






Specification For Approval

CUSTOMER	C-TECH
Product Name	SAW FILTER
Part Number.	511243

C-TECH	Designed	Checked	Approved
			
	11/18	11/18	11/18
CUSTOMER	Designed	Checked	Approved
	/	/	/

We presented the approval sheet for SAW FILTER from _____.

2010. 11. 18.

FACTORY : GYEONG GI, YEOJU, GANAM, YANGGUI, 511-1, KOREA

TEL : (031)881-2160 FAX : (031)884-9691

Manager : Mr. LEWIS(+82-10-9151-0958)



Approval Revision List

Version	Date	LIST & CONTENT	PAGE	INSPECTOR
Ver.0	10.11.05	First Draft		Choi Ki Bong
Ver.1	10.11.18	Second Draft		Choi Ki Bong

(CONTENTS TABLE)

1. OUTLINE	5
1.1. PRINCIPAL	5
1.2. CHARACTERISTIC	5
2. OUTLINE	6
2.1. APPLICATION	6
2.1.1. Electrical Specification (T=25℃)	6
2.1.2. Electrical Specification (T=-30℃ ~ 85℃).....	7
3. STRUCTURE MAP	8
3.1. MAP FOR BLOCK.....	8
3.2. MATCHING CONFIGURATION	8
3.3. MATCHING DEVICE & PCB	9
3.4. DRAWING.....	9
3.5. MARKING.....	10
3.6. PART LIST.....	10
4. TEST PROCEDURE	11
4.1. EXTERNAL INSPECTION	11
4.2. ELECTRICAL SPECIFICATION.....	11
4.2.1. Test Equipment.....	11
4.2.2. Test Criteria.....	11
4.2.3. Network Analyzer Calibration & Test Process.....	12
4.2.4. Electrical Specification Inspection.....	13
4.3. TEST DATA (T=25℃).....	14
4.4. TEST DATA (T=85℃).....	15
4.5. TEST DATA (T=-30℃)	16
5. PACKING	17
6. RELIABILITY TEST DATA	18
6.1. MTF : 3.5E+5 HOUR @ 40℃	18
6.2. MSL RATING : NOT MOISTURE SENSITIVE (LEVEL 1).....	18
6.3. RELIABILITY CHARACTERISTIC	18
6.3.1. LIFE TEST	18



6.3.2.	MECHANICAL TEST	18
6.3.3.	HEAT CYCLE, SOLDERING	18
7.	REFLOW DATA	19
7.1.	REFLOW PROFILE.....	19
7.2.	LEAD FINISH	19
8.	QUALITY GUARANTEED	20

1. OUTLINE

1.1. Principal

SAW Filter consists of two transducers with interdigital arrays(IDT: Inter Digital Transducer) of thin metal electrodes deposited on a piezoelectric substrate, and converts the incoming electric signal to an acoustic one, Surface Acoustic Wave, and vice-versa.

The SAW Filter consists of two IDT on a piezoelectric crystal substrate. The IDTs consists of interleaved metal electrodes which are used to launch and receive the waves, so that an electrical signal is converted to an acoustic wave and then back to an electrical signal.

An "Impulse" voltage applied to the transducer generates, due to piezoelectricity, mechanical displacements in the crystal between electrodes (or fingers) of opposites polarity. These crystal displacements propagate and create a wave at the surface of the crystal perpendicular to the electrodes. The inverse phenomenon occurs when this acoustic wave travels under another transducer : it in turn creates an electromagnetic output signal. The characteristic of frequency depends on the pattern of electrodes.

1.2. Characteristic

- Minimize size.
- High stability and reliability with singular pattern.(Not necessary modulate)
- Suitability for High Frequency Filter with good selectivity
- Good Yield for mass production through semiconductor process

2. OUTLINE

2.1. Application

This approval data sheet shall presented the application(Repeater) and standards of 511243.

2.1.1. Electrical Specification (T=25°C)

Parameter	Unit	Min.	Typ.	Max.
Center Frequency	MHz	69.92	70.00	70.08
Insertion Loss	dB	-	8.00	10.00
1dB Bandwidth	MHz	1.60	1.84	-
3dB Bandwidth	MHz	2.00	2.28	-
30dB Bandwidth	MHz	-	3.60	3.80
40dB Bandwidth	MHz	-	3.93	4.10
Passband Ripple ($F_0 \pm 0.6\text{MHz}$)	dB	-	0.50	1.00
Group Delay Variation ($F_0 \pm 0.6\text{MHz}$)	nsec	-	80	150
Absolute Delay	μsec	-	2.3	-
Ultimate Attenuation	dB	35	40	-
Substrate Material	-	112-LiTaO ₃		
Temperature Coefficient	ppm/°C	-24		

