

Price, Small Size, and High Efficiency Make Bus Converter Module Perfect Match for LED Application

The Moving Pixel Company
Beaverton, Oregon

John Kovacs, Vicor Applications Engineer, said that “Scott Silver, President of The Moving Pixel Company of Beaverton, Oregon has implemented a technical breakthrough by utilizing the newly available high brightness white LEDs (light emitting diodes) in a backlighting panel for Liquid Crystal Displays (LCDs).”

Silver says, “This design is based on the patented technology of one of our customers, a privately held company that develops and markets innovative High Dynamic Range (HDR) image technology.” This technology makes possible much brighter displays, as much as ten times brighter than a conventional LCD. Intensive video processing algorithms adjust the brightness of the LEDs. Every single LED in the backlight is individually addressable so the light levels can be changed dynamically frame by frame and spacially microregion by microregion. This technology for enhanced dynamic range displays enables them to display pictures much more vividly with much darker darks and much brighter brights than previously possible.

These new LEDs require a 4 VDC @ 200 W power supply in very small package size. And that’s when Vicor came into the picture. Working with John, Scott recognized that the Vicor BCM was a perfect solution for his design.

The BCM application involves large format displays — 37- and 46-inch high-definition displays — for high-end imaging applications. Moving Pixel’s customer has been in discussions with some very large format television manufacturers regarding the use of their HDR imaging technology. The expectation is that eventually they will be in high-volume production for televisions. Price, however, is an important factor for this consumer application; and prices have been trending down steadily on this technology. The first big format displays were priced at \$100,000; then dropped to \$50,000. The latest display that Moving Pixel worked on is targeted at a cost of \$20,000.

The BCM was designed into the high-power LED application to address a current distribution problem. Previously, everything was powered off a 5.5 V power supply at 500 amps, an unwieldy amount of current to distribute around inside the display.

“We came up with an architecture based on the BCM — really, the BCM made this possible,” said Silver. “We distributed 48 volts everywhere at a much lower current. And then locally, we stepped it down to the high-current 4 volts that we needed. On each of the large format boards there are four boards in one of our systems. In total we had 16 BCMs running in each system. We had 4 volts at 200 amps on each board. If we had tried to do that in a big power supply, we would have had an 800-amp power supply. Of course, such a supply is dangerous as well. We distributed 20 amps of 48 volts to each board, which is much more manageable, quite fusible.”

Customer Application CA:001

Silver continued, "Several factors make the BCM the right solution for us. A very important factor was the size and efficiency of the BCM (because we don't have to do anything special like heatsinking), and another was running at 48 volts. The BCM has the optimal voltages. We could trim to what we specifically needed to do. Typically, we trim the input voltage to run these systems at 4.1 to 4.2 V. Because the BCM is a converter and not a regulator, we're able to pump up our 48 input voltage to get the voltage out that we need. With these advantages and the reasonable price of the component, the BCM is an ideal part for us."

Figure 1. Because of its high conversion efficiency and safe operating temperature range, the BCM does not require a discrete heat sink in typical applications.



The 48 V to 4 V BCM (Bus Converter Module) is a member of Vicor's new Factorized Power Architecture family of V•I Chips. It is a high efficiency (>94%), narrow input range Sine Amplitude Converter — a new class of DC-DC converter topologies — that may be used to power non-isolated POL converters or as an independent source. The BCM (Figure 1) is very small with a footprint of 210 W/in², low weight of 0.5 ounce, and a high density of 876 W/in³.

The Moving Pixel Company, of Beaverton, Oregon designs custom hardware and software for high-performance real-time embedded applications; from subsystems to the entire product including mechanical design for a wide range of OEM applications.