

Evergaze

Focusing the world for the visually impaired with Maxim Lens Driver

What makes the Evergaze team feel particularly good about its seeBOOST® electro-optical medical device is its impact on people with vision loss. Based in Richardson, Texas, Evergaze was founded by Patrick Antaki, Ronnie Dunn, and Russell Lemburg, electro-optical systems experts who identified a compelling application for their technology in helping those with low vision. (Low vision refers to any visual condition that is not correctible through conventional refractive means such as prescription glasses or contact lenses.) After much research into macular degeneration, the founders defined a product that could address unique vision challenges faced by these users. The seeBOOST wearable device consists of prescription glasses with a permanently attached monocular electronic vision augmentation system that provides:

- Instant auto-focusing
- Automatic contrast and brightness enhancement
- Selectable color modes
- User-adjustable magnification



Evergaze recently entered into a five-year agreement with the Dallas Lighthouse for the Blind to distribute seeBOOST to its affiliated national network of nonprofit organizations.

Challenge

- Meet requirements for small form factor, low power, and high reliability

Solution

- Lens driver
- MAX44009
- MAX8834Y
- MAX77818
- Overvoltage protector ICs

Benefits

- Met performance and small form factor requirements
- Good support from apps engineers and Maxim Ventures

While the major market for these glasses is age-related macular degeneration, they are also useful for those suffering from diabetic retinopathy. “With seeBOOST there’s a tangible, immediate benefit to people. The technology is complex yet the product is extremely easy to use. The end result is a human benefit – imagine a grandmother being able to see and recognize her grandchildren’s faces,” said Antaki, president of Evergaze. “That’s what this technology does for people.”

Most of Evergaze’s customers are between 70 and 90 years old and need visual assistance with many everyday tasks, from reading mail to paying bills or playing a game of bridge. Noted Antaki, “A customer came into the office months ago, tried on the glasses and said to us, ‘I had not seen my wife’s face in years.’ You can’t do that with optical-only solutions, you need coupled electronics and optics to do the job.”

CUSTOMER SUCCESS STORY: EVERGAZE



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— Patrick Antaki, Co-Founder and President, Evergaze

Design Challenges

seeBOOST glasses feature a camera with an adjustable lens, an FPGA for real-time image processing, and a liquid crystal-on-silicon (LCoS) display. The design consists of five circuit boards with three custom optical components, three different lenses, and a custom cable assembly. To control the lens, the Evergaze team needed a small, low-power, and highly reliable driver. The team also needed components that would support their design's specific performance parameters. The system design challenges were enormous. The product had to weigh less than 1 oz. to be comfortable; it had to provide a large field-of-view to compensate for the user's loss of central vision while simultaneously not occluding any of their remaining peripheral vision; it had to allow for natural eye contact with others interacting with the user who is wearing seeBOOST; it had to feature imperceptible delay from the real world to the electronic display (to avoid nausea and headaches caused by most head-mounted displays); and, finally, it had to dissipate all that heat without feeling warm to the touch.

“Our auto-focus capability is the fastest and most accurate in the world” notes Antaki. “For our customers, seeBOOST is their eye, the actual vision they're using to interact with the world. Any delays in finding proper focus takes something away from their vision.”

Solution

After talking with a colleague who works at Maxim, Antaki and his team determined that the company's lens driver would provide the capabilities needed. Along the way, the team also gained the support of [Maxim Ventures](#). Rounding out the team's bill of materials (BOM) from Maxim are:

- [MAX44009](#) ambient light sensor with ADC
- [MAX8834Y](#) adaptive step-up converter
- [MAX77818](#) switching mode charger with fuel gauge
- [Overvoltage protector ICs](#)
- [MAX44265](#) op-amp
- [MAX11607](#) quad ADC
- Boost converter
- [MAX15053](#) buck converter
- [MAX8880](#) LDO regulator



A single, large knob on seeBOOST allows users to control magnification and to toggle between normal viewing and inverted colors, which makes text on white paper easier to perceive.

CUSTOMER SUCCESS STORY: EVERGAZE

Benefits

For Evergaze, one of the benefits of Maxim ICs is that nearly all of the parts they needed are available in tiny chip-scale packages. The team is also pleased with the performance of the parts. For example, the lens driver is so reliable that the team is confident it will continue to perform in a device that is designed to be heavily used (estimated at over 60 million auto-focus cycles during the product's lifetime). Antaki adds that the MAX77818 switching mode charger is a "super sophisticated part that allows us to combine multiple different battery charging inputs and energy monitoring."

The team is also pleased with the support received by Maxim applications engineers, in getting evaluation boards and technical questions answered quickly. "It's all the little things that Maxim helped us with which add up to make a significant difference," Antaki said.

Evergaze continues to work on improving seeBOOST for a market that it considers to be underserved. In the U.S. alone, roughly 11 million people are afflicted with some form of age-related macular degeneration, according to BrightFocus Foundation. Antaki notes that the market for seeBOOST could eventually reach hundreds of thousands of people, with potential for further expansion globally. "If you take all the products developed for this (condition) over the last decades, no one has come close to offering a product that has such a significant impact of people's quality of life," he said.

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