

Version:
January 12, 2017



Dielectric Technology vs. Saw Technology

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Table 1: Performance Comparison		
Performance Comparison	Dielectric Filter (2GHz)	SAW Filter (2GHz)
Insertion Loss	Low (>1.8dB)	Medium (>2.5dB)
Fractional Band Width	Wide (<10%)	Medium (<3%)
Frequency Range	Wide (<10G)	Medium (<3G)
Spurious Response	Fair	Good
Handling Power	High (<200W)	Low (<0.3W)
IM (Inter-Modulation)	Excellent	Fair
Temperature Performance	Stable (0~5ppm)	Unstable (-20~-90ppm)
Impedance Matching	Good	Good
Design flexibility	Good	Fair
Size	Medium	Small
Weight	Medium	Light
Cost	Low	Medium

The technology comparison between dielectric filter and SAW filter is shown in Table 1. Items of comparison are electrical performances (insertion loss, fractional bandwidth, spurious response), handling power and intermodulation, size and weight, temperature stability, design flexibility, and cost (mass productivity).

SAW filter is superior in spurious response, size, weight, especially, but inferior in fractional bandwidth, frequency range and high handling power. On the other hand, dielectric filter is superior in insertion loss, fractional bandwidth, handling power, intermodulation and temperature performance, but inferior in spurious response, size, and weight. Those features are due to physical nature. As a result, each technology may be compensative with each other.

Commercially speaking, SAW is suitable for less than 1 GHz low power application, for example 900MHz band cellular handset filters. Dielectric filter is suitable for more than 2 GHz high power application, for example millimeter wave filter and cellular base station filter. But in overlapping region, for example 2GHz band handset filters, the method to gain the most practical and powerful solution must be combination and fusion of these technologies. Now what is required strongly for dielectric filter is the break through to the new technology suitable for combining with SAW technology.

As a candidate of novel dielectric technologies, planar filter utilizing thin film electrode is introduced. That may be coexisting and will be harmonized with SAW technology in the future. And dielectric technology will be growing up more than ever. Especially, for use of high power, wide band and high frequency operation, dielectric technology will be kept as the most powerful technology.