Significant Pickup in M&A Activity in the Semiconductor Sector

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SECTOR — SEMICONDUCTORS

TWST: Could you begin with a brief introduction to your semiconductor coverage, including some of the names in your group?

Mr. Shankar: At ROTH Capital Partners, we focus a lot on the small and midcap sectors of the economy. My coverage focus is small and midcap semiconductor stocks where there has been a lot of activity both in terms of M&A and new product cycles driving growth. Having said that, I have also followed some of the large bellwether semiconductor names such as Intel (INTC), Micron (MU), NVIDIA (NVDA) and others over my 22-year semiconductor research career.

My semiconductor sector coverage focuses a lot on high-growth segments that relate to the mobility, smartphone and tablet area, and also the data center and the network infrastructure semiconductor sector. I believe that the mobility and data center network infrastructure semiconductor market will likely have high growth of 20% to 25% per year compared to the other mature segments of the semiconductor market such as PC, industrial, wired telecom infrastructure, consumer segments, which will likely grow at 3% to 5% per year in line with global GDP growth.

TWST: How would you characterize the current semiconductor cycle, and where are we in the cycle?

Mr. Shankar: The industry itself is pretty cyclical, and the cyclical parts of the semiconductor sector such as PCs, analog chips for industrial, automotive and wired telecom are in a moderate up cycle in line with a recovery in the global macroeconomic cycle, especially in the U.S. market. Layered on top of this cyclical recovery are the high-growth segments of the semiconductor industry, such as chips for smartphones and tablets, wireless 4G/LTE infrastructure, public and private cloud data center investments, next-generation connected home broadband, and consumer electronics such as 4K TVs, streaming video, and high-speed home broadband connectivity, connected hybrid and electric cars, etc.

There is fairly good correlation between global GDP growth and the semiconductor industry. If Europe recovers and China and emerging regions continue their growth, we could see further legs to this semiconductor up cycle. We have seen a pretty good recovery in U.S. enterprise spending, data center spending and also the cyclical parts of the U.S. economy like industrial, consumer, automotive, wired telecom, etc. So we are sort of at the midcycle in the cyclical recovery within the semiconductor sector.

TWST: How are inventory levels trending, and what are the implications of those trends in your view?

Mr. Shankar: I would say, again, it sort of depends on the semiconductor subsector. It is a very fragmented market, as there are lots of different semiconductor-intensive products and end markets. For many of the emerging growth semiconductor companies that I
follow, inventory levels are generally in line with demand trends, and they don’t have any excess pockets of inventory, I believe that inventory levels are relatively stable for communications and data center infrastructure semiconductor chips.

In the area of mobility, inventory levels depend heavily on the customer base, such as exposure to new product cycles at Apple (AAPL), Samsung (005930.KS), China Android ecosystem, etc. If you are exposed to companies such as Samsung, for example, there have been some pockets of excess inventory, but semiconductor companies with exposure to Apple, which are in the midst of a new product launch with the iPhone 6, are probably looking at some pretty good demand trends. Companies exposed to Apple may have built desirable inventory, which will likely be used to fuel the ramp of the iPhone 6 product line. In the last year, we have also seen dramatic growth.

TWST: What is your view on semiconductor companies exposed to the PC industry? Do we want to invest in those stocks, or should we still be avoiding them?

Mr. Shankar: A year ago, the common perception was that the PC market was in secular decline, and we would definitely want to avoid the PC sector. I do think that the PC is a very flexible, ever-changing platform, and we’re seeing some pockets of strength in the PC industry, such as corporate PCs and demand for enterprise PCs in the developed market. We have seen a dramatic slowdown in the growth rate of tablets, especially in developed markets. We believe that Microsoft’s (MSFT) termination of support for Windows XP and an aging fleet of corporate PCs — four to five years old — and the emergence of attractive, thin and light notebook PCs and hybrid tablet/notebook PCs and all-in-one PCs are rejuvenating some segments of the PC market.

