Zacks Small-Cap Research

May 16, 2012
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TowerJazz (TSEM-NASDAQ)

TSEM: Long-Term Story Remains Intact; OUTPERFORM

Current Recommendation	**Outperform**
Prior Recommendation	Neutral
Date of Last Change	02/23/2012
Current Price (05/15/12)	$0.96
Target Price	**$2.00**

OUTLOOK

TowerJazz is a pure-play semiconductor wafer foundry with two IC plants in Israel and one in California, that manufacture SiGe, MEMS, RF, embedded flash-based memory, analog/mixed-signal, and CMOS image-sensor devices. Over the past year the firm has been building capacity due to accelerated design-win momentum, which have been realized within a large group of diversified, global customers, many of which being market share and technology platform leaders for their respective markets. We see value in the shares and reiterate our outperform rating.

SUMMARY DATA

52-Week High	**$1.29**
52-Week Low	**$0.61**
One-Year Return (%)	**-23.54**
Beta	**1.72**
Average Daily Volume (sh)	**334,095**
Shares Outstanding (mil)	**318**
Market Capitalization ($mil)	**$309**
Short Interest Ratio (days)	**1.59**
Institutional Ownership (%)	**3**
Insider Ownership (%)	**1**
Annual Cash Dividend	**$0.00**
Dividend Yield (%)	**0.00**
5-Yr. Historical Growth Rates	
Sales (%)	**27.8**
Earnings Per Share (%)	**N/A**
Dividend (%)	**N/A**
P/E using TTM EPS	**1.9**
P/E using 2012 Estimate	**1.5**
Zacks Rank	**3**

Risk Level	**Moderate**
Type of Stock	**Small-Blend**
Industry	**Elec Comp-Semic**

ZACKS ESTIMATES

Revenue
(in millions of $)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2009	58 A	61 A	80 A	101 A	297 A
2010	114 A	126 A	135 A	135 A	509 A
2011	121 A	140 A	176 A	175 A	611 A
2012	173 E	181 E	195 E	200 E	748 E

Earnings per Share
(Non-GAAP)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2009	-$0.02 A	$0.03 A	$0.07 A	$0.11 A	$0.19 A
2010	$0.13 A	$0.15 A	$0.15 A	$0.14 A	$0.55 A
2011	$0.11 A	$0.15 A	$0.14 A	$0.11 A	$0.52 A
2012	$0.13 E	$0.15 E	$0.18 E	$0.20 E	$0.66 E

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WHATS NEW

TowerJazz will report its first quarter of 2012 results on May 17, 2012. Management anticipates fiscal 2012 first quarter revenues to be in the range of $165 million to $175 million. The guidance would represent nearly a 41 percent year over year growth in revenues at the midpoint of the projected range for the quarter.

Furthermore, the Company continues to target a $200 million quarterly revenue run rate by year end and believes it will continue to outperform.

The firm is now enjoying a substantial ramp in volume productions that were signed in the 2008-2009 time frame. In general the time frame from design win to volume production is a two year process. Design wins per quarter were approximately 50 per quarter in 2008, 75 per quarter in 2009, and 110 per quarter in 2010. The firm received a triple digit number of design wins in the past quarter, which will likely benefit the firm in 2012 and beyond.

On April 23, 2012 TowerJazz announced the completion of the successful transfer of its CMOS image sensor (CIS) technology from its Migdal Haemek, Israel facility to its US fab in Newport Beach, California providing multi-sourcing to better address its customers' growing needs. TowerJazz's CIS process has already been running in high volume in its Israeli plants, and is now available in its Newport Beach, CA facility for customers that require on-shore manufacturing.

Why it Matters

The CIS process enables the customization of pixels according to project needs and its superior performance (dark current, low noise and dynamic range) enables a rich offering for various digital imaging applications. For example, TowerJazz's presence in the industrial sensor market is growing significantly with new applications such as fingerprint detection for homeland security, traffic monitoring cameras and others. Integration of TowerJazz's NMOS pixel with its 0.18 analog CMOS provides a US-based solution for specialty image sensors for aerospace and defense applications as well. In addition, TowerJazz's patented stitching technology overcomes photolithography tool limitations to seamlessly tile 5.5-micron pixel sections into a large pixel array, resulting in ultra-high resolution, high-quality color image sensors. This technology enables manufacturing of die sizes up to a single die per 200-mm wafer.

