

Photronics (PLAB) Summary

Photomasks for the integrated circuit and display markets

August 30, 2017

Key Takeaways

For information, please contact:

[Erik Kobayashi-Solomon](#)

+1 646 801.2464

- **Market Capitalization:** \$541 million
- **Largest merchant manufacturer of semiconductor photomasks.** See below for an overview of how photomasks are used in the semiconductor production process.
- **Strong net cash position:** Sale of half of JV to Micron provided ample cash.
- **Large Capital Expenses on the horizon.** Construction of Chinese manufacturing plants may be funded with local debt issuance.

Overview

Semiconductor chips are comprised of fine wires inscribed into complex patterns on a silicon wafer. The process by which the complex pattern is inscribed is called [photolithography](#), using what is known as [photomasks](#). Photronics is the largest “merchant” (i.e., third-party) supplier of photomasks in the world and participates in two areas: integrated circuits (IC) and flat-panel displays (FPD). IC masks have made up 77% of sales in the TTM period; FPD is the remaining 23%.

Photronics’ largest IC customer is UMC, a Taiwan foundry that has started moving into China. UMC is a second-tier foundry compared to its competitor, Taiwan Semiconductor (ticker: TSM, company known as TSMC), which creates all their photomasks in-house. Photronics is moving into China with UMC for IC production and is building a new plant with its JV partner Dai-Nippon Printing (DNP). The company is investing \$160 million over the next five years to build out its Chinese plant with DNP. The company produces photomasks for both 200mm and 350mm wafers (the latter is state-of-the-art for logic circuits as it allows for a more efficient production process).

Photronics had a JV with Micron (MU), which was bought out by Micron in 2016. Micron continues to buy masks from Photronics, but volume has decreased. At present, the IR manager mentioned that the company had the capacity to generate roughly \$550 million in revenues versus \$483 generated in the TTM period, implying a capacity utilization of around 88%.

Company sees the FPD business as a growth driver, especially from the move from LCD displays to AMOLED ones. Samsung closed down two FPD lines recently (hurting PLAB’s revenues), but will open these again as AMOLED lines, which will help PLAB. AMOLED masks are more complex and heavily layered, so revenue opportunities are greater.

Company has generated a 9-year RGR of roughly 1.5%. When asked about this, the rep said that the trend over the last decade was for more companies to take the mask-making process in-house. Proportion of in-house mask-making has shifted from 45% of market to 65%. Photronics has grown – albeit modestly – within this environment.

Information provided by IOI Investment Services, LLC d/b/a Framework Investing “Framework,” should not be used as investment advice. Framework does not act in the capacity of a Registered Investment Advisor. For investment advice geared towards your specific needs, we encourage you to contact your financial planner or advisor.

Value Drivers

Revenues

Roughly 20% of 2016 sales were into UMC for IC masks; we think another 17% of sales were likely into Samsung, related to FPD and IC masks. The majority of the Samsung business is related to FPD (“50% of our FPD business is to Samsung”). Another 10% of 2016 sales were to Micron, but that amount is reduced after the JV buy-out.

50% of 2016 revenues were generated from Photronics’ five largest customers.

List of customers from 2016 10-K with large customers bolded.

AU Optronics Corp.	MagnaChip Semiconductor Corporation
Dongbu HiTek Co., Ltd.	Micron Technology, Inc.
Epcos AG	Nanya Technology Corporation
Global Foundries, Inc.	ON Semiconductor Corporation
Himax Display, Inc.	Powerchip Technology Corporation
Infineon Technologies AG	Samsung Electronics Co., Ltd.
Innolux Corporation	STMicroelectronics N.V.
Inotera Memories, Inc.	Texas Instruments, Incorporated
Intel Corporation	Tower Semiconductor, Ltd.
LG Display Co., Ltd	United Microelectronics Corp.

