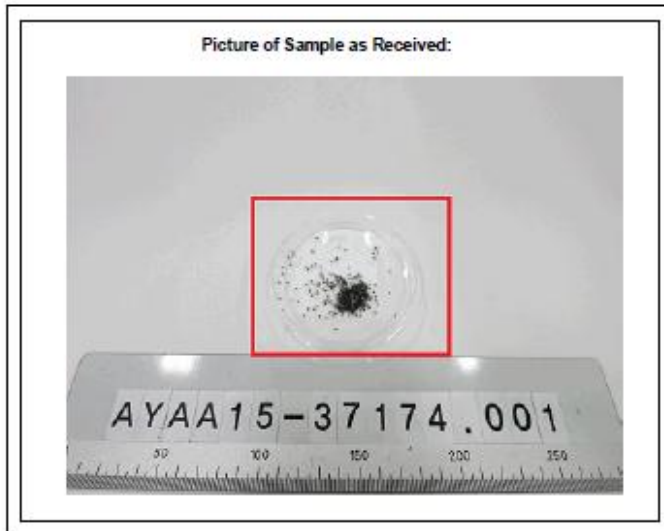
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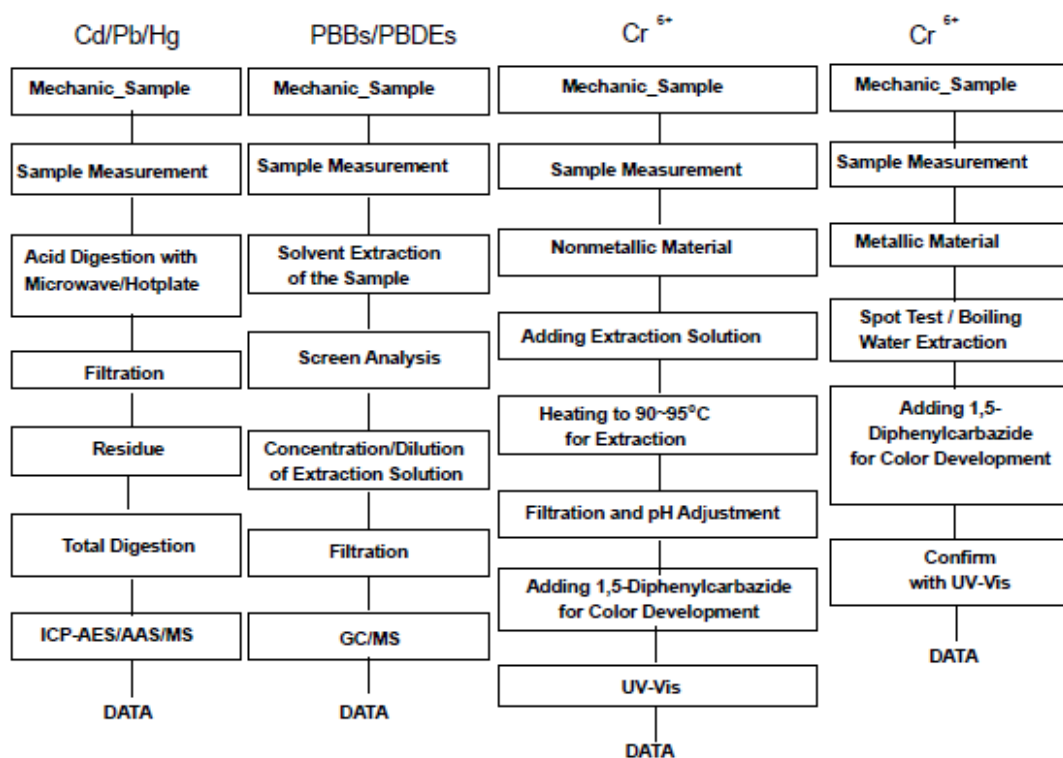


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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ /PBBs&PBDEs Testing



