

Interview with Ahmed Masood from Supertex

Ahmed Masood joined Supertex in 2004. He has over 20 years of industry experience in design, marketing, and business unit management. He has held senior management positions at On Semiconductor, Temic/Siliconix, and National Semiconductor. Ahmed holds a Bachelor of Science in Electrical Engineering from Columbia University and an MBA from the UCLA, Anderson Graduate School of Management.



Q: Please give us some background about Supertex and how you came to be involved in the LCD TV market.

A: Supertex saw a trend emerging in 2004, where LEDs were beginning to be used for back-lighting LCD TVs. Supertex began to work with the leading TV manufacturers and currently we are developing our fifth generation LED driver for the 2011 year models. Supertex is currently the market leader for LED drivers for LCD TVs.

Q: What exactly do LED drivers do?

A: Our LED drivers take voltage from the main TV power supply circuit and deliver constant current to single or multiple LED string(s) used for backlighting the LCD TV screen.

Q: Is there a significant difference between LED driving technology and CCFL-based technology? Is there a significant price difference?

A: LED backlighting offers a number of tremendous advantages over CCFL backlighting. Just to name a few: Power savings of up to 50%; better contrast ratio; better color gamut; and the elimination of motion blur. Because these LED Backlighting Units (BLUs) are a lot thinner than their CCFL counterparts, they allow TV manufacturers the ability to offer extremely thin and light LCD screens. The latest LED-backlit TVs are under 0.5" thick.

Q: Tell us about some of the unique things that your LED drivers enable in the LCD TV market.

A: Our LED drivers employ our proprietary high voltage CMOS (HVCMOS) process. The HVCMOS used for building LED drivers can operate directly from the main AC supply line (up to 450V) without using a separate power conversion stage.

Q: Please give us a brief tutorial describing terms like “buck, boost, buck-boost, and SEPIC topologies.”

A: Our LED drivers can be configured to run in any of these modes, depending on the system requirement (i.e. input voltage versus the output load voltage).

- Buck configuration is used when the input voltage is greater than the output load voltage. Example: 120V or 240V input voltage driving an LED load of 80V.
- Boost configuration is used when the input voltage is lower than the output load voltage. Example: 24V input driving a 50V output load.
- Buck-Boost (or Ćuk) configuration is used when the input and output voltages are roughly equivalent. Example: Input and output are roughly 120V. This configuration requires sensing the output voltage reference from the high-side voltage line.
- SEPIC is similar to the Buck-Boost but requires sensing from the low-side of the voltage line.

Q: Are your LED drivers agnostic when it comes to the LEDs being incorporated, or do you need to design customized drivers for each LED solution?

A: Supertex drivers are very versatile and can operate from a very wide input voltage range from 8V to 450V. Depending on the input and output loads, a user can configure any of the topologies listed above.

Q: Most LED backlighting today uses edge-mounted white LEDs. Please give us your opinions about a shift to behind-the-screen LED placements.

A: Edge backlighting, of course, is much cheaper than direct backlighting, since it requires a lot fewer LEDs. Direct backlighting gives a user the option of “local dimming,” allowing for much better contrast ratio and overall better picture quality. Due to the much higher cost of direct backlighting, we feel a majority of the TVs will employ edge backlighting. Our drivers are capable of operating in both edge and direct backlighting configurations.

Q: Will LED backlighting shift to RGB solutions or do you think white LEDs will remain dominant for the foreseeable future? Does Supertex have any preferences?

A: Our drivers can drive both white and RGB LEDs. As white LED based systems are much cheaper to build, we feel that the majority of LCD TVs will continue to use white LEDs.

Q: What sorts of things does Supertex do to stay differentiated in the field of LED backlighting?

A: We continue to work with leading TV manufacturers to develop new drivers using our proprietary HVCMOS process and help customers keep the overall system cost lower than other competing solutions.

Q: Tell us about your pulse-width modulated dimming capabilities.

A: All of our drivers use PWM dimming, with some drivers allowing a dimming ratio of up to 5000:1. This gives our customers a fairly wide dimming range and options.

Q: Can you give us some clues about next-generation solutions and the sorts of differentiators we might see in the future?

A: Details about our next generation drivers are very closely guarded as leading TV manufacturers want to use these drivers and features to stay ahead of their competition.

Q: Tell us about LED binning and the problems you encounter in this regard.

A: The biggest problem our customers tell us in LED backlighting design is heat dissipation. Because LEDs are heat sources, unless proper precautions for heat-sinking are considered, the LEDs are prone to overheating and failure. Another important factor is to minimize unnecessary power losses, requiring the use of well-matched (or binned LEDs). Unlike our competition, the Supertex solution requires binning by current only – whereas most of our competitors require binning by not just current but by V_f (forward voltage) also, which is more cumbersome and potentially more costly.