✓ All specifications are based on matching schematic shown below

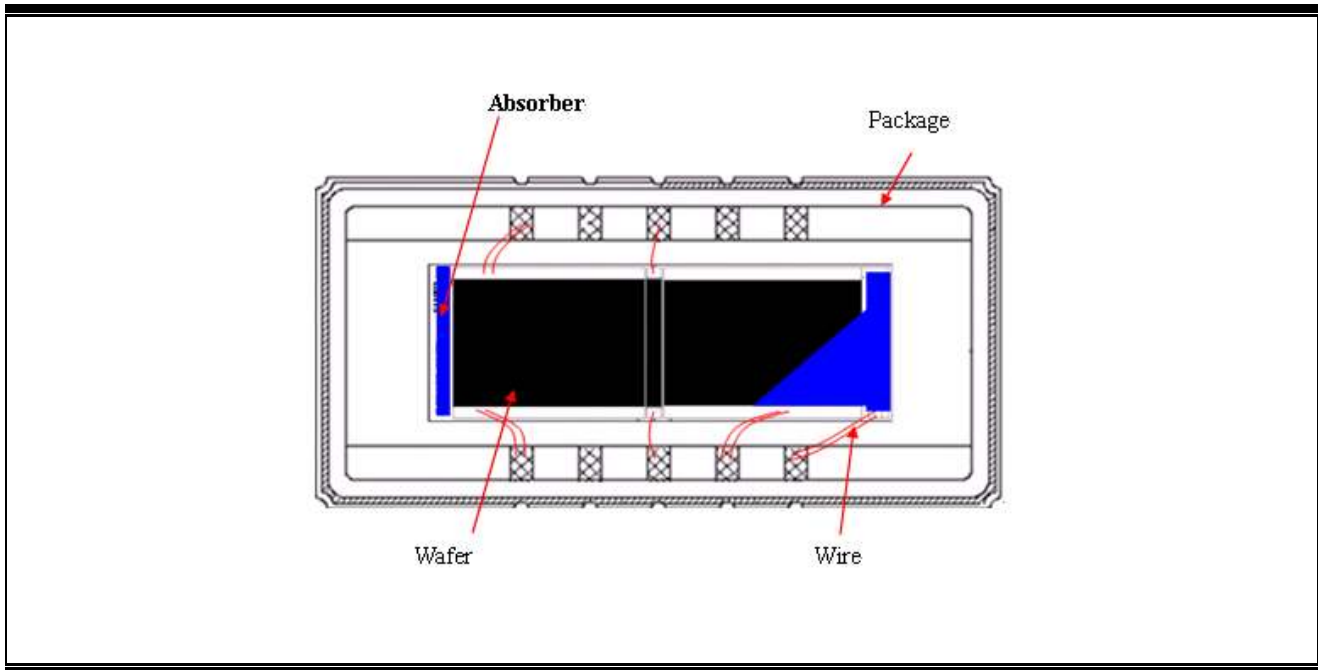
2.1.2. Electrical Specification (T=-30°C ~ 85°C)

Parameter	Unit	Min.	Typ.	Max.
Center Frequency	MHz	69.75	70.00	70.25
Insertion Loss	dB	-	8.00	11.50
1dB Bandwidth	MHz	1.55	1.84	-
3dB Bandwidth	MHz	2.00	2.28	-
30dB Bandwidth	MHz	-	3.60	3.80
40dB Bandwidth	MHz	-	3.93	4.15
Passband Ripple ($F_0 \pm 0.6\text{MHz}$)	dB	-	0.50	1.00
Group Delay Variation ($F_0 \pm 0.6\text{MHz}$)	nsec	-	80	150
Absolute Delay	μsec	-	2.3	-
Ultimate Attenuation	dB	35	40	-
Substrate Material	-	112-LiTaO ₃		
Temperature Coefficient	ppm/°C	-24		

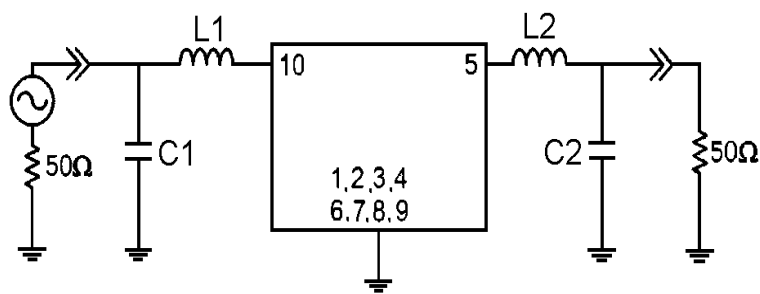
✓ All specifications are based on matching schematic shown below

