

2010—A tremendous year for MOCVD suppliers.

Will it continue in 2011?



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A record Q4'10 capped a remarkable eight quarters for leading MOCVD suppliers Aixtron and Veeco. MOCVD shipments to produce blue/green LEDs from suppliers Aixtron, Applied Materials, Jusung, Veeco and Taiyo Nippon Sanso, increased for seven consecutive quarters as shown in Figure 1. Tool shipments were up a remarkable 250% from 228 in 2009 to 798 in 2010.

Aixtron and Veeco continued to dominate this market as shown in Figure 2, accounting for a 97% share in 2010 despite a number of new entrants. Aixtron has many more tools installed than Veeco as one of the early players in this space and offers both horizontal and vertical approaches and multiple platforms of each approach. In addition, until recently, Aixtron had a healthy advantage in tool capacity in the form of the CRIUS II and G5. As a result, Veeco must often unseat Aixtron to win business which hasn't been easy given existing players' familiarity and acceptance of the Aixtron tools and their capacity advantage.

However, Veeco has proven it can take share from Aixtron as shown in Figure 2 with its unit share rising from 31% to 42% from 2009 to 2010 on the acceptance of the K465i which is believed to generate fewer contaminants in the process chamber resulting in less maintenance and higher uptime. Veeco has won significant business in China and Korea over this period and has also started improving its share in Taiwan where Aixtron has long been dominant. As a result, for the past two quarters, the K465i was the LED industry's best selling tool. In addition, in early 2011, Veeco scaled the process chamber to sizes comparable to the CRIUS II and G5, mounted two to

four process chambers on a central transfer chamber and accelerated its temperature settling time capabilities setting a new

standard for industry throughput in its MaxBright system. With just a 13% share in Q1'09, Veeco has come a long way.

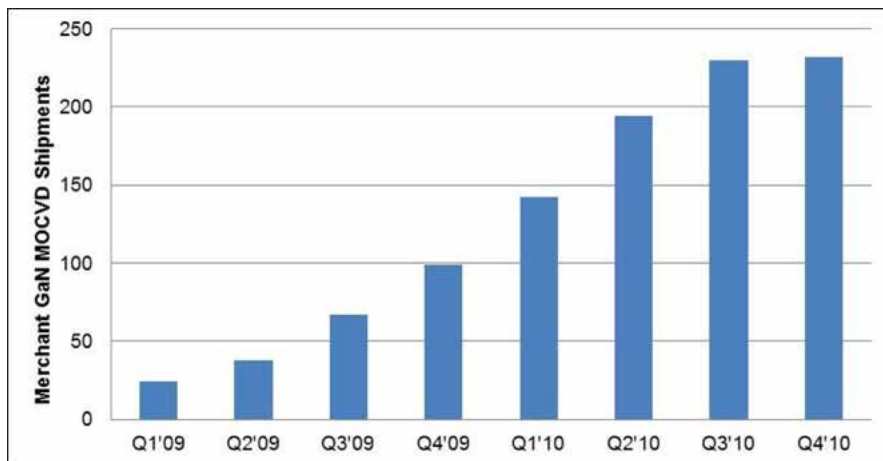


Figure 1. Q1'09 – Q4'10 GaN MOCVD shipments. (Source: IMS Research's Quarterly GaN LED Supply and Demand Report.)

