FABS and LABS

Akoustis Technologies XBAW® Wafer Fab

Akoustis Technologies is building a new generation of RF filter technology, adding a phase to the history of upstate New York's original technology companies: Corning, Xerox and Kodak. In 2017, Akoustis acquired a MEMS manufacturing facility in Canandaigua, not far from Rochester, to manufacture its XBAW® filters for the Wi-Fi and mobile wireless markets. Xerox had developed the site in the late 1980s as a center for microtechnology. In 2003, after Xerox departed, the Research Foundation for the State of New York made the site a center of excellence to support economic development in the region.

XBAW—Akoustis' patented, high purity piezoelectric bulk acoustic wave (BAW) filter technology—is actually a MEMS device, which made the fab perfect for Akoustis' production manufacturing. Formed in 2014, Akoustis' first years were spent developing the piezoelectric technology underlying the XBAW process. By 2017, company executives were assessing strategic alternatives for volume manufacturing and learned of the Canandaigua operation. Acquiring an existing capability was far faster and less expensive than building a green field operation: Akoustis paid less than $3 million for the building, equipment and 57 acres of land—capitalizing on an investment of $88 million by the previous owners. The fab was already staffed with an experienced technical and operations team, who joined Akoustis and began transferring and optimizing the XBAW process for production, which was qualified in July 2018.

Akoustis uses high purity piezoelectric material for its XBAW filters, which improves performance compared to BAW filters fabricated with poly-crystalline material. XBAW filters offer lower insertion loss, higher power handling and tighter k_t^2 coupling, which extends bandwidth and upper frequency coverage and increases the steepness of the skirts. The higher power handling of XBAW meets the requirements of Wi-Fi access points, small cells and 5G mMIMO base stations, and the XBAW filters are significantly smaller than dielectric resonator filters, which have historically been used.

The number of mask levels for the MEMS-based process is comparable to other BAW processes, so there's no added complexity. Akoustis uses in-process RF testing and high accuracy trimming to tune filter performance and increase yields. The process is compatible with SMT packaging and wafer-level packaging, and wafer-level packaging for mobile applications is currently being qualified.

To support an ambitious production ramp from multiple design wins, the fab is running two shifts while in the middle of a 500 percent equipment capacity expansion, scheduled to be completed by mid-year. With three clean rooms in the 120,000 square foot building, capacity is not constrained by space: the 150 mm fab's capacity is ultimately scalable to 150,000 wafer starts per year, which will support up to 5 billion XBAW filters per year.

Upstate New York's technology base includes well-known semiconductor companies—IBM, GlobalFoundries, ON Semiconductor, Cree—ensuring a pool of experienced technical talent to support Akoustis' growth, and nearby community colleges and universities—Rochester Institute of Technology and Cornell—are sources for recruiting new graduates.

The Akoustis team in Canandaigua is diverse and driven by an innovative, tight-knit culture. They see the impact of their work, the opportunity to make a difference in a small cap company aiming to penetrate a multi-billion dollar market at the center of society's desire to be connected at all times, anywhere on the globe.

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