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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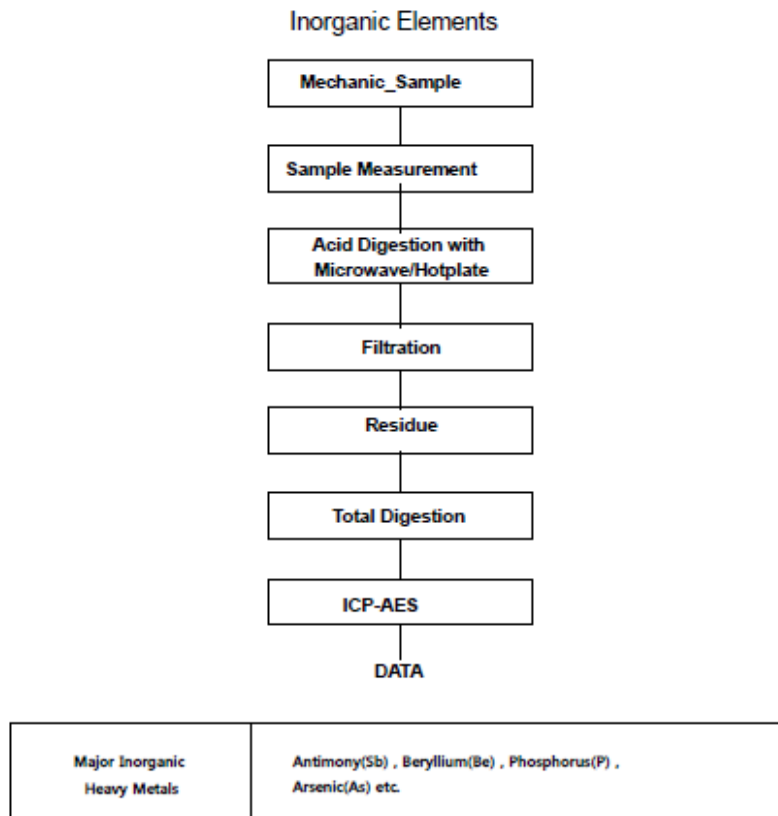


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Flow Chart for Inorganic Elements Testing



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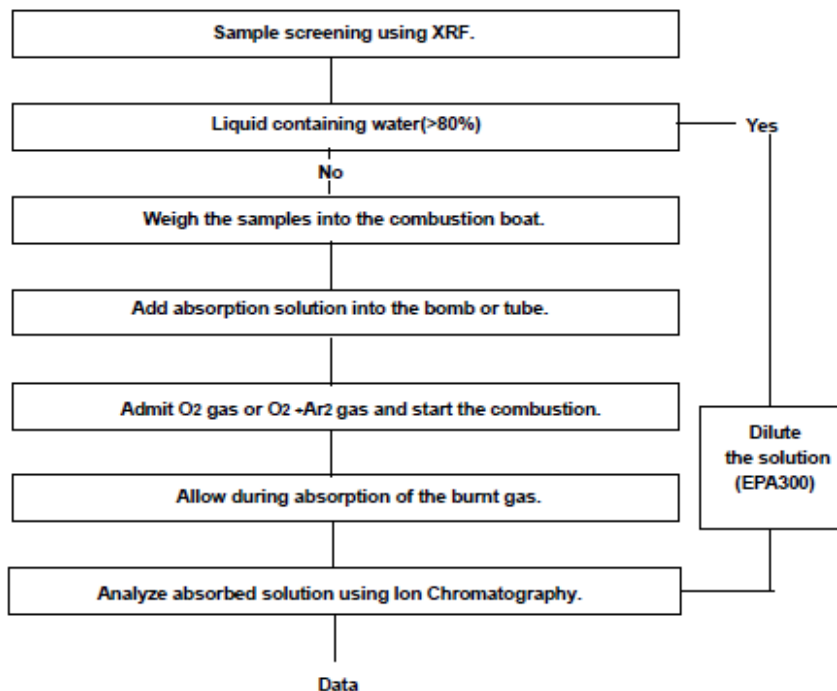


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Flow Chart for Halogen Test



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