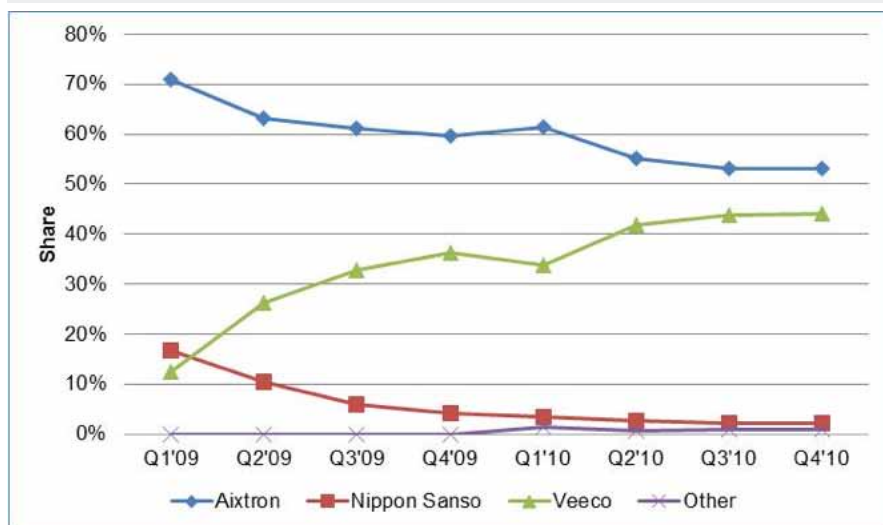


Figure 2. Q1'09 – Q4'10 GaN MOCVD supplier share. (Source: IMS Research's Quarterly GaN LED Supply and Demand Report.)

If you look at each company's financials, you can see that both companies have come a long way very quickly as shown in Figure 3. Aixtron's revenues rose 142% in 2010 to over \$1B while Veeco's revenues grew even faster, up 230% to \$933M. In addition, the companies also became highly profitable with Aixtron's operating margins rising from 21% in 2009 to 35% in 2010 with Veeco's growing from -2% to 30%, a dramatic improvement.

Of course, the reason for all of this sudden growth is the rapid adoption of LEDs into backlighting as shown in Figure 4 and the potential for widespread adoption of LEDs into general lighting. In backlighting, LED costs have come down to similar levels as the incumbent technology, cold cathode fluorescent (CCFL), up to panel sizes of 15"-17". In addition, with premiums continuing to fall at larger sizes while offering numerous advantages including thinner form factor, lighter weight, increased portability, no mercury, faster turn-on times, etc., penetration will continue to increase. For general lighting, LEDs are priced at much higher premiums and will require continued cost reductions before seeing a similar uptake. However, general lighting represents an enormous replacement market. The combination of these two and other smaller opportunities has existing LED manufacturers significantly expanding capacity while also attracting numerous new entrants. In fact, we show over 30 new players receiving MOCVD tools in 2010 and 2011 which excludes JVs in China which would easily grow this figure closer to 40. With over 90 companies now buying MOCVD tools, it has created a much larger market.

This rapidly growing market has also produced significant changes in regional demand. As shown in Figure 5, Korea and Taiwan dominated MOCVD installations in 2009 and through the first half of 2010, but in the second half of 2010, China became the leading region and dominated Q4'10 installations. We expect China's share to remain dominant in 2011 as well for a few reasons. First, the Chinese government has established significant incentives to build LEDs in China resulting in large tool subsidies, tax breaks, and discounted or free land among others. Second, with the incentives administered at the provincial level, some provinces are ending their subsidies ahead of plan due to other priorities leading to accelerated deliveries in those areas. Third, a number of provinces are competing to

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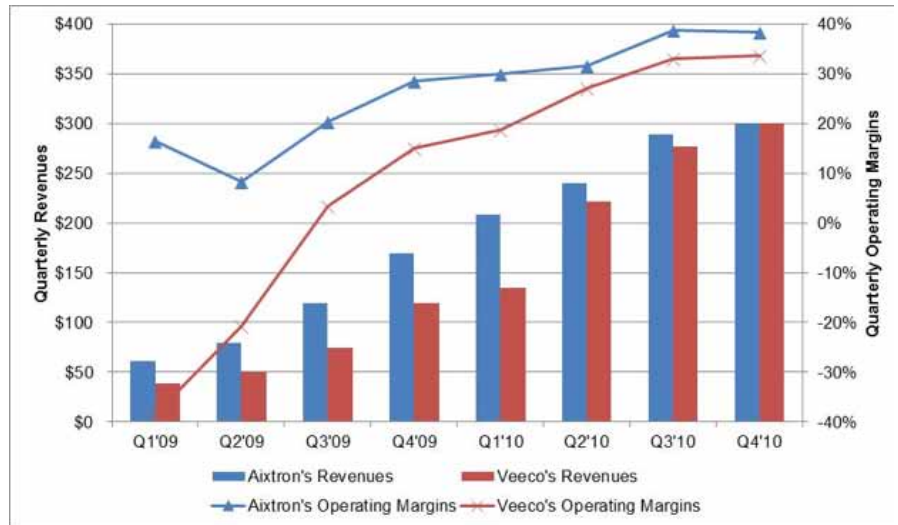


Figure 3. Aixtron's and Veeco's quarterly revenues and operating margins. (Source: IMS Research's Quarterly GaN LED Supply and Demand Report.)

