

FAB S and LAB S

MACOM—Partners from RF to Light



MACOM was launched in the summer of 1950 as Microwave Associates by four ex-Sylvania engineers—Vessarios Chigas, Louis Roberts, Hugh Wainwright and Richard Walker—as a consulting and research company for mmWave technology. The company branded itself as the first name in microwave for many years, as an early company to the growing microwave industry. It has acquired and spun off many other famous companies, such as Linkabit, which included Irwin Jacobs and Andrew Viterbi who launched Qualcomm, Omni Spectra and Adams Russell, before being re-launched as an IPO in 2012 after its breakup by Tyco Electronics a few years prior.

The company started in Boston but moved into several suburbs, as it expanded its operations around the Boston area. In 1984, MACOM established the Advanced Semiconductor Operation in Lowell, Mass. to focus on GaAs ICs. The Lowell facility recently underwent a large expansion and building update to accommodate its growth.

The new 280,000 square foot headquarters includes the heart of the company, its original wafer fabrication facility, which contains 34,000 square feet of clean room manufacturing space outputting 2,000 wafers per month. The IC fabrication includes Silicon, GaAs and InP devices for both RF/microwave and optical applications ranging from diodes to highly integrated circuits. The company also makes use of external foundries for other processes and additional capacity.

The Lowell wafer fabrication equipment set includes i-line steppers with TEL coaters, E-beam system for fine line lithography, contact aligners, evaporators, medium current implanter, rapid thermal anneal system, multiple grind and polish tools, various state-of-the-art dry etchers, saw/scribe for wafer singulation, dual chamber epitaxial reactors and wafer bonders for PIN diodes. MACOM maintains an annual capital budget for new equipment

and building renovations to continuously improve the Fab environment and capabilities.

Process control and proper inspection are key attributes of MACOM's operation. The facility includes automated optical inspection, Zeiss Analytical SEM with EDX, Hitachi CD SEM, 3D optical interferometry and laser imaging, spectrophotometry, photoluminescence, acoustic micro imaging and surface charge analyzer. The company makes use of outside labs for more exotic analysis such as SIMS, FIB, EMMI, EDX line scans, etc. The facility is ISO9001 certified with Trusted Foundry and DLA Certifications.

MACOM uses the eight disciplines as a way of business and culture to handle manufacturing issues. First they establish a team of people with product/process knowledge. Then they describe the problem: who, what, where, when, why, how. Next they develop an interim containment plan before proceeding to determine and verify the root causes and escape points. Next they verify permanent corrections followed by defining and implementing corrective actions. At the end of the process, they prevent recurrence and system problems by modifying the management systems, operation systems, practices and procedures. And most importantly, the final step, to congratulate the team.

Today, MACOM is not only a leading microwave components company, but also a leader in the optical components area through several acquisitions. They recently announced a partnership with STMicroelectronics to process 6 in. GaN on Silicon wafers for high volume RF/microwave power products and plan to advance to 8 in. wafers in the near future. The plan is to drive down the cost of GaN devices for wide commercial adoption from telecom to RF energy applications. MACOM remains aggressive in market driving for change in the way traditional markets are approached—just as they did in 1950 to push mmWave technology to the forefront of the industry.

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