

## **Multi-physics Modeling of BAW and SAW components**

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Nowadays, primarily acoustic wave devices are used for filtering in front ends of modern mobile transceivers. No competitive technology providing the same performance at the same size and cost exists at the moment. Usually, Tx filters are used at high-power levels. A part of the applied power will dissipate and cause a temperature increase within the filter. The temperature increase affects the filter performance. On the one hand, the steepness of the filter skirts can become insufficient so the filter will not switch from transmission to rejection within the specified band gap, or the specified insertion loss will not be maintained. On the other hand, the lifetime of each device exponentially depends on the temperature and, therefore, will be significantly reduced by the self-heating effect. This short course introduces to multi-physics modeling of bulk acoustic wave and surface acoustic wave devices. After introducing the fundamentals of BAW and SAW components, their basics modeling will discuss. For analyzing the devices at higher power levels, approaches for multi-physics modeling are presented allowing for accurate and at the same time efficient modeling. One approach takes the different types of losses and their spatial distribution into account. The short course covers the following topics:

1. Basics of BAW and SAW
2. Acoustics modeling of BAW and SAW
3. Multi-physics modeling of BAW and SAW
4. Characterization methods for BAW and SAW