Foundry Landscape 2008-2010

($M)	2008		2009		2010	
1	TSMC	10,556	TSMC	,8989	TSMC	13,307
2	UMC	3,070	UMC	2,815	UMC	3,965
3	Chartered	1,743	GlobalFoundries*	2,641	GlobalFoundries	3,510
4	SMIC	1,353	SMIC	1,070	SMIC	1,555
5	Vanguard	511	Dongbu	395	**TowerJazz**	**510**
6	Dongbu	490	Vanguard	382	Vanguard	505
7	X-Fab	368	**TowerJazz**	**299**	Dongbu	495
8	SSMC	340	SSMC	280	SSMC	330
9	HHNEC	290	HHNEC	240	X-Fab	320
10	**TowerJazz**	**252**	X-Fab	212	HHNEC	295
11	Grace	230	He Jian	180	Grace	260
12	He Jian	195	Silterra	170	WIN	221
13	Silterra	175	WIN	145	Altis	215
14	ASMC	134	Grace	100	He Jian	205
15	WIN	117	ASMC	94	Silterra	200
16	Mosel-Vitelic	98	XinXin	55	ASMC	150
17	XinXin	20	Mosel-Vitelic	51	Mosel-Vitelic	80
18	Altis	0	Altis	0	XinXin	75
19	-	-	-	-	-	-
20+	Others	148	Others	171	Others	204

INVESTMENT THESIS

Tower Semiconductor Ltd. operates as a global specialty foundry company. Its wholly owned subsidiary, Jazz Semiconductor, Inc., specializes in analog-intensive mixed-signal (AIMS) foundry solutions. Tower and Jazz manufacture integrated circuits with geometries ranging from 1.0 to 0.13-micron, as well as provide design enablement tools to allow complex designs to be achieved quickly and accurately. The company and its subsidiary offer a range of process technologies, including digital, mixed-signal and RFCMOS, HV CMOS, BCD, non-volatile memory (NVM), embedded NVM, MEMS, and CMOS image sensors. Tower and Jazz maintain two fabrication facilities in Israel, as well as one fabrication facility in the United States, with additional capacity available through manufacturing partnerships in China.

As of March 31, 2011, the firm held 197 patents in force in the United States and 33 patents in force in foreign countries.

Foundry History

Historically semiconductor firms (also called integrated device manufacturers or IDMs) manufactured chips in their own fabs (chip fabrication plant). By the 1990's as chips grew smaller and more complex it was a natural that fab less outsourced manufacturing began to emerge. Semiconductor devices are broadly divided into three categories—analog, digital and radio frequency (RF). Analog semiconductors condition and regulate real world information such as light, temperature, speed, pressure, power and electrical currents. Digital logic semiconductors process information in only two states. Mixed-signal semiconductors combine both analog and digital technology into a single device. Typically, an analog sensor samples real world information, and then converts the input into an electronic analog signal, which is converted into a digital format for further digital processing. The analog and mixed-signal markets tend

to be more varied and specialized, with customized products that have longer life cycles than the digital industry segment. There is an ongoing drive to decrease the number of discrete devices, lessen power requirements and shrink the size of the existing devices, which correspondingly increase performance and reliability. Consequently, a greater amount of functionality is being consolidated into increasingly smaller devices

The availability of IC designs require process technologies other than standard digital CMOS have created a market for independent foundries that focus on providing specialized process technologies. Thus, wafer manufacturers may also need to make a significant investment in specialty process technologies to manufacture these semiconductors. Specialty process technologies enable greater analog content and can reduce the die size of an analog or mixed-signal semiconductor, thereby increasing the number of dies that can be manufactured on a wafer and reducing final die cost. In addition, specialty process technologies can enable increased performance, superior noise reduction and improved power efficiency of analog and mixed-signal semiconductors compared to traditional standard CMOS processes. These specialty process technologies include advanced analog CMOS, radio frequency CMOS (RF CMOS),CMOS Image Sensors (CIS), high voltage CMOS, bipolar CMOS (BiCMOS), silicon germanium BiCMOS (SiGe BiCMOS), and bipolar double-diffused metal oxide semiconductor (BCD).