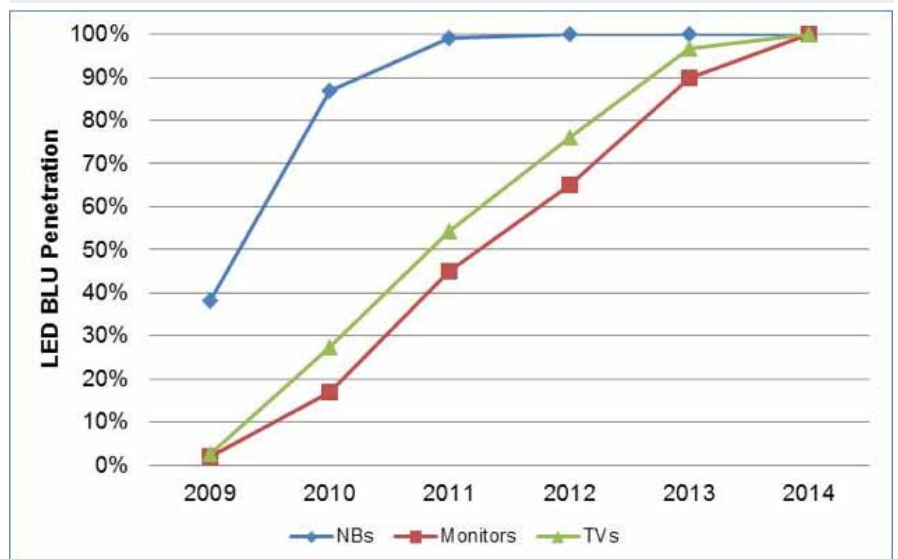


Figure 4. LED backlight penetration by application. (Source: IMS Research's Quarterly GaN LED Supply and Demand Report.)

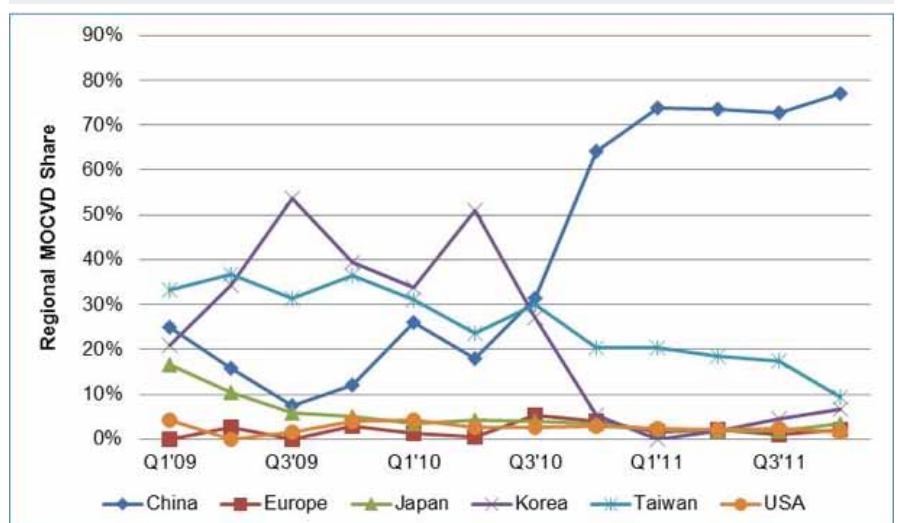


Figure 5. Regional MOCVD demand. (Source: IMS Research's Quarterly GaN LED Supply and Demand Report.)