

SAW Bandpass Filter Design for 1.6-GHz PCM Timing Tank Applications

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A 1.6-GHz surface acoustic wave (SAW) timing tank for a self-timed regenerative repeater for an ultrahigh-speed PCM optical fiber transmission system is described. A SAW narrow bandpass filter with 0.74- μm linewidth interdigital transducers with double electrode geometry and 20-nm aluminum metallization on AT-quartz substrate is realized by conventional optical photolithography. Typical performance obtained is as follows: center frequency f_0 is 1.5993 GHz; insertion loss is 22 dB; stopband attenuation is above 23 dB with respect to the passband; stability is $|2Q_L / \Delta f / f_0| < 0.1$, where Q_L is loaded Q value and Δf is mistuning due to temperature effects. It is demonstrated that SAW quartz transversal filters can be made into new practical filters which have both high Q value and high stability in the GHz range and are satisfactory from the standpoints of precise design, fabrication technique, and performance.

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