3. STRUCTURE MAP

3.1. Map for Block



3.2. Matching Configuration



50Ω Single-ended

$L1=100\text{nH}$, $L2=120\text{nH}$, $C1=91\text{pF}$, $C2=68\text{pF}$

Source / Load Impedance = 50Ω

Ambient Temperature = 25°C

3.3. Matching Device & PCB

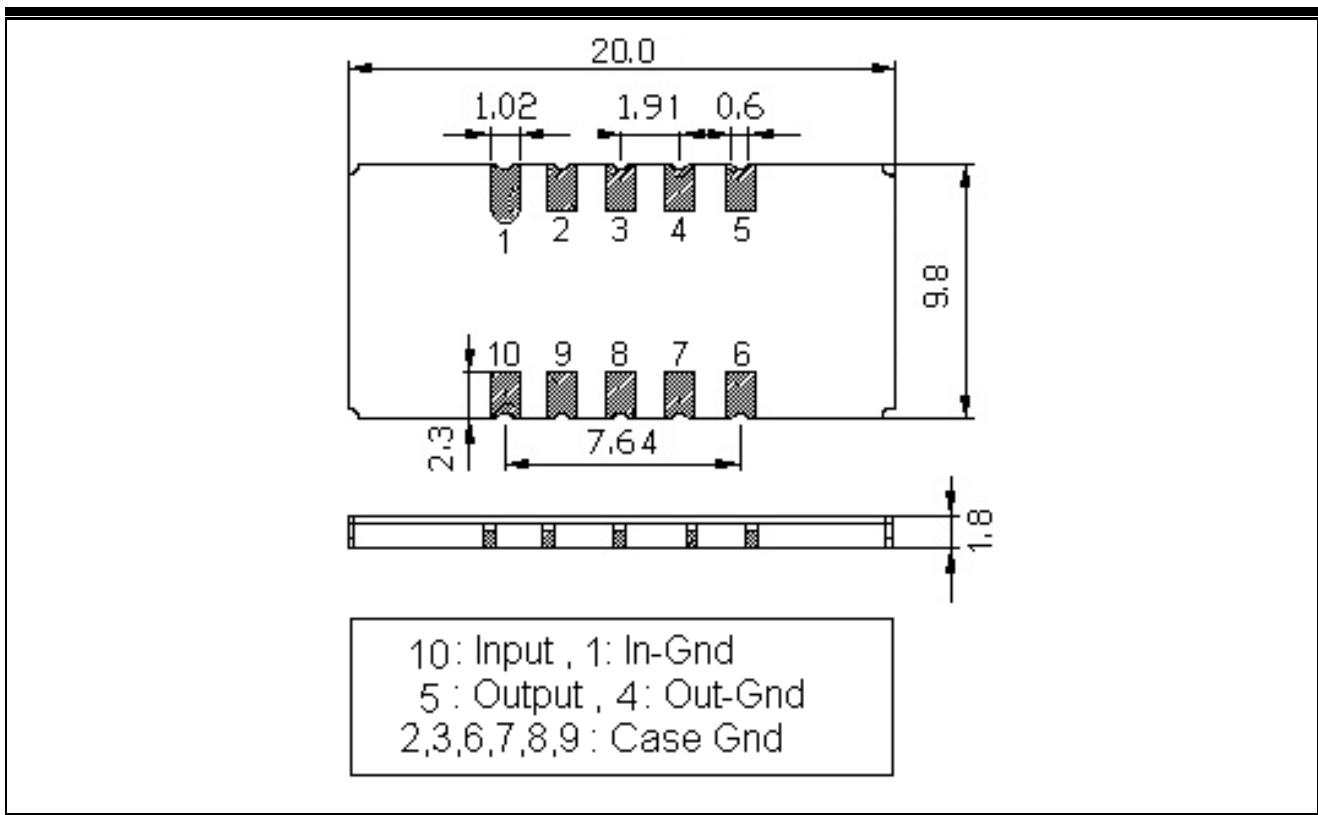
Matching Device

	Maker	Size	Tolerance	비고
Inductor	TOKO	1608	±2%	
Capacitor	TOKO	1608	±2%	
Resistor	SAMSUNG	1608	-	

PCB

LAYER	TYPE	THICKNESS	OZ	Coating
2-LAYER	FR-4	0.8t	1oz	GREEN PSR

3.4. Drawing



3.5. Marking



- ① C-TECH : Company LOGO
- ② 511243 : Product Name
- ③ 70 : Center Frequency
- ④ 2 : Bandwidth
- ⑤ XXYY : Date Code
- ⑥ ■ : Direction mark

3.6. Part List

NO	Product	Supplier	MPN	Register Date	RACK Type	Module Name	Product Name	Standard	QTY
1	Wafer	C-TECH	-	2010/09	Raw Material		Wafer	LT	1
2	Pkg		-	2010/09	Raw Material		PKG	2098 SMD	1
3	Lid		-	2010/09	Raw Material		CAP	2098 LID	1
4	Wire		Heraeus	2010/09	Raw Material		Al-Wire	1.25mil	1
5	Absorber		Markem	2010/09	Raw Material		Ink	7132 White	1
6	Epoxy		Cookson EL	2010/09	Raw Material		Epoxy	Staystik 371G	1

4. TEST PROCEDURE

4.1. External Inspection

- ✓ Inspect exterior and measurement.
- ✓ Inspect the location of no.4 Pin and compare it with no.4 marking.
- ✓ Inspect Part Number and Lot Number.