Consumer PCs are still an area of weakness, especially in emerging markets where smartphones and low-cost tablets are being used as substitutes for PCs. Intel is driving innovation such as hybrid tablet/PCs in various attractive form factors such as thin and light clamshells, detachables, all-in-one PCs and powerful/low-cost Android tablets. Last year the PC industry probably declined by 10%, and this year I think it will decline by probably 3% to 5%. So the PC industry is still in decline, but there are pockets of growth in there. Investors have benefited from the stability and renewed growth in segments of the PC market with stocks such as Intel for PC processors, NVIDIA for high-end enthusiast and gaming PC graphics, and Micron Technology, which has doubled down on PC DRAM with the Elpida acquisition and consolidation in the DRAM memory sector.

TWST: Like you mentioned, we’ve been seeing a lot of consolidation in the semiconductor sector. What are some of the best mergers and acquisitions that you’ve seen this year, and what do you like about them?

Mr. Shankar: Definitely the pace of semiconductor M&A has picked up, and this has to do with economies of scale, the move to platform semiconductor companies, and the evolution of Swiss Army knife System-on-Chip companies that integrate multiple functions with software drivers at low power and small form factor. Small semiconductor companies are finding that they need to be part of a bigger company to leverage their R&D and sales/marketing reach globally.

We have seen some significant M&A within the semiconductor sector this year. For example, the pending merger between Infineon (IFX.DE) and International Rectifier (IRF) represents a good consolidation of semiconductor companies in the analog and high-voltage power semiconductor space, and they can leverage each other’s strengths in areas such as automotive, industrial and high-reliability applications.

We’ve also seen the acquisition of LSI Logic by Avago (AVGO). I think Avago has been able to effectively pick up LSI’s core assets in custom analog, mixed signal and system-on-chip for communications infrastructure, data center markets, etc. Avago has also divested noncore assets from the LSI acquisition such as the solid-state disk drive controller chip business to Seagate (STX), and they’ve also recently sold their network processor business to Intel, but I think Avago is benefiting from LSI’s deep expertise in analog/mix signal and communications chips. Avago also bought PLX Technology, which is a small company, which had some interesting technologies like PCI Express as high-performance I/O standard, but I think they needed somebody of Avago’s size and scope to really drive the next generation of PCI Express technology into the market for converged server, storage and networking applications.

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<td>Krishna Shankar’s coverage focuses on small and midcap semi stocks where there has been significant activity in terms of M&amp;A and new product cycles driving growth. Mr. Shankar says the cyclical parts of the sector are in a moderate up cycle in line with the global macroeconomic recovery. Also, the pace of M&amp;A has picked up significantly. He shares specific names within his coverage and what he likes about each. Companies include: Intel Corporation (INTC); Micron Technology (MU); NVIDIA Corporation (NVDA); Apple (AAPL); Samsung Electronics Co. Ltd. (005930.KS); Microsoft Corporation (MSFT); Infineon Technologies AG (IFX.DE); International Rectifier Corporation (IRF); Avago Technologies Limited (AVGO); Seagate Technology Public Limited Company (STX); Peregrine Semiconductor Corporation (PSEM); Murata Manufacturing Co., Ltd. (TYO:6981); TriQuint Semiconductor (TQNT); RF Micro Devices (RFMD); MEDITEK INC TWD10 (2454.TW); Montage Technology Group Limited (MONT); Hittite Microwave Corporation (HITT); Analog Devices (ADI); M/A-Com Technology Solutions Holdings (MTSI); Applied Materials (AMAT); Tokyo Electron Ltd (TYO:8035); Entropic Communications (ENTR); Broadcom Corp. (BRCM); Pixelworks (PXLW); QuickLogic Corporation (QUIK); InvenSense (INVN); LG Electronics (066570.KS); Coolpad Group Limited (2369.HK); ZTE Corporation (SHE:000063); Applied Micro Circuits Corporation (AMCC); Applied Optoelectronics (AAOI); Cavium (CVM); MoSys (MOSY); Finisar Corp. (FNR); JDS Uniphase Corporation (JDSU); Inphi Corporation (IPHI); Spanspan (CODE); Nantong Fujitsu Microelectronics Co.Ltd. (SHE:002156); Lantronix (LTRX); GigaOptix (GIG) and Pericom Semiconductor Corp. (PSEM).</td>
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Inphi recently bought the asset of a late-stage private company, Cortina. The IPO market for semiconductors has not been that strong lately, so Cortina was trying to go public, and they found a good buyer in Inphi, which picked up their communications processor and network infrastructure segments of the market. So there again it was a case of broadening of Inphi’s product line and leveraging Cortina’s products into that distribution channel.