Specialized Markets, higher margin

The company uses CMOS (complementary metal oxide semiconductor) IC technology within the semiconductor devices. Strategically, management has targeted the manufacture of embedded flash-based memory, analog/mixed-signal and CMOS image-sensor device markets. Management asserts that these targeted specialized markets produce relatively higher gross margins and have higher growth characteristics than the general industry. Embedded flash memory is non-volatile erasable memory used within MP3 players, wireless handsets, digital cameras, DVD players, set-top boxes and PCs. The analog/mixed signal ICs are used in a wide variety of end applications that include wireless handsets, PCs, DVD players, automotive electronics and medical imaging equipment. CMOS image sensors are used within wireless handsets, digital cameras, video cameras and video game consoles. Applications within the consumer market account for 50% of revenue, while communications was 15%, PC was 7%, multi-markets 18% and the combined industrial, medical and automotive the remaining 10%.

Some industries that will benefit from optical sensors include certain processing industries that can use sensors for controlling chemical formulations and temperatures. In the medical industry, the sensors will facilitate the development of novel imaging systems. The sensors will help the construction industry monitor the structural health of different buildings, bridges, and tunnels and facilitate the environmental industry in monitoring pollutants and contamination.
The multiplexing capability of optical sensors makes them an excellent candidate for structural health monitoring in aerospace applications where weight is a major consideration. Degradable polymer sensors are used to deliver antiviral drugs, pain and chemotherapy medications, and contraceptives. Universities and companies can use simulation equipment for their research and teaching needs. A range of basic and applied research programs are being conducted in aeropropulsion, space sciences, photonics, and materials technology

Merger.

Jazz semiconductor was formed as the result of a spin off in 2002 from Conexant (Conexant dates back to Rockwell Semiconductor). Jazz is the owner of the Newport Beach CA 200mm facility and several industry leading technologies such as SiGE, BiCMOS, and MEMS. We feel the merger is significant to Tower for the following reasons.

- The merger was done at a time when the rest of the industry was in survival mode.
- The customer base was doubled.
- Towerjazz is the lead in specialty higher margin foundry.



Diverse Customer Base (Source,Towerjazz)

The firm produces its products with its specialty process technology the designs are typically more complex than the manufacture of standard technology. This has the effect of drawing industry leading customers to the firm and makes it harder for them to leave for the competition.

SiGe

TSEM's BiCMOS process technologies have more features than RF CMOS process technologies and power various RF semiconductors such as wireless transceivers and television tuners. Towerjazz takes it a step further and incorporate high-speed bipolar transistors into an RF CMOS process. The equipment requirements for BiCMOS manufacturing are specialized and require enhanced tool capabilities to achieve high yield manufacturing. Towerjazz remains the only foundry in the world with multi-fab SiGE capacity.

Power Management

TSEM's high voltage CMOS and BCD process technologies have more features than advanced analog CMOS processes and are well suited for power and driver semiconductors such as voltage regulators, battery chargers, power management products and audio amplifiers.

With worldwide energy standards becoming more stringent, we are optimistic about Towerjazz technology. In particular, several new government standards are being enacted that will force new products to adopt newer technologies, displacing the inefficient legacy linear transformers. The standards imposed by the California Energy Commission (CEC) became mandatory for all external power supplies by July 2008. This is a critical event given that California is the seventh largest economy in the world and usually the pioneer in leading edge legislation that many other states usually adopt later. Washington

State and Arizona have both since adopted the same California standard. China recently announced a new voluntary program similar to the Energy Star program and also adopted the California standards. The European Commission has set European standards for energy efficient external AC/DC power supplies that are even more stringent than the CEC standards, although it is initially on a voluntary basis. Australia not only adopted the CEC standards, but made compliance mandatory by April 2006. The current worldwide energy situation has created greater sensitivity to the burgeoning problem. TSEM integrated power products conform to these new standards. As customers begin to design-in integrated power ICs that are in conformance with these new energy efficiency standards, the firm should be able to capitalize on the conversion.