4.2. Electrical Specification

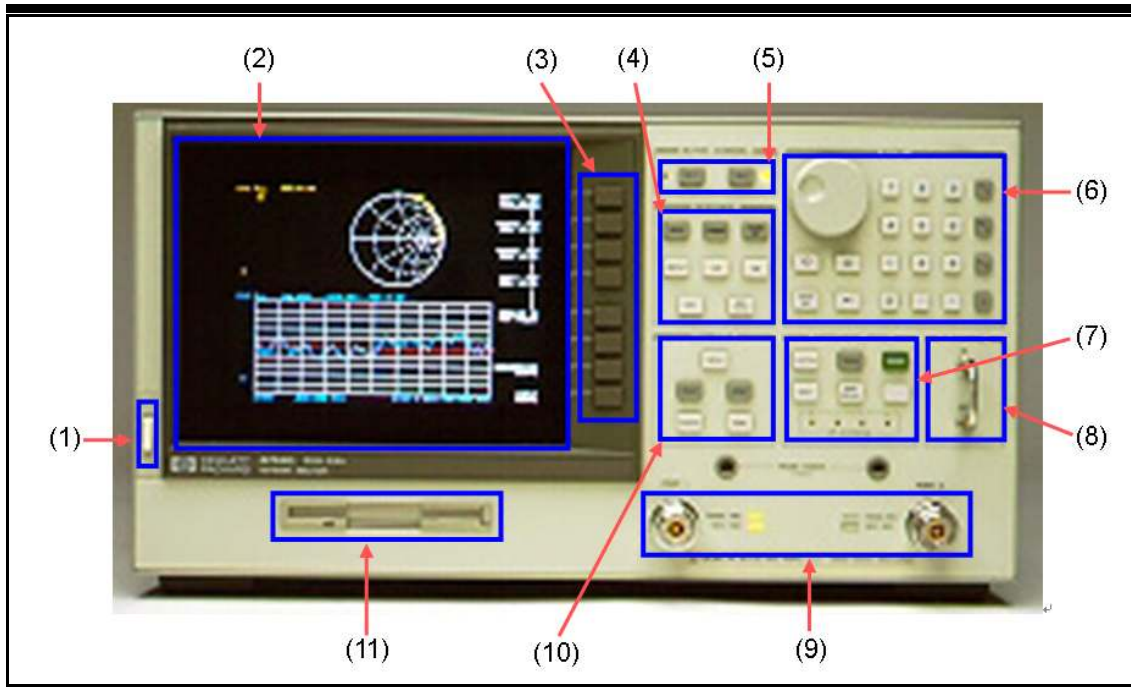
4.2.1. Test Equipment

Network Analyzer, JIG & EVB for Test

4.2.2. Test Criteria

- ✓ Center Frquency.
- ✓ Insertion Loss
- ✓ 1dB Bandwidth
- ✓ 3dB Bandwidth
- ✓ 40dB Bandwidth
- ✓ Attenuation
- ✓ Amplitude Ripple
- ✓ Absolute Delay, Group Delay Variation

4.2.3. Network Analyzer Calibration & Test Process



[Network Analyzer : Aglient 8753D, 8753ES], [CAL KIT : 85033C]

Step1 : Connect Cable to no. 9

Step2 : Choice between (1) Power S/W ON or (7) Preset

Step3 : Press (10). [MENU], [Sweep Time]-400ms, [Number of Point]-801.

Step4 : Press (10) [MENU], [Coupled CH]→ [OFF]. Input the parameter of products' Center, Span.

Step5 : Press (5) and choose [CH1], (4)→[CAL], [CAL KIT]→[3.5mmD]
[Calibration Menu]→[Full 2-Port]

Step6 : After Step 5, choose (3)→[Reflection]. Connect the Cable[connected (9)] to cal kit(" Open" , " Short" , " Load").

Step7 : (3)→[Transmission]. Connect And Thru " cal kit" between Port 1 and 2.

Step8 : (3)→[Isolation]. [Omit Isolation]

Step9 : (3)→[Done 2-Port CAL]. Calibration.

Step10 : (5)→[CH2]. Repeat the process " Step1~Step9" for Calibration.

4.2.4. Electrical Specification Inspection

- Connect the cable[which is connected PORT1(in) & PORT2(out)] and EVB or JIG and then Insepect.

Step1 : POWER S/W ON or PRESET

Step2 : MEAS → Ref1 : FWD/S21 (A/R)

Step3 : CENTER → 70MHz(CENTER FREQUENCY) → SPAN → 50MHz

Step4 : MENU → NUMBER OF POINTS → 801 → COUPLED CH OFF

Step5 : SCALE REF → REFERENCE VALUE → - 10dB → Set up KNOB

Step6 : MARKER → 70MHz (CENTER FREQUENCY) → ΔMODE MENU → ΔREF=1

Step7 : MARKER FCTN → MARKER SERCH [OFF] → WIDTH ON

☞ Inspect Center, Loss, Bandwidth : Set up “ - 3dB” for Marker Width Value.

☞ Inspect “ -40dB” or “ other Bandwidth” : Set up “ -40dB” or “ T.B.D” for Marker Width Value.