We’ve also seen the announcement of the acquisition of Peregrine Semiconductor (PSMI) by Murata (TYO:6981), and that’s an example of a Japanese wireless module company achieving higher levels of vertical integration so that they own the RF chips that go into their wireless modules. I think that’s a good example of Murata leveraging Peregrine Semiconductor to integrate vertically and provide more value-add. We’ve also seen mergers of equals such as TriQuint (TQTNT) and RFMD (RFMD) with consolidation of market share and overlapping RF capabilities within the wireless space. We have also seen a pickup in China and Taiwan semiconductor M&A activity as witnessed by the merger of MediaTek (2454.TW) and MStar in Taiwan, and also rollup strategies by China sovereign funds within the China semiconductor market with companies such as Spreadtrum, RDA, Montage (MONT), etc.

Other notable M&A activity driven by scale include the pending acquisition of HITT (HITT) by ADI (ADI), Mindsped by M/A-Com (MTSI), pending Applied Materials (AMAT) merger with TEL (TYO:8035) to achieve consolidation with the maturing semiconductor capital equipment sector, etc. Recently, we have also seen Entropic Communications (ENTR) announce its intention to explore strategic alternatives as it attempts to gain scale and compete more effectively with BRCM (BRCM) in the connected home set-top box market.

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**TWST:** What’s your take on current valuations? How aggressive do we want to be on buying semiconductor stocks at these prices?

**Mr. Shankar:** My semiconductor universe is trading at what I would describe as reasonable midcycle valuations. My sector is trading at 1.5 times to 2.0 times enterprise value to calendar 2015 revenue, at 14 times to 18 times calendar 2015 earnings, about 2.5 times to 3.5 times book value and approximately 10 times to 20 times trailing EBITDA. Like many parts of the tech sector and the market as a whole, the multiples have expanded in a low interest rate environment; they are what I would describe as a midcycle market growth multiples. If the global economies continue to strengthen and we have specific product cycles in areas such as mobility, data center, wireless infrastructure, broadband connected home, etc., we could see expansion of valuation multiples for specific semiconductor stocks. I think overall valuations are reasonable, but we would advise investors to be selective and really buy specific stocks on weakness, which have new product cycles, restructuring or M&A drivers, and where the valuations are attractive.

**TWST:** Let’s talk about some specific names. Can you give us three stocks from your group that you would highlight as best bets for Q4 and going into 2015?

**Mr. Shankar:** We recommend that investors adopt a diversified strategy to minimize risk while investing in a basket of small/midcap semiconductor stocks that benefit from the high growth in the mobility and data center infrastructure semiconductor market. First of all, we like Pixelworks (PXLW). Pixelworks is a play on the mobility semiconductor space. Historically, they have had business from their video-processing capabilities in areas such as projectors and high-end TVs including 4K Ultra-high-definition TVs. But recently they have made a big push into selling IP and chips for the mobility space, and as smartphones and tablets become primary viewing devices for high-quality, low-power video in high resolution, they are emulating the capabilities of high-end TVs and projectors in terms of the video resolution and quality of video that they demand.

They’ve had a good business in projectors and Ultra-high-end definition TVs, but mobility is a new leg of growth for them, and they’ve had some good licensing and chip business in that area lately. At the end of last year, they disclosed that Apple was a 10% customer for them — Apple, I believe, has licensed high-end video processor I.P. from them. So I think investors are hoping that the business with Apple has the potential to expand with time.