VALUATION

The firm appears undervalued when looking at several metrics.

…Enterprise Multiple

The enterprise multiple looks at a firm as a potential acquirer would, because it takes debt into account - an item which other multiples like the P/E ratio do not include. Enterprise value is calculated as market cap plus debt, minority interest and preferred shares, minus total cash and cash equivalents. The Firm's Enterprise multiple is 3.33x compared to 7.81x for the industry. **According to the enterprise multiple TSEM appears undervalued compared to industry.**

$$\text{Enterprise Multiple} = \frac{\text{Enterprise Value}}{\text{EBITDA}}$$

Metric	TSEM	Industry Average
EV/EBITDA	3.33	7.81

…Two Stage Free Cash Flow to Equity Model

FCFE = Net Income - Net Capital Expenditure - Change in Net Working Capital + New Debt - Debt Repayment

Assumptions

- The firm is expected to grow at a higher growth rate in the first period.
- The growth rate will drop at the end of the first period to the stable growth rate.

Rationale for using the Model
As the firm grows its top-line to $1 billion, we expect the firm to grow at a higher overall rate than the industry. As These products mature and the firm faces more competition we expect the growth rate to level off.

Weakness of the Model
As you add more layers to the model it is more sensitive to the assumptions you make. The growth may look more "lumpy" than we have it in the model.

Output
We used the following inputs:

- A 5-year period with an earnings growth rate of 8.0% and a discount rate of 13.50%.
- A continuing period assumed to go on forever, with earnings growing at 5% and a discount rate of 13.05%.

With these inputs we arrive at a price of $2.50

According to the model, the firm appears undervalued.

…Price to Earnings Multiples/ Price to Sales Multiples

Due to its simplicity the Price/Earnings ratio is easily the most widely used metric in all of finance. The first strength of the model is that it is intuitive. It is simply the price paid for current earnings. It can also act as a proxy for other firm characteristics such as risk and growth. There is a downside to the P/E ratio in that it has the potential to reflect investor's mood rather than the fundamentals of the firm. It also eliminates assumptions about risk, growth, and retention ratio (something discounted cash flow models account for.)

While not as popular as Price/Earnings or Price/BV, Price/Sales is not influenced by accounting decisions in depreciation, inventory and extraordinary charges. P/S multiples are much less volatile than P/E multiples. However if the problem with the firm lies in cost control the P/S ratio will not reflect this flaw.

The firm appears undervalued compared to the industry.

Metric	TSEM	Industry Average
P/E TTM	1.86	13.91
P/E 2012 (E)	1.47	13.32
P/S	0.51	2.44

*source for background on valuation models: Investment Valuation, Aswath Damodaran

Our price target of $2.00 per share is the average of 2.65x our 2012 EPS estimate and our two stage model. We would add shares at these levels. We were conservative in our model and assumed most of the diluted shares are converted. If the firm addresses this issue down the road one could argue for a higher valuation.

Perhaps the recent disconnect in the shares performance versus its operating results lies in the fact that the firm has capital notes and equity options that if converted could increase the number of shares outstanding to 500-550 million shares. The notes along with some other equity options may be a medium term headwind for the firm, yet they were given at a time when the firm was questionable as a going concern and was hemorrhaging cash. What once saved the firm now may be holding it back. The notes can be negotiated or bought out, but that seems to be a longer-term issue for the firm to tackle. Our opinion is the firm is focused on getting to the $1 billion annual sales mark and will then turn its attention to improving the balance sheet.

On October 10th 2011 TSEM announced that Jazz Technologies Inc. completed a voluntary transaction to early redeem the entire remaining $35,091,000 principal amount of its outstanding 8.00% notes originally due December 31, 2011. If not redeemed, the notes were convertible into Tower Semiconductor's shares. The company financed the early redemption through available cash on hand. This could be the first step toward addressing the share count/ balance sheet issue.

