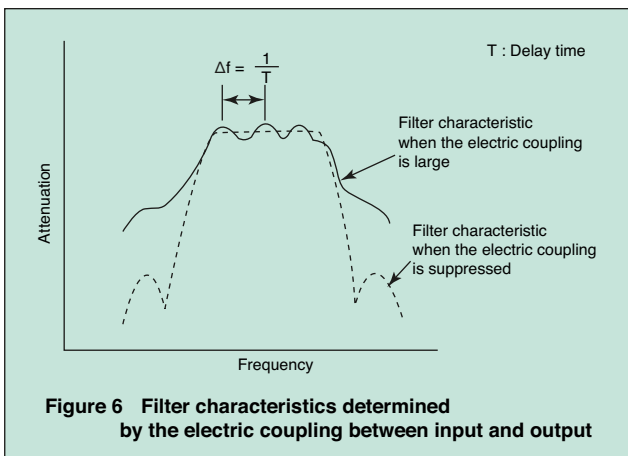


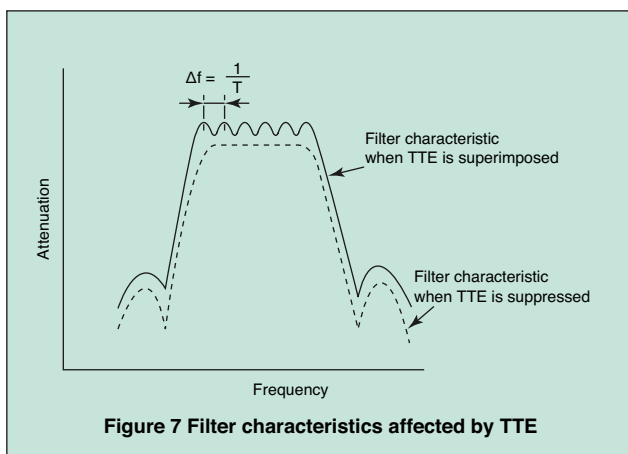
Precautions for Use

Please read the following precautions carefully in order to ensure NDK's SAW Filter is used correctly and delivers the best performance.

1. Only use them within their maximal rated values.
2. A highly applied DC voltage and an excessive input level will cause a more rapid deterioration of their characteristics. Make sure to use them within their rated values.
3. Static electricity on the input and output terminals results in the deterioration of the inside of the SAW filter and a failure of the device.
4. As shown in Figure 6, a ripple occurs in the amplitude and group delay time characteristics because of the electric coupling between input and output. When using a SAW filter, determine shield grounding conditions so that the electric coupling between input and output is minimal. Use the following equation to calculate the ripple period: $\Delta f = 1/T$.



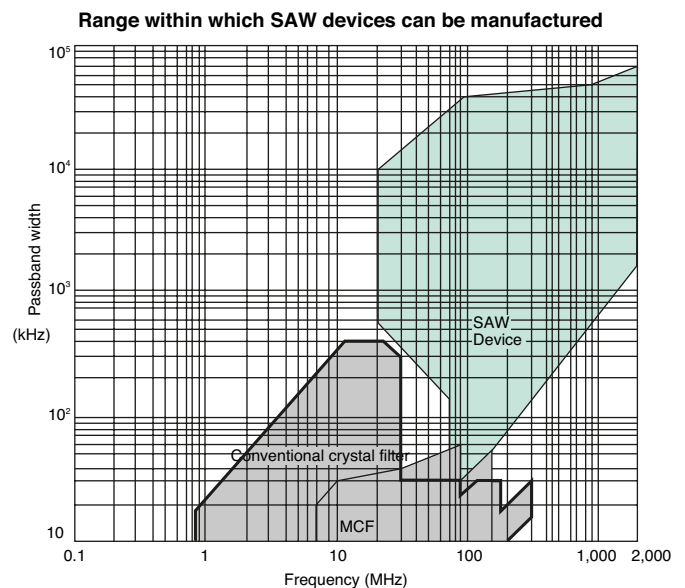
5. As shown in Figure 7, the multireflection (TTE) wave of a surface wave between input and output is superimposed on the main signal, thereby causing a ripple in the amplitude and group delay time characteristics. This ripple can be decreased by mismatching the input and output termination conditions. Use a SAW filter on the rated termination conditions. Use the following equation to calculate the ripple period: $\Delta f = 1/T$.



6. Be careful not to apply any strong force to the pin terminals.
7. When storing a SAW filter or transporting it, strictly maintain the ambient temperature at 85°C or lower.
8. When soldering a SAW filter, be careful and ensure no source voltage is applied to it.
9. Mounting of a surface-mount SAW filter
 - (1) Rapid temperature change after a board has been mounted
When the material of the mounting board for a surface-mount MCF package with ceramics has an expansion coefficient that is different from that of the ceramic material, the soldered fillet section may crack if subjected to repeated extreme temperature changes over a long time.
Under such conditions, it is recommended that the situation be checked beforehand.
 - (2) Shock by automatic mounting
When a SAW filter is adsorbed or chucked in the course of automatic mounting or a shock that exceeds the specified value occurs when mounting on the board, the characteristics will change or deteriorate.
 - (3) Stress by board bending
After a SAW filter has been soldered to a printed board, bending the board surface may cause the soldered part to peel off or the SAW filter package to crack due to mechanical stress.
10. Avoid ultrasonic cleaning after an element single body and a printed board have been mounted

SAW Device-Manufacturable Range

The figure below shows the schematic range within which SAW devices can be manufactured.



(For information about crystal filters, see our separate volume "Crystal Filters.")