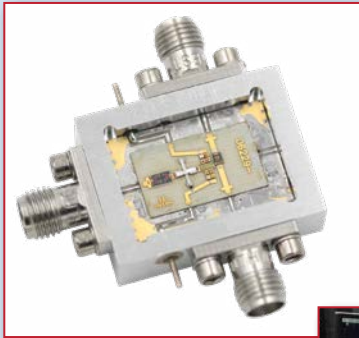


FAB S and LAB S

Marki Microwave: Three Decades and Two Generations



A hybrid mixer is like a piece of jewelry. That insight was the enabling technology for Ferenc Marki, previously a goldsmith and jeweler, to design microwave mixers and ultimately start Marki Microwave. The first production mixer he designed at Watkins Johnson (WJ), his first job after college, covered 4 to 12 GHz, used baluns assembled from miniature coax and HP beam lead diodes. The mixer, the M12, was hard to produce, so he asked HP to develop lower capacitance diodes to get more repeatable performance. At the time, the market for mixers was principally below 1 GHz, and Ferenc's boss was skeptical anyone would want a mixer with an IF to 4 GHz. Ironically, the M12 was chosen by WJ's own systems division for use on a defense program.

As is often the case when a creative genius finds management unwilling to fund the vision, Marki left WJ for AvanteK and Western Microwave before forming Marki Microwave in 1991, gaining the freedom to control the product roadmap and the resources to develop it. Marki's business philosophy was simple: gain a deep understanding of a customer's need and then develop a mixer so good—performance, repeatability, ease of assembly—the customer "couldn't refuse to buy it." The ability to make customers' dreams come true fueled Marki Microwave's growth.

Though Christopher Marki grew up with the company, he had little interest in joining his father's niche technology, instead getting a Ph.D. in photonics. Yet Chris was inspired by his father's ability to add value by solving difficult problems—the *raison d'être* for engineering—and, when he graduated, decided to take advantage of the opportunity to further that quest with his father. He joined Marki in 2007 and assumed the role of chief executive at the end of 2016.

During the interim, Chris led an engineering team that

evolved many of his father's hybrid mixer designs, using MMIC technology to achieve the same or better performance at lower cost. Yet he preserved hand-soldered hybrid assembly where it was the only way to achieve the design goals. Marki also expanded the company's product families, introducing innovative designs that complement its roots, such as LO amplifiers optimized to drive mixers.

The company has retained the principle of manufacturing its products in-house except for semiconductors. Not surprising that Marki's growth outgrew its facility in Morgan Hill, Calif., so the company built a new 60,000 square-foot facility on a four acre lot, also in Morgan Hill, with 40,000 square feet for manufacturing and 20,000 for offices. Capabilities include the full range of hand solder and automated chip-and-wire assembly, RF testing to >110 GHz, cryogenic test, environmental screening and a new manufacturing execution system to manage the workflow.

Amazingly, the move from the old to the new facility occurred over one weekend last year. The operations team developed a thorough qualification plan to bring up the manufacturing processes in the new factory, coordinating with customers on products controlled by source control drawings. Product inventory levels were increased prior to the move to ensure Marki could meet near-term product demand.

Marki's business has remained strong throughout the pandemic, and the outlook for the fourth decade is good: a strong pipeline of new innovative products, an expanded management team and a new facility. Christopher Marki is continuing his father's vision of making a customer's dream come true. In his own words, "The most noble thing an engineer can do is to solve somebody else's problem."

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