SAW DEVICES

GLOSSARY OF TERMS

Nominal frequency (Fn): The nominal values of the center frequency F0 and is used as the reference frequency of related standard. Unit of nominal frequency is in MHz.

Insertion Loss (IL): The logarithmic ratio of the power delivered to the load impedance before the filter is inserted to the power delivered to the load impedance after the filter is inserted. Unit of Insertion loss in is dB.

Pass Bandwidth (BWp): The frequency interval in which the relative attenuation (the attenuation from the minimum insertion loss) is equal to the specified value 3dB.

Stop Bandwidth (BWr): The frequency interval in which the relative attenuation (the attenuation from the minimum insertion loss) is equal to the specified value of "A" dB.

Group Delay Ripple (GDR): The difference between the maximum and minimum value of the group delay in the specified range of the pass band. Unit in µs.

Pass band Ripple (AR): The difference between the minimum peak attenuation and the maximum peak attenuation within a pass band. Unit is in dB.

Terminating Impedance (Zt): Impedance presented to the filter by the source or by the load.

HANDLING PRECAUTIONS

1. Use the SAW product within its maximum ratings.
2. Never apply voltage higher than the maximum rating since high level voltage could accelerate deterioration of the SAW characteristics.
3. The shield grounding condition should be determined so that electrical coupling between input and output may be minimized before using the device. Coupling between input and output will cause ripples in the pass band amplitude and group delay.
4. Storage temperature shall not exceed 85°C.
5. Be careful when using ultrasonic cleaning SAW products since device material and construction is sensitive to ultrasonic vibration.
6. Do not apply sudden or excessive thermal or mechanical shock to the SAW products since it could worsen or deteriorate the SAW characteristics.

ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

Shock (Drop test): Natural drop on a hardwood board at 1.0m, 3 times. The specimens shall meet the electrical specifications.

Vibration: Frequency with an amplitude of 1.5mm sweeping between 10Hz to 55Hz within 1 minute for 2 hours minimum on each axis on three (3) mutually perpendicular axes. The specimens shall meet the electrical specifications.

Resistance to solder heat: Immerse the leads or terminals in soldering bath at 245° ±5°C for 5 ±0.5 s. 75% or more of the immersed surface shall be covered with solder.

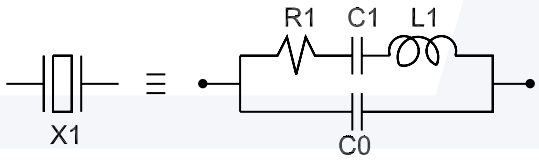
Temperature characteristics: Specimens shall be measured within -40°C to +85°C temperature range. The specimens shall meet the electrical specifications.

Dry heat (aging test): Temperature 125°C ±2°C for 250 hours. The specimens shall meet the electrical specifications.

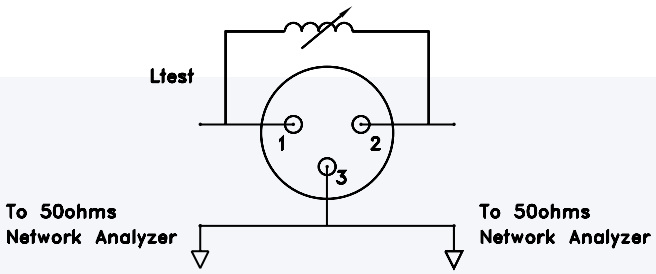
Cold resistance: Temperature - 40°C ±3°C. Duration 96 hours. The specimens shall meet the electrical specifications.

Thermal shock: Heat cycle conditions -55°C (30 minutes), 25°C (5 minutes), +85°C (30 minutes) for 5 cycles. The specimens shall meet the electrical specifications.

EQUIVALENT LC MODEL SAW RESONATOR



TEST CIRCUIT SAW RESONATOR



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SAW DEVICES

Definition of SAW:
Surface Acoustic Wave (SAW) is a wave propagating along the surface of an elastic substrate. Frequency of SAW is:

$$F = \frac{V}{\lambda}$$

Where V is the velocity of SAW (~ 3,100m/s)
λ Is the IDT period.
Frequency range of SAW products is 10MHz to 3GHz.

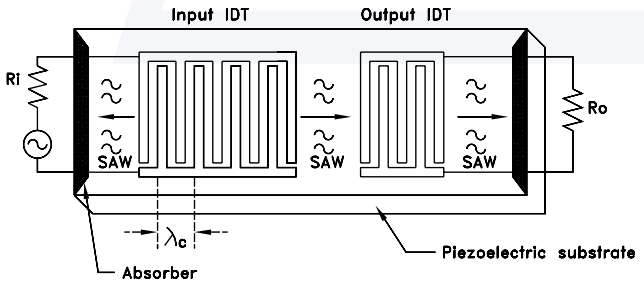
SAW filters characteristics:

- SAW filter is an integrated, passive device with bandpass filter characteristics.
- Operation is based on the interference of mechanical surface waves.
- Input/Output transducers are formed on a piezoelectric material.

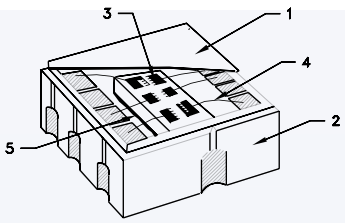
SAW filters advantages:

- Reduced size and weight.
- High reliability and ruggedness.
- No tuning or readjustment.
- Mass production capable.

