True Thermal Imaging for Consumer Markets

A Micron/Agiltron Case Study

Agiltron, Inc.

Agiltron has been developing and manufacturing premium optical products since 2001. Their product offerings include components for infrared detection and communications and solid-state photonic components. Customers include a majority of large U.S. defense and aerospace companies, worldwide communications and networking companies, and other Fortune 500 companies.

footprints, high cost, and are power hungry. Until recently, Agiltron's prototypes were running with high-end CCDs, but because of the many technological advances taking place with CMOS sensors, they began researching the possibility of using an alternative imager to work with their LightLever™ sensor—one that could achieve close to the same performance, but with lower power consumption and at a lower cost.

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Product Development

Agiltron recently developed a high-sensitivity, passive infrared (IR) thermal sensor that, when coupled with a conventional image sensor, can convert heat into a visible light image. The passive photomechanical IR sensor array eliminates the need for electronic connections, so the LightLever™ device doesn't give off any heat. This breakthrough technology creates a two-sensor, true thermal imaging solution that enables cameras to see in the dark and through smoke and fog.

Agiltron realized that if they could build their cameras with the right combination of cost and superior quality, their product would be sitting on several vertical markets. They could produce a mass-marketable, IR imaging solution for the consumer, commercial, and military markets. The challenge was to find a visible imager to work with their LightLever™ sensor that would deliver the required price point and performance.

The Challenges

Traditionally, CCDs had been the only sensors capable of accommodating Agiltron's thermal imaging system. Nothing had compared to them in quality. They provide the optical performance but have comparatively large design

In order to shrink the footprint, lower the power consumption, and get the right pricing, Agiltron explored the use of a CMOS image sensor rather than CCD. They were hesitant due to the traditional limitations of CMOS sensors; but with the recent advances in CMOS technology, they moved ahead with a market sampling of the latest CMOS sensors.

Agiltron's goal was to produce a high-quality, low-cost thermal imaging camera to compete in the same market as the visible light to near-IR cameras. These traditional cameras require illumination and cannot see through smoke and fog or detect objects that are hidden in shadow. Agiltron sought to drop the power consumption, raise the output quality, lower the BOM, and push the capabilities of their LightLever™ sensor.

Zeroing in on a Solution

Matthew Zavracky, lead design engineer with Agiltron, researched the CMOS imager market for the highest-performance sensors. A few promising product listings and specifications were found on the Web from several imager manufacturing companies, and Agiltron contacted them to get technical details and part capabilities. Specifics seemed to get hazy. The Agiltron team asked for the demo boards, reference designs, and evaluation kits. They needed these kinds of tools to speed their development process and

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design cycle. At this point in the process, according to Matthew Zavracky, "The phone calls stopped." In the end, they found several companies that were making claims, but only one that offered any real solutions.

The Micron CMOS Solution

During the research phase, Agiltron had contacted Micron Technology. Influenced by Micron's reputation of being a top CMOS supplier, Agiltron had high expectations. After seeing that Micron had an array of potential imagers in its portfolio that could provide image quality on par with the more expensive CCD sensors Agiltron had been using, Matthew connected with Paul Gallagher, Micron Imaging Group's director of new market development. Paul and Matthew identified the features that were most important to Agiltron, and after examining specifications, narrowed the possible solutions down to the MT9V032.

Finding an imager that most closely matched what Agiltron needed was only part of the equation. Agiltron also needed demos, evaluation tools, and access to engineering support. Micron's field engineer, Joe Camilleri, and sales engineer, Paul Giambalvo, visited Agiltron and demonstrated the MT9V032 with evaluation boards, and provided excellent ongoing support. Micron provided all of the required demos, evaluation kits, and reference kits. With reliable tools and technical support, Agiltron was up and running more quickly than anticipated.

Agiltron found the MT9V032 a cinch to work with—the board easily integrated the sensor and software. It offered performance enhancement in areas that were important to Agiltron and their LightLever™ technology. Among the features Agiltron wanted most, the MT9V032 delivered low noise, an operating temperature range (–40° to +85° C), and increased dynamic range (>55dB linear; >80–100dB in HiDy mode). The MT9V032 is used as a monochrome, plug-and-play device with 10-bit ADC resolution, a companding mode, and temporal averaging. The Agiltron team also found that Micron's imager had more integration capabilities than CCDs. It worked with their chosen DSP (Blackfin) and integrated well with their LightLever™ sensor, completing the system.

The End Result

Agiltron's LightLever™ prototypes include Micron's MT9V032. It delivers CCD-like quality, addresses Agiltron's power concerns, and enables them to reach their cost objectives. They expect to ramp production in the first quarter of 2007 with a low-cost, high-quality, true thermal imaging camera. Agiltron intends to bring this product to a mass-marketable level.

For Micron's part of the process, the team at Agiltron believes they got more than an excellent imager. "The technical support from Micron was outstanding," Matthew said. It was Micron's hands-on assistance and willingness to go the extra mile—as much as it was the MT9V032 CMOS imager itself—that helped Agiltron build the thermal imaging camera they had envisioned.

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