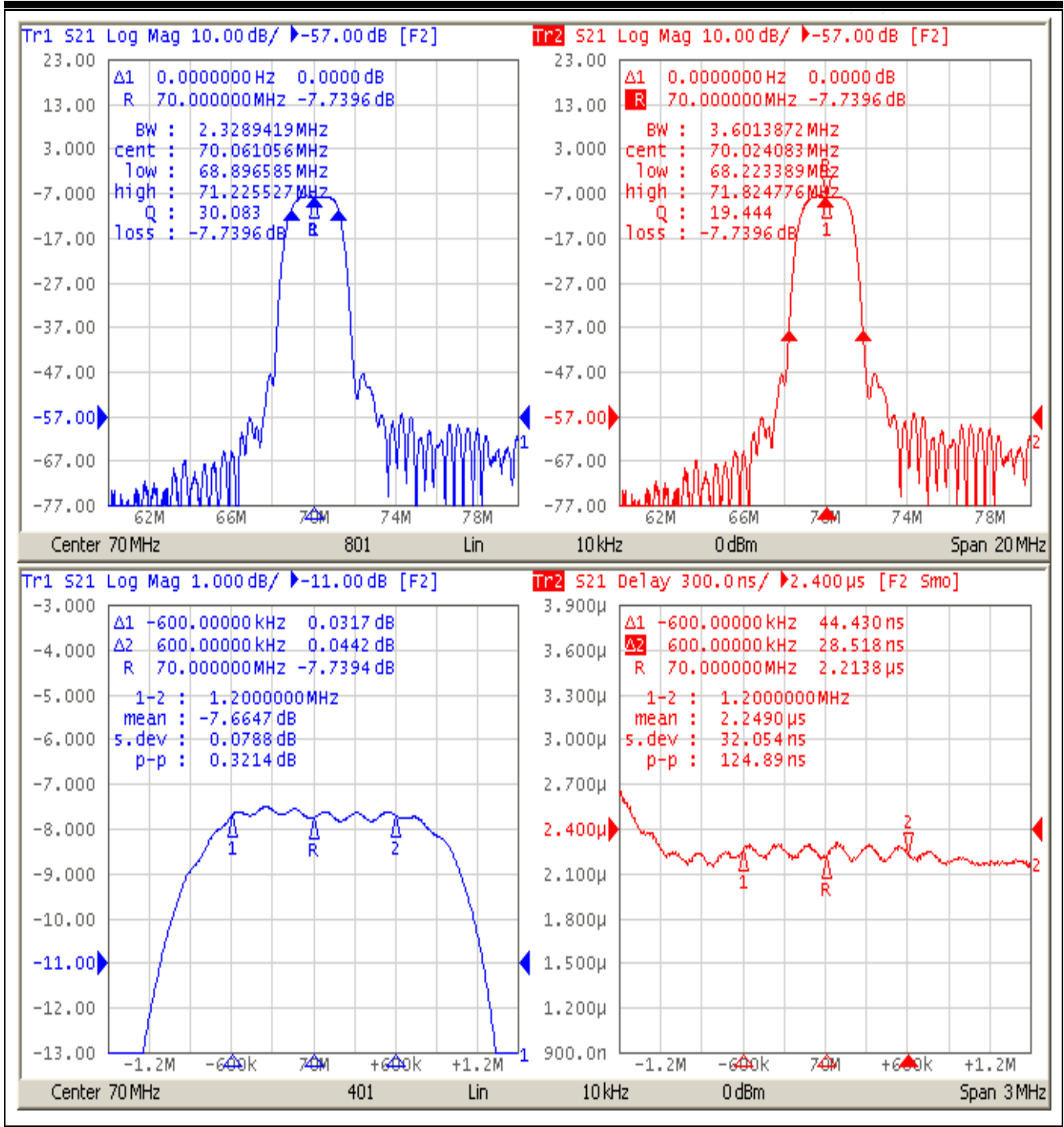
☞ Inspect “ Attenuation” : Inspect the standard about attenuation

Step8 : CHAN2 → SCAL REF → SCALE/DIV → 1 → X1 → REFERENCE VALLUE →
- 10dB → Calibrate KNOB(Between - 4dBc and standard)