SAW filters fundamentals:
SAW devices consist of two transducers with interdigital transducers of thin metal electrodes deposited on a piezoelectric substrate such as quartz or lithium tantalite. One of these acts as the device input and converts signal voltage variations into mechanical surface acoustic waves. The other IDT is used as an output receiver to convert mechanical SAW vibrations back into output voltages. Such energy conversions require the Interdigital transducers to be used in conjunction with elastic surfaces that are also piezoelectric ones.



SAW devices structure:		
No.	**Parts list**	**Materials**
1	Lid	FeNiCo
2	Ceramic base	Al2O3
3	Chip (Die)	LT, LN, SiO2
4	Wire	Al, Au

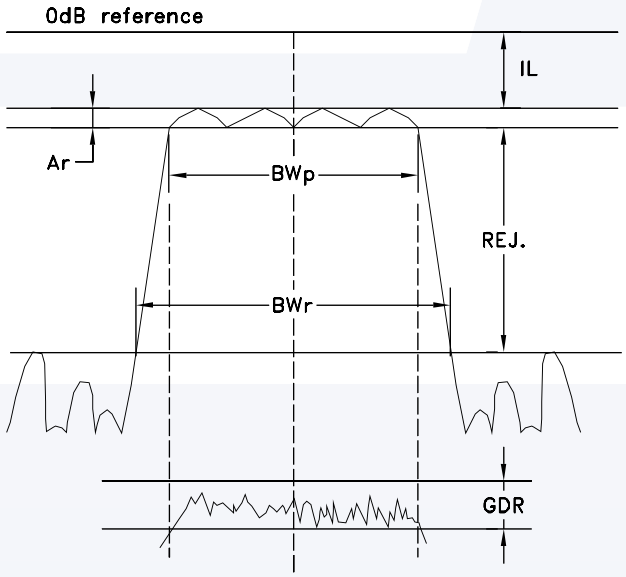


SAW filters manufacturing process:

- Wafer ($LiTaO_3$ or $LiNbO_3$, or SiO_2)
- Al deposit (sputtering) 0.15µ to 1.5µ
- Photoresist (PR coating)
- Exposure
- Develop
- Al etching (Wet etching)
- PR removal
- QC check + Probing (F0, IL)
- Sieving (Scribing)
- QC check (chips, cracks)
- Mounting Ag/UV bond
- Wire bonding
- Seam sealing
- Marking
- Final tests and inspections

SAW filter parameters:

- Nominal frequency Fn (MHz)
- Pass Bandwidth 3dB BWp (MHz)
- Stop Bandwidth BWr (MHz)
- Insertion Loss IL (dB)
- Pass Band Ripple AR (dB)
- Group Delay GD (µs)
- Temperature coefficient TC (ppm/K)
- Termination Impedance (ohms)
- Operating temperature range T (°C)



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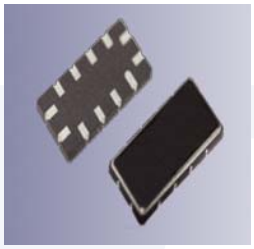
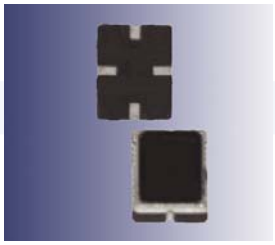
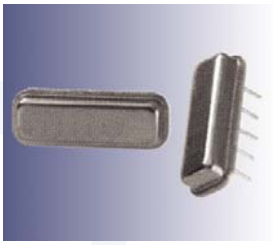
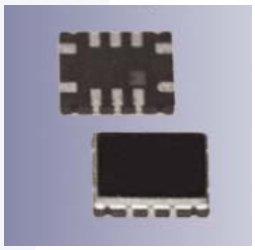






With the growth of wireless communications, SAW devices have become a critical component for electronics manufacturers. For 2002, Abracon is pleased to announce the addition of SAW Resonators and SAW Filters to our Frequency Control product line. With high volume off-shore manufacturing, Leading technology and Superior engineering resources in design and process manufacturing, Abracon would like to be your preferred supplier for SAW devices.

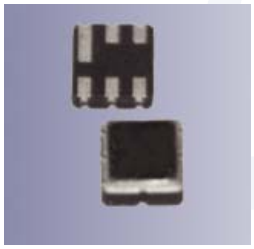
• Mobile Phones



Our experienced engineering team can support your SAW application from the initial design through production. Custom designs are available utilizing high technology mask designs, wafer fabrication, assembly and complete reliability testing.

For immediate assistance,
Please contact Abracon Corporation or send an email to: abrinfo@abracon.com

• Automotive Electronics



Applications for Commercial Communications:

- Fiber Optics
- LAN Systems • Cable TV, Set-top box
- Digital Audio/Video Broadcasting (DAB)/(DVB)
- Digital Satellite Systems

• Remote Keyless Entry

Applications for Consumer Communications:

- Mobile Phones • Pagers • Wireless Lan Systems
- Remote Keyless Entry (RKE) • Security Systems
- Garage Door Opener

Products offered:

RF SAW filters (0.1GHz ~ 2GHz)
IF SAW filters (10MHz ~ 500MHz)
SAW resonators one port or two ports (200MHz ~ 600MHz)

• Wireless Communications

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