PROJECTED INCOME STATEMENT

INCOME STATEMENT ($ Millions)	Dec-10 Q4 10	Mar-11 Q1 11	Jun-11 Q2 11	Sep-11 Q3 11 E	Dec-11 Q4 11	Mar-12 Q1 12 E	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012 E
REVENUE												
Net Revenue	**135.1**	**120.6**	**139.7**	**176.1**	**174.6**	**173.0**	**230.9**	**251.7**	**298.8**	**509.3**	**611.0**	**748.0**
Sequential Growth		*-11%*	*16%*	*26%*	*-1%*	*-1%*						
OPERATING EXPENSES												
Cost of Revenues	78.59	67.57	80.20	118.66	116.84	117.50	147.4	174.2	206.5	284.7	383.3	450.0
% of Revenue	*58.2%*	*56.0%*	*57.4%*	*67.4%*	*66.9%*	*67.9%*						
Gross Profit -	**56.5**	**53.0**	**59.5**	**57.5**	**57.7**	**55.5**	**83.5**	**77.5**	**92.3**	**224.5**	**227.7**	**298.0**
Proforma Gross Margin	*41.8%*	*44.0%*	*42.6%*	*32.6%*	*33.1%*	*32.1%*	*36.2%*	*30.8%*	*30.9%*	*44.1%*	*37.3%*	*39.8%*
R&D + Engg	4.31	5.25	4.99	6.06	6.55	6.25	10.4	13.2	22.2	22.6	22.9	28.0
% of Revenue	*3.2%*	*4.4%*	*3.6%*	*3.4%*	*3.8%*	*3.6%*	*4.5%*	*5.3%*	*7.4%*	*4.4%*	*3.7%*	*3.7%*
SG&A	6.16	7.79	9.02	12.36	11.53	12.50	24.2	28.1	29.0	34	41	50
% of Revenue	*4.6%*	*6.5%*	*6.5%*	*7.0%*	*6.6%*	*7.2%*	*10.5%*	*11.2%*	*9.7%*	*6.6%*	*6.7%*	*6.7%*
GW Amort, Restructuring, other			*1.49*				-	-	-		*1.49*	*1.49*
% of Revenue												
Total Operating Expenses	10.47	13.05	15.51	18.42	18.08	18.75	34.6	41.4	51.1	56	65	79
% of Revenue	*7.7%*	*10.8%*	*11.1%*	*10.5%*	*10.4%*	*10.8%*	*15.0%*	*16.4%*	*17.1%*	*11%*	*11%*	*11%*
Operating Income -	**46.1**	**40.0**	**44.0**	**39.0**	**39.7**	**36.8**	**48.9**	**36.1**	**41.2**	**168**	**163**	**219**
Operating Margin	*34.1%*	*33.2%*	*31.5%*	*22.2%*	*22.7%*	*21.2%*	*21%*	*14%*	*14%*	*33%*	*27%*	*29%*
NON-OPERATING ITEMS												
Non operating Income/Expense	-8	-7	3	7	-6	6	-28.8	-19.4	-22.2	-19	-4	-5
% of Revenue	*-5.75%*	*-5.82%*	*1.90%*	*3.82%*	*-3.59%*	*3.47%*	*-12.48%*	*-7.72%*	*-7.42%*	*-3.79%*	*-0.64%*	*-0.67%*
Tax Provision	3.0	1.5	0.8	0.0	-0.5	0.0	0.00	0.58	-5.0	13	2	4
Effective Tax Rate												
Net Income -	**35.34**	**31.50**	**45.84**	**45.75**	**33.91**	**42.75**	**20.08**	**16.08**	**24.06**	**136.2**	**157.0**	**209.5**
Net Income Margin	*26.2%*	*26.1%*	*32.8%*	*26.0%*	*19.4%*	*24.7%*	*8.7%*	*6.4%*	*8.1%*	*27%*	*26%*	*28%*
EARNINGS PER SHARE												
EPS - Basic	$0.14	$0.11	$0.15	$0.14	$0.14	$0.13	$0.17	$0.12	$0.19	$0.55	$0.52	$0.66
EPS - Diluted	$0.14	$0.11	$0.15	$0.14	$0.14	$0.13	$0.17	$0.12	$0.19	$0.55	$0.52	$0.66