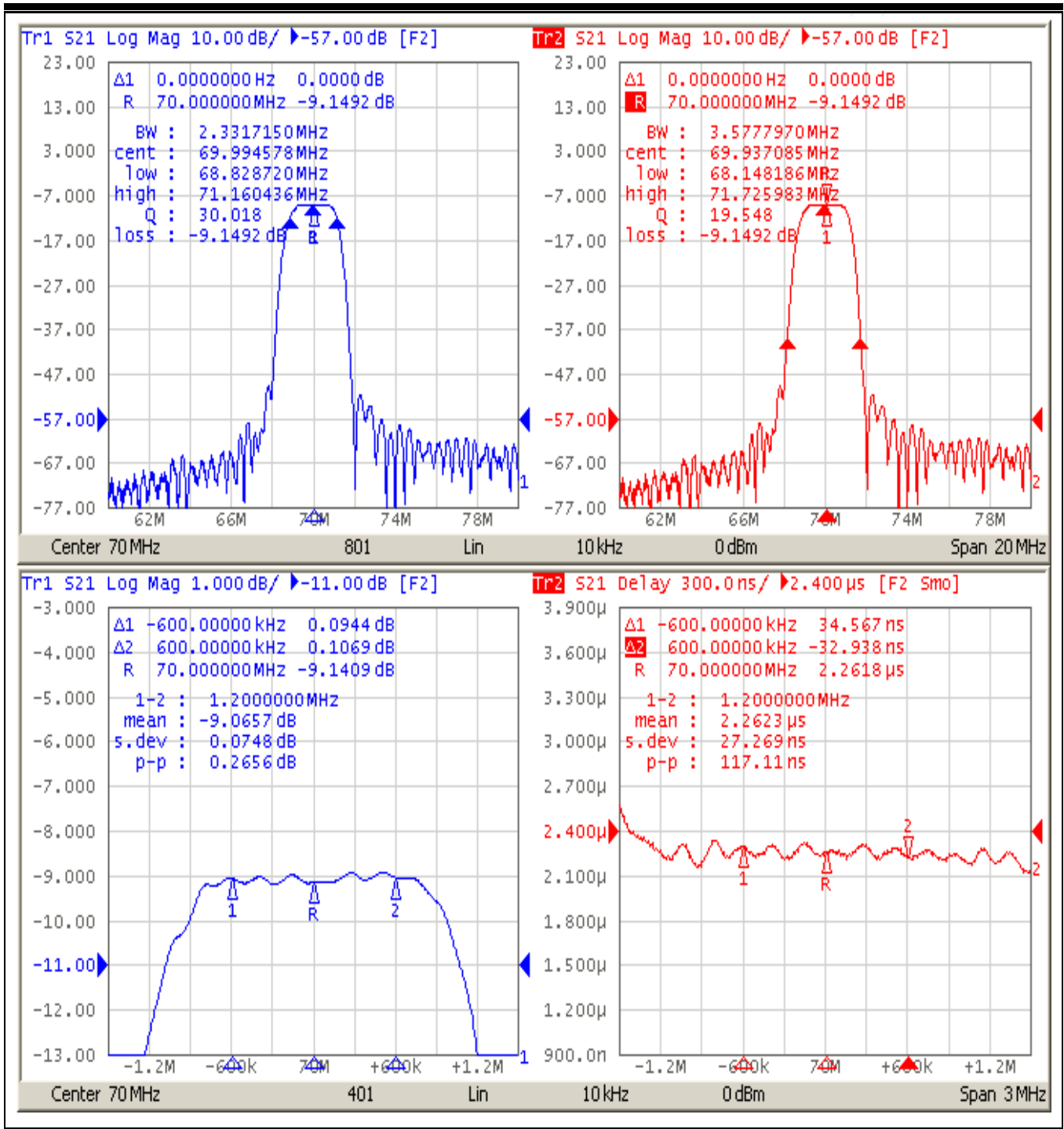
Step9 : Ripple : SPAN → 1MHz → MARKER → MARKER MODE MENU →
UNCOUPLED → RETURN → ALL OFF → “ MARKER1” move LEFT PEAK →
ΔMODE MENU → ΔREF=1 → 2 → Move Right PEAK → MARKER FCTN →
STATS ON

Step10 : GDV & A.Delay : CHAN2 → FORMAT → DELAY → SMOOTHING ON → MARKER
ALLOFF → MARKER1 → 70MHz → MARKER REFERENCE → SCALE Calibrate

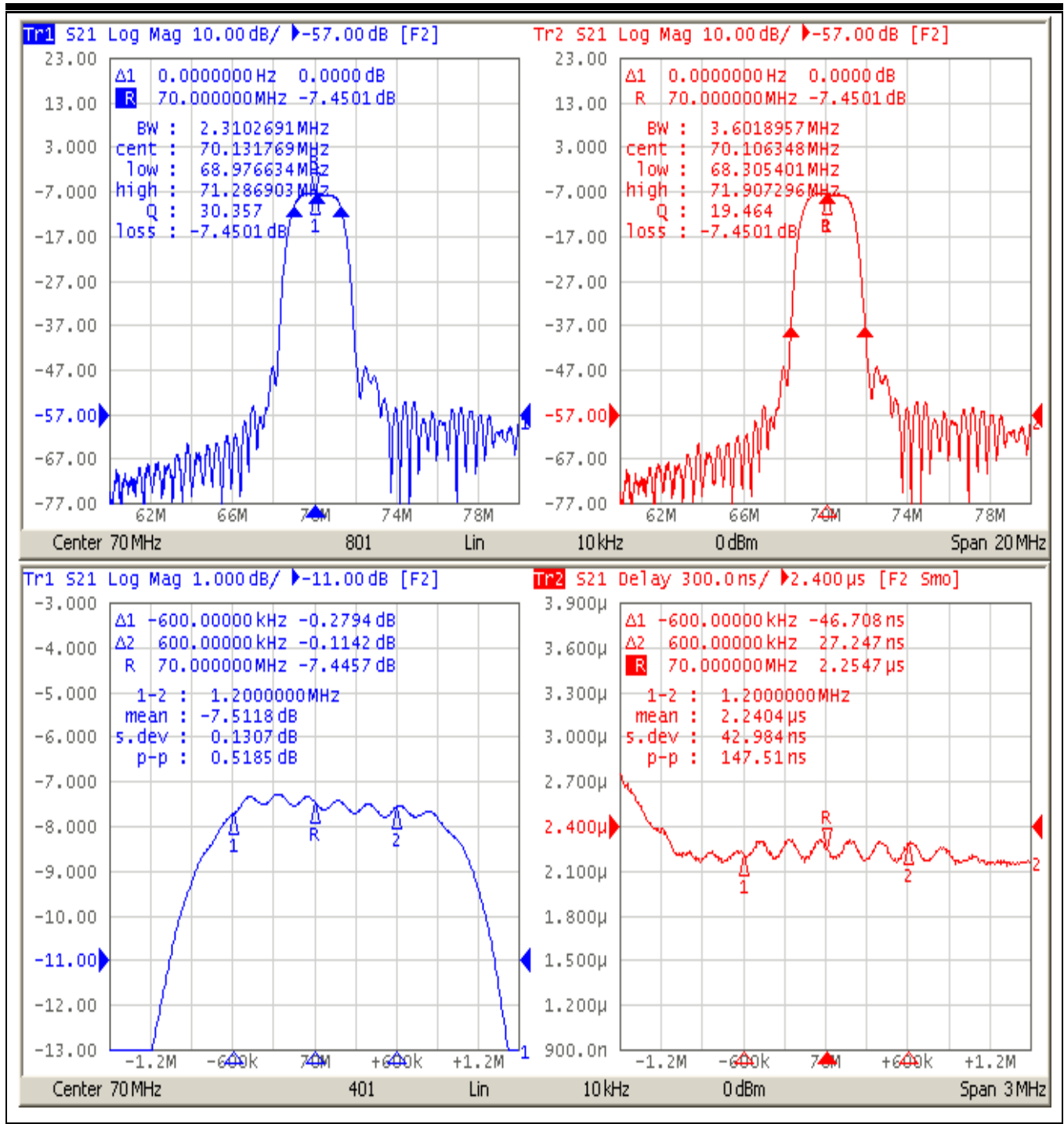
4.3. Test DATA (T=25°C)