They are also engaged in the potential licensing and chip sales for the mobility market to the high-volume Android and ultra-book PC ecosystem. So if they get either I.P. licensing or chip sales of their Iris mobility video processor technology to the Android ecosystem that would be a pretty good opportunity for them. So I think they have the opportunity to grow revenues at 20% to 30% in calendar year 2015 driven by this mobility product cycle, and I’m carrying an EPS estimate of $0.44 for them in calendar year 2015; so we think that stock could potentially trade up to $12 over the next 12 months or 18 months.
always-on wearables market. So as smartphones and tablets move to incorporating different kinds of sensors such as gyroscopes, accelerometers, compass, pressure sensor, temperature, light, etc., they need a sensor hub which is low-power, high-performance, which is able to fuse all these sensor signals together. QuickLogic sensor hub chip is able to integrate all that and provide a very low-power, high-performance solution that extends the battery lives and really provides the differentiating factors for next-generation smartphones and tablets.

As data centers move to 40 and 100 gigabit-per-second speeds, they are replacing the copper cables with fiber optic cables. So AAOI is a beneficiary of pretty strong growth in fiber optic cabling within data centers where they provide the lasers. They also are a key provider of lasers in components and subsystems to the cable infrastructure market, and while that market has been slow in 2013 and first-half 2014, we think you could see a pretty significant DOCSIS 3.1 cable infrastructure upgrade cycle as the cable operators upgrade their customers to higher speed networks.

Then finally, AAOI also has good emerging business in fiber to the home, where they are a key provider of laser components for gigabit-per-second high-speed fiber-to-home networks. That business is very early, but that has the potential to grow very rapidly. Despite some pre-announcements and warnings from larger optical component and subsystem companies such as FNSR (FNSR), JDSU (JDSU), we believe that AAOI is in the right growth segments within data center, cable infrastructure and fiber-to-the-home with high margins and proprietary technology products.

We like AMCC and CAVM as plays on processors and network accelerators and connectivity chips for next-generation data centers. Both companies are introducing new 64-bit ARM-based server and system-level SoC chips targeting the $10 billion-plus data center server processor and SoC market. We believe that ARM-based server and

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They also have a programmable connectivity chip which has now got some pretty good design win momentum, and their new next-generation sensor hub also has an element of programmability with embedded IP connectivity blocks within it. So I think QuickLogic could benefit from the trend to low-power programmable sensor hub with built-in programmable connectivity for smartphones.

QUIK is executing well on developing both custom and standard catalog CSSP versions of the sensor hub platform with programmable connectivity, and QUIK has also invested heavily in software and algorithm development to provide a turnkey solution. We believe that QUIK will likely announce some significant design wins within this market soon and likely have healthy revenue growth based on these potential wins during 2015.

Another large-cap mobility name that we like is InvenSense (INVN). The company is a pure play on providing highly integrated sensor platforms that incorporate gyroscopes, accelerometers, pressure sensors and compass devices as system-on-chip solutions with software. The company has some marquee customers such as Samsung and LG (066570.KS) for its sensor platforms together with high-growth China smartphone vendors such as Xiaomi, Huawei, Coolpad (2369.HK), ZTE (SHE:000063), etc. We believe that INVN may also have the opportunity to gain Apple as a customer in new platforms such as the iPhone6, Apple Watch and iPad.

In the data center and networking infrastructure market, we like names such as AMCC (AMCC), AAOI (AAOI), CAVM (CAVM) and MOSY (MOSY). AAOI makes lasers, optical sub systems and optical systems, which drive the fiber optic cables within data centers. SoC companies, over time, will likely capture market share from the Intel quasimonopoly within data center server processors. Intel currently has over 95% of the server processor market. AMCC is the early production ramp of its 64-bit ARM server SoC and claims multiple design wins with server, networking and Web scale service providers.

AMCC stock has pulled back due to a decline in the legacy PowerPC business and softness and an inventory correction for their 10Gig Ethernet/OTN connectivity chips. CAVM stock, trading near all-time highs, is benefiting from strong revenue growth for its flagship OCTEON multicore processors, networking adapter Liquid IO cards and NITROX security chips. We believe that Cavium’s new products such as Thunder family of 64-bit ARM SoCs that leverage its multicore OCTEON platform for the data center, recent Xpliant data center switch semiconductor acquisition, OCTEON Fusion small cell base station chips and NEURON search engine platforms will help the company post sustained revenue growth over the next few years.