Q: Using edge-lighting across a very large surface must create all sorts of problems, particularly with regard to both overall brightness and then brightness uniformity across the surface of the display. Is Supertex able to help in these areas?

A: LEDs are becoming more efficient every year. As an example, a 100-200 mA LED can deliver much higher light output (in lumens per watt) than equivalent LEDs from 1-2 years ago. Additionally, light guides that are used to disperse light from the edges to the back panel are also becoming more efficient. TV manufacturers can therefore build 60+ inch TVs using edge-lit LEDs today, which they may not have been able to do without using very costly, high current, ultra high brightness LEDs in the past.

Q: Is your support for the LCD TV industry limited to LED drivers, or are you also supplying other solutions to the LCD TV market.

A: Our primary focus for the LCD TV market is the LED drivers used for backlighting.

Q: Do you think the driving force behind LED backlighting is due to superior front-of-screen performance, or do you think “green” factors are more significant?

A: LED backlit TVs not only offer a “green” alternative but even the edge-lit LED BLUs offer a much better picture quality over their CCFL counterparts.

Q: Please tell us more about your “green” initiatives.

A: Supertex today is recognized as one of the leading LED driver suppliers offering the most power efficient (hence green) solution in the market today. We are continuing to strengthen our patent portfolio in this area and we want to use our proprietary process and design to maintain that standing.

Q: Tell us briefly about some of the other markets that Supertex supports. Are there any breakthrough technologies outside of the world of LED backlighting that are particularly exciting to you?

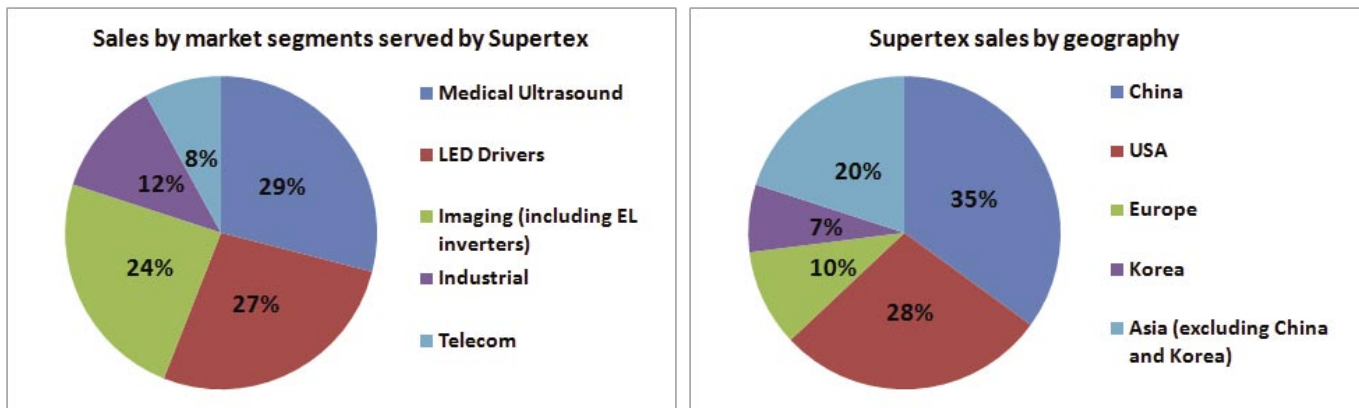
A: Supertex is also the leading supplier of medical ultrasound transmit pulsers and switches. We also have the leading position in the EL inverter market supplying the cell phone market.

Q: It seems that most US-based companies involved in the semiconductor industry are “fables”. Supertex has a 6-inch wafer fab in California. Do you think this gives Supertex some advantages or do you think that your foundry approach sometimes limits your options?

A: We still have a cost advantage over most of our competitors, since we use a high voltage analog process, which does not require the smallest geometric node (as you know analog design does not shrink that much). Our California fab is almost fully amortized, which gives us a fairly reasonable front end wafer cost. Our IC assembly and test is done offshore in Asia, just like the rest of our competitors.

Q: Tell us about your sales mix, both geographically and by end market.

A:



Q: How is Supertex positioned in terms of market share in the area of LED drivers for the LCD TV market?

A: The exact market share data changes very rapidly, but right now (and for the last several years) we are (and have been) the leading supplier in this market.

Q: Tell us about one of your favorite “customer success” stories.

A: Our customers’ problems are fairly common. The funny thing is that no matter whenever I visit a new customer they always want the same thing -- the highest power efficiency at a cost considerably lower than their competition. Once we go through the analysis of their system requirement and propose a solution they get awed and say something like, “I wish we had this discussion with you last year, we would not have gone with”

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