4.4. Test DATA (T=85°C)

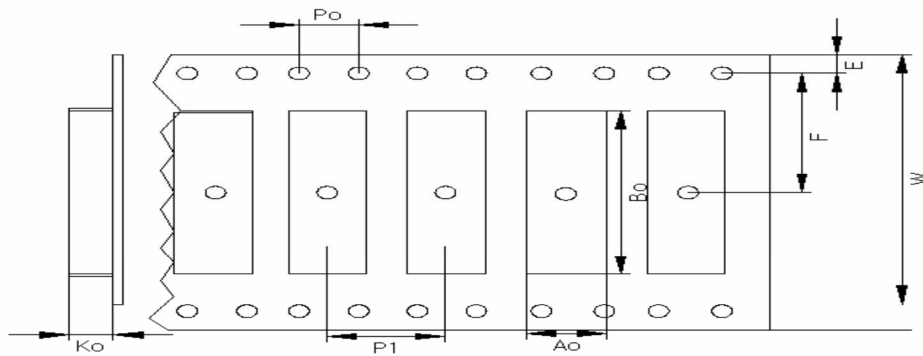


4.5. Test DATA (T=-30°C)



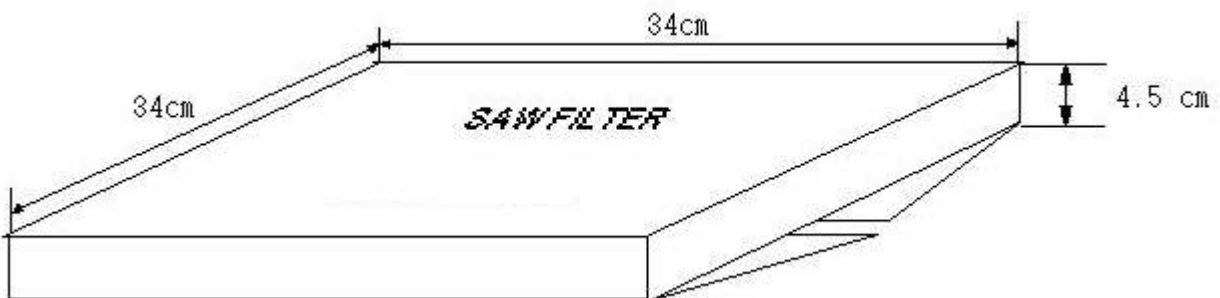
5. PACKING

- 1) M.P.Q : 2000ea / 1 reel
- 2) Taping Drawing



Ao	Bo	Ko	W	E	F	Po	P1
10.10±0.2	20.30±0.1	1.85±0.2	32.0±0.3	1.75±0.1	14.2±0.15	4.0±0.1	16.0±0.1

- 3) BOX Drawing : 1reel / 1box



6. RELIABILITY TEST DATA

6.1. MTTF : 3.5E+5 hour @ 40°C

- Defect Rate : 1.0 X 10⁻⁵ /hr @ 40°C (CL 60%)
- SAW FILTER is impossible item to be repaired. So the average life is MTTF(not MTBF)

6.2. MSL Rating : Not moisture sensitive (Level 1)

6.3. Reliability Characteristic

6.3.1. LIFE TEST

ITEM	TEST CONDITION	LIMIT
High Temperature Exposure	Ta = +85±2°C , 500hrs	After reliability test, all data must meet the standard of specification
Low Temperature Exposure	Ta = -45±2°C , 500hrs	
Static Humidity	Ta = +45°C , 90~95% , 250hrs	