One other stock in the comms and infrastructure space is an early-stage company called MoSys, the ticker is MOSY. They have some key design wins for their bandwidth-enabling memory subsystems. For next-generation data centers and telecom/network infrastructure, MOSY has its proprietary Bandwidth Engine platform to speed up processor-to-memory bandwidth bottleneck issues within the data center. They have a very high-performance intelligent memory subsystem based on low-power 1-T SRAM cell, which uses their high-speed serial GigaChip serial interface and some intelligence on their subsystems. We believe that the Bandwidth Engine platform has the potential to dramatically improve telecom/network infrastructure and data center performance.
MOSY also has a second product line known as LineSpeed GearBox, which provides low-power, high-speed analog/mixed signal timing, signal conditioning, and speed grooming/conversion with next-generation datacenters and targets an existing market dominated by IPHI (IPHI), BRCM, AVGO, etc. MOSY has some design wins for the Bandwidth Engine and LineSpeed product family, which could translate to significant revenues in 2015 and beyond.

Another attractive name within our universe is Spansion (CODE). It’s a $1.4 billion market cap name, and they benefit from transforming themselves from embedded NOR flash memory company into a more diversified provider of embedded NOR flash, microcontrollers, analog and SoC semiconductors. They made a very judicious acquisition of the Fujitsu’s (SHE:002156) microcontroller and analog business, and they’ve integrated that well, so they should benefit from that acquisition and become a more well-rounded player in the embedded, automotive, communications, industrial market.

We also like Lantronix (LTRX) as a microcap play, which benefits from selling modules and connectivity platforms that enable machine-to-machine connectivity and the Internet of Things. LTRX has a diversified set of customers in various industrial, communications, IT infrastructure, medical, energy, hospitality industries. LTRX has a new management team that is focused on expanding their presence in the fast-growing machine-to-machine and Internet-of-Things connectivity market with complete, plug-and-play modules that combine chip, module, software and platforms to enable rapid time to market and also easily add connectivity to the installed base of machines.

Finally, we recommend that investors accumulate two cash-rich small-cap semiconductor names within our universe: GIG (GIG) and PSEM (PSEM). GIG — $38 million market cap with $18 million cash — is a microcap play on providing laser driver and amplifier chips for fiber optics within telecom and data center applications. GIG also benefits from a cash-cow mature custom ASIC business with high margins.

We also like PSEM — $215 million market cap, $120 million cash — which is an analog/mixed signal semiconductor company focused on timing, connectivity, I/O and analog/power management for diversified end markets in server, storage, networking, consumer electronics and embedded markets. PSEM is lowering its dependence on the PC market and is improving gross margins by focusing on higher-value-add analog/mixed signal platform solutions.

TWST: What is a theme or a trend that is just developing now that could be important in 2015?

Mr. Shankar: I think the big trends for calendar year 2015 will be finding ways to invest in next-generation mobility devices and next-generation mega-data centers. Within mobility, what is going to differentiate the winning companies will be the ability to provide things which the user cares about: video quality, low-power video processing as companies like Pixelworks; or the ability to do motion sensing; low-power motion hubs and the ability to use this smartphone, tablet; and always-on wearables for location-sensitive mobile applications and e-commerce, such as QUIK and INVN.

Then within the datacom and infrastructure market, I think it’s a big move to software-defined networking, network function virtualization and the ability to do virtualized networking, server and storage functions. Within that context, we think names such as AAOI for next-generation lasers and optical subsystems in the data center, AMCC and CAVM for 64-bit ARM-based servers, and MOSY for next-generation bandwidth enabling systems are good ways to play the trends toward high-performance software-defined data centers. So the use of mobility device is expanding from a billion smartphones and tablets, to potentially several billion wearable always-on devices over the next five years. Those will drive the need for a lot of low-power mobility semiconductors, and the data center also should expand to meet the needs of those billions of mobile users.

So I think the key trend to watch is the next-generation mobility and the next-generation data center chip which will facilitate this move to a new architecture with virtualized on-demand pools of compute, networking and storage that can be configured dynamically on-demand to serve always-on, low-power, wearable mobile devices.

TWST: Thank you. (MES)

Note: Opinions and recommendations are as of 09/09/14.