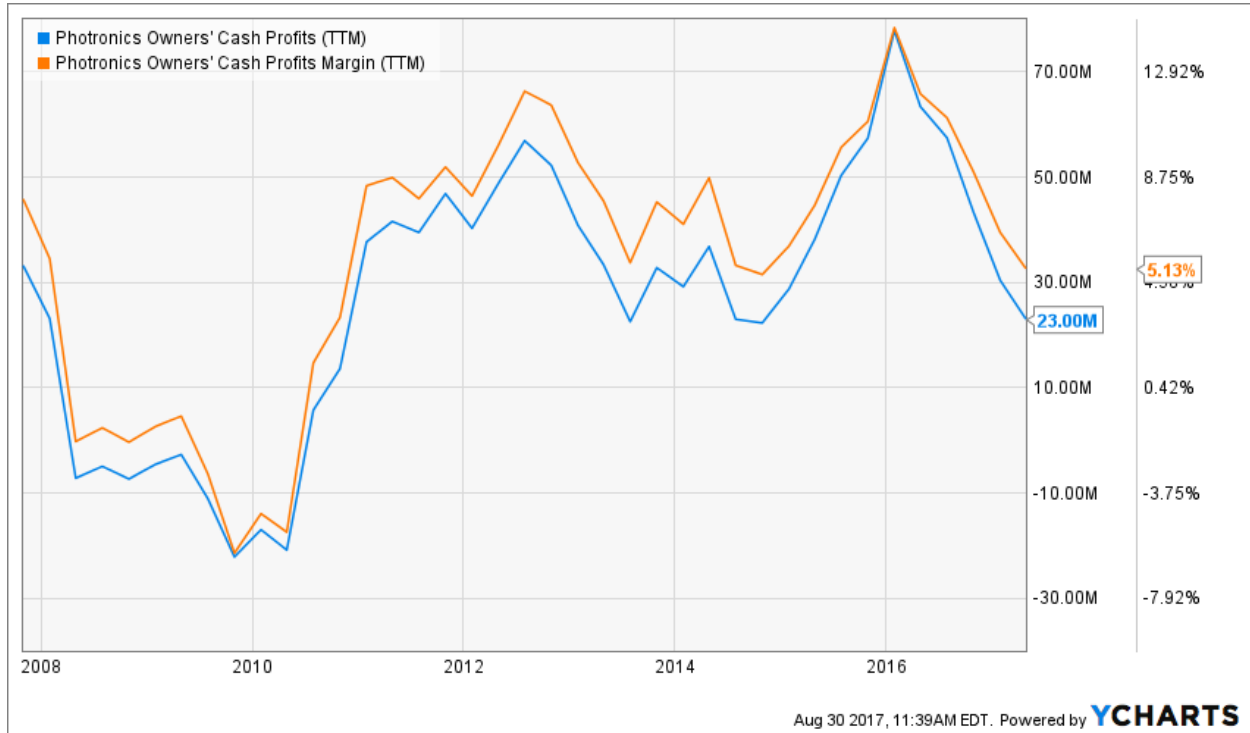
Revenues will likely increase with the completion and ramp-up of the Chinese plants. Shorter term, Samsung’s bring back the AMOLED FPD production lines should produce a boost.