6.3.2. MECHANICAL TEST

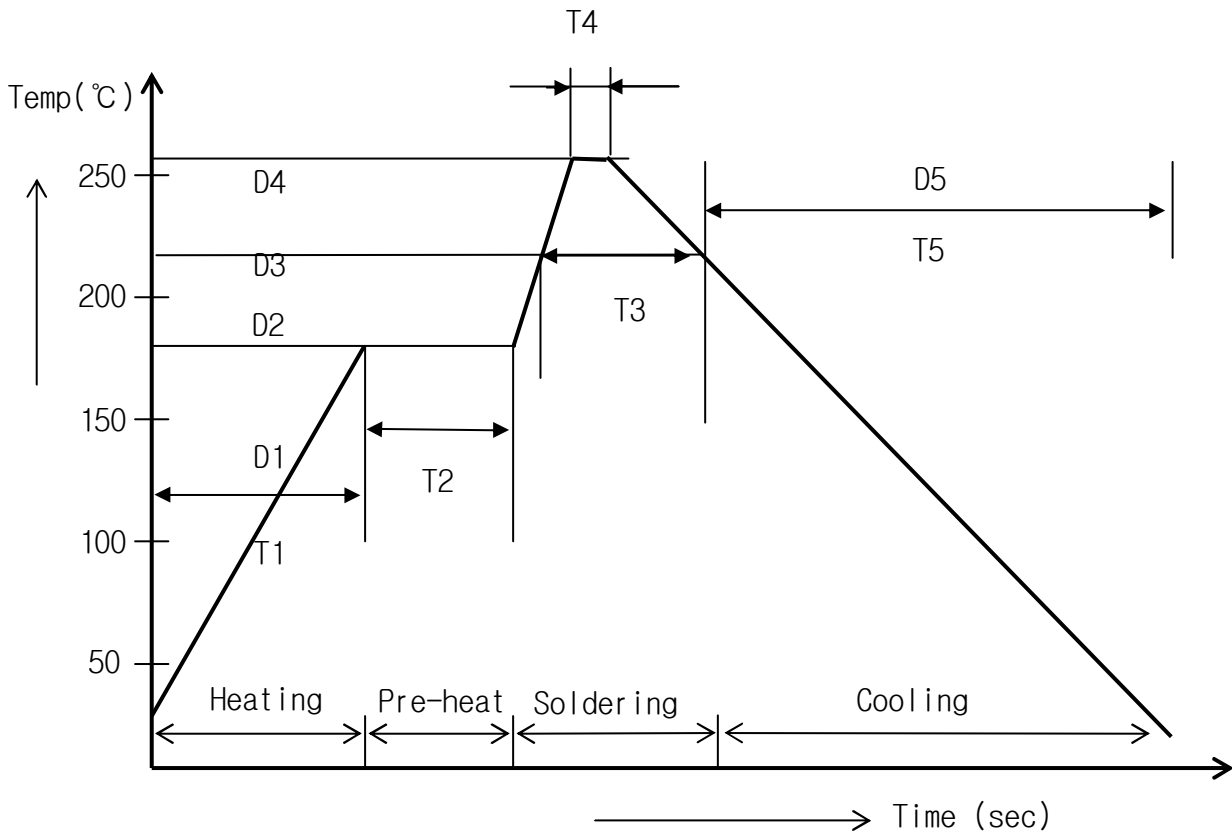
ITEM	TEST CONDITION	LIMIT
Vibration	Amplitude = 1.5mm 10~55hz, 2hrs	Same as 6-3-1
Drop test	Height = 1m , drop 3 times	

6.3.3. HEAT CYCLE, SOLDERING

ITEM	TEST CONDITION	LIMIT
Heat Cycle	-30°C,30min→85°C,30min , 10cycle	Same as 6-3-1
Solder Resistivity	240°C, 10sec in soldering bath	

7. Reflow Data

7.1. Reflow Profile



No.	ITEM	Temperature (°C)	Time (sec)
1	Heating	D1 : 25°C => 180±5°C	T1 : 30 ~ 60
2	Pre-Heat	D2 : 180±5°C	T2 : 30 ~ 60
3	Soldering	D3 : 220±5°C	T3 : 30 ~ 40
4	Soldering Peak Time	D4 : 260±5°C	T4 : 3~5, 1 time
5	Cooling Time	D5 : 220°C => 25°C	T4 : 60~120, slow cooling

7.2. Lead Finish

- SMD Type / Ni Plating 1.8um~8.0um / Gold 0.3um min.
- After plating Nickel, K/R Brazing. And then Immersing Gold plating.



8. Quality Guaranteed

- 1) The Warranty lasts for 2 years.
- 2) If Quality is guaranteed to customers, there should not be any inferior goods being shipped to customer.
- 3) Guarantees that the Products are free from defects concerning workmanship and material, such as to make their use impossible, for the Warranty period, which shall keep accurate records of deliveries. If any of the Products is found to be defective within Warranty period due to workmanship and material, customer will give prompt notice. Supplier as the case may be indicating the nature and extent of the defect. Supplier may replace the defective product without charge.
- 4) For A/S, present exact part list and part lay out based on this approval sheet.
- 5) For revising approval data sheet, Supplier can change the specification after confirmation from customer's Quality Dept.