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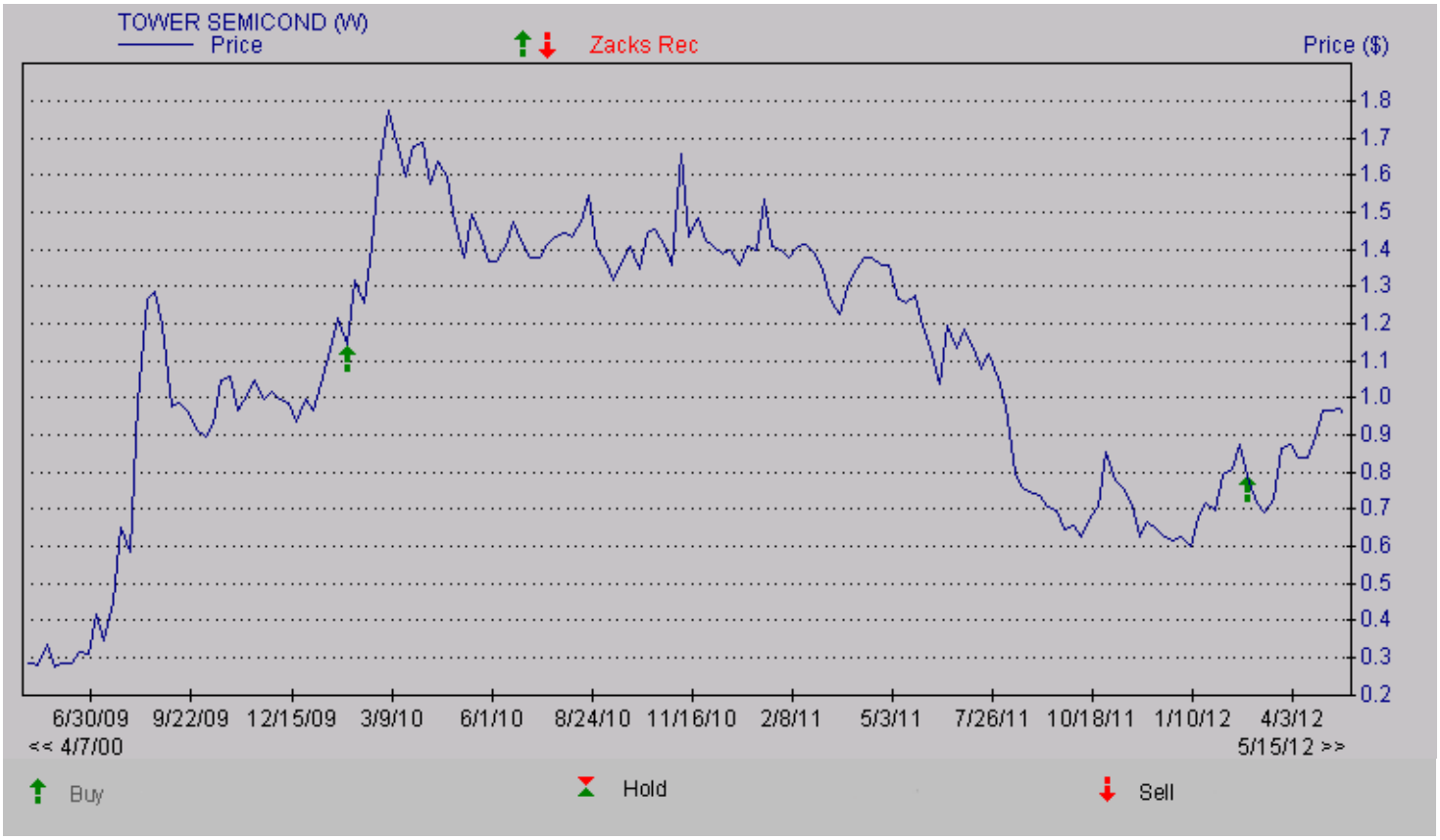

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