

Printed Electronics Start-up Specializes in Low-Volume Tag Production

By focusing on production runs as small as 150 units, Mu-Gahat says it provides companies with greater flexibility for testing and development.

By Beth Bacheldor

May 9, 2008—With development underway for the last three years, RFID and printed electronics company Mu-Gahat officially launched in April, claiming it can produce economical RFID tags in volumes as low as 150 units. The Sunnyvale, Calif., start-up says this will give design engineers, label converters and others the opportunity to more easily experiment with new technologies, address businesses' unique needs and test products.

The market for printed electronics is just beginning to emerge, says Baxter Watkins, CEO and founder of Mu-Gahat. "Similar to the early semiconductor market," Watkins says, "there are specific applications that are legitimizing its acceptance and driving its demand. In some cases, the market applications are near-term and dynamic, while others are more long-range and evolving." The fast-growing RFID market is one of the most widespread and immediate applications for printed electronics.

"Previously," Watkins states, "most RFID manufacturers had focused entirely on high-volume production. Mu-Gahat saw a need in this early stage market for a specialist in prototyping and low-volume production of RFID [tags]."

The name Mu-Gahat, which derives from the Native American Washoe tribal word for "bridge," represents the company's mission of building bridges between customers' ideas and their realization. "To the best of our knowledge, we are the only Native American minority business enterprise specializing in this area," says Watkins, an enrolled member of the Choctaw Tribe of Oklahoma.

Watkins and a team of RF professionals formed Mu-Gahat in response to a customer request for a better method of production for printed circuits. Led by Josef Kirmeier, an expert in the fields of optics, electro-mechanical systems and RF design, Mu-Gahat developed its laser ablation technology, which leverages a patent-pending roll-to-roll laser production system, proprietary design software and Mühlbauer's FCM 10000 flip-chip equipment. With such technology, Mu-Gahat can provide up to five simultaneous "variations on a theme" for testing tags. In its production facility, the company can handle economical runs of as little as 150 units, up to 2 million units. For larger runs, Mu-Gahat plans to work with partners.

To produce its in-house tags, Mu-Gahat purchases polyethylene terephthalate (PET) or some other substrate material that is coated with both aluminum and copper in a manner specifically engineered to work with the company's laser ablation process. "The material is manufactured in a roll-to-roll process," Baxter explains, "and we then use our proprietary software and program the laser with the appropriate UHF [ultrahigh-frequency] or HF [high-frequency] design file and ablate away material from the substrate, leaving the dry antenna pattern. The process is finished using Mühlbauer flip-chip technology to accurately place and

attach the chip to the antenna."

Besides its in-house tag production, Mu-Gahat partners with such leading RFID technology vendors as [Impinj](#), [Texas Instruments](#) and [NXP Semiconductors](#), to provide stock RFID tags for applications such as archival magnetic tape, item-level tracking, and box and pallet tracking. Mu-Gahat can specially tune the stock RFID tags for a customer's specific application.

Two weeks ago, Mu-Gahat announced its first stock UHF RFID tags designed specifically for tracking back-up magnetic tape cartridges. The company chose to pursue the market for magnetic storage tapes, Baxter says, because the installed base market is in the tens of millions of tapes, "and is showing sustainable growth of multimillions of tapes each year." RFID tags, he adds, "have become an imperative for supply chain logistics, and to ensure data security and compliance with government regulations, so we believe that at some point, a magnetic storage tape without an RFID tracking system will be an anomaly."

Mu-Gahat's new TC10 "202" inlay contains an Impinj RFID chip that complies with the EPC Class 1 Gen 2 standard. It can accommodate a 96-bit Electronic Product Code (EPC) and has 64 bits of user read-write memory. Tape cartridges contain metal and metallic oxides, which can interfere with RF waves and "de-tune" conventional inlays. The TC10 "202" inlay, however, has been engineered to operate in the presence of such materials, and has a read range of over 3 feet (when utilizing a handheld interrogator), even when used on cartridges stored in stacks of up to 10 units. "This is important because most archival tapes are kept stacked in the library and not isolated," Baxter says. "We've tested single cartridge reads of up to 15 feet."

Mu-Gahat isn't the only vendor tackling the magnetic storage tape market. RFID component manufacturer [KSW Microtec](#), headquartered in Dresden, Germany, recently unveiled a new UHF Gen 2 transponder for magnetic tape cartridges that complies with the EPC Class 1 Gen 2 specification and employs NXP's Ucode G2X ICs. The transponder has 512 bits of user memory and is designed for a 10-year lifetime once converted into a media bar-code label, according to KSW Microtec.

But to the best of his team's knowledge, Baxter says, Mu-Gahat's magnetic storage tape tags provide better read range performance for both single and stacked cartridge reads. "In addition," he states, "we've incorporated unique changes to our design based upon input received by industry professionals, cassette manufacturers, label converters and end users that differentiate us from our competition."

RELATED ARTICLES Mu-Gahat currently has several customers signed up for its services, including [Kovio](#), a privately held Silicon Valley company that's developing a new category of semiconductor products using printed silicon electronics and thin film technology. (At this time, Mu-Gahat is unable to discuss the application the two companies are working on.)

Over the next six to 12 months, Mu-Gahat intends to focus on the continued development of laser-based manufacturing technologies and products for the RFID, flexible circuits and associated markets. The company soon plans to launch a series of HF inlays.

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