Value Drivers

Profits

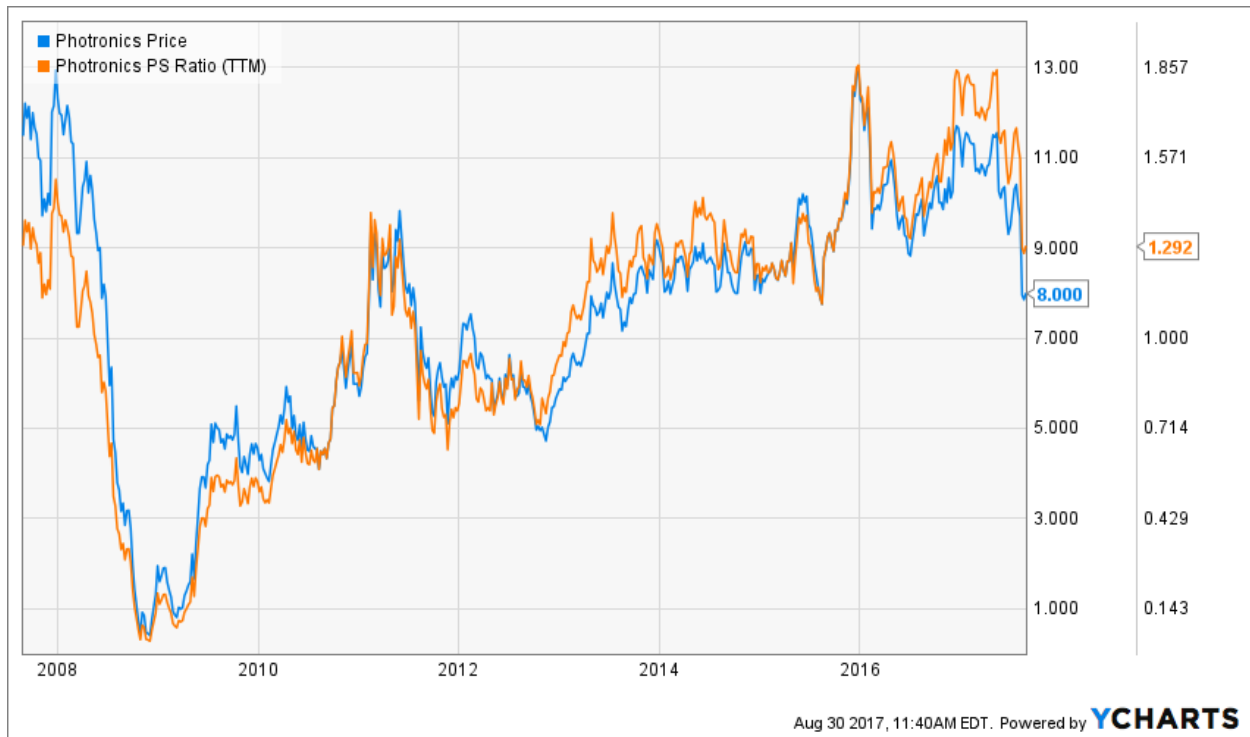
Clearly, this business has operational leverage, as can be seen with the similarity between the two profit humps with the two revenue humps. During low-demand environments like 2009, profitability takes a big hit. We were impressed with the degree to which the company was able to retain fairly good profitability over the cycle, especially as a small supplier to a cyclical industry.



Market

Price and PS Ratio

Recent business developments (loss of some of Micron's business, Samsung pulling two production lines off, and UMC market share losses) have pulled the price down. Price to Sales looks about average over a "normal" operating environment.



Market Options

Option Market is illiquid and strictly short-tenor only. No LEAPS available and a very wide bid-ask spread. (Calls in upper diagram, puts in lower).

PLAB

SEP 15 '17 (16 DAYS) | OCT 20 '17 (51 DAYS) | DEC 15 '17 (107 DAYS) | MAR 16 '18 (198 DAYS) | MORE

CALLS

LAST (\$)	BID x ASK	DIVAMT DIVIDEND DATE	VOLUMEIMPL. BD VL. x IMPL. ASK...	DELTA	DAYS	STRIKE
c5.40	5.40 x 5.70		N/A x 122.033%	1.000	198	2.5
c2.90	3.00 x 3.30		N/A x 65.607%	0.979	198	5
c1.00	1.05 x 1.20		32.290% x 39.282%	0.664	198	7.5
c0.20	0.20 x 0.30		31.583% x 37.224%	0.237	198	10
c0.05	x 0.10		x 41.157%	0.055	198	12.5
c0.00	x 0.05		x 46.357%	0.010	198	15
c0.00	x 0.05		x 54.895%	0.002	198	17.5
c0.00	x 0.05		x 62.316%	0.000	198	20

8.00 +0.20 (+2.56%)

PUTS

IV: 34.3%

STRIKE	LAST (\$)	BID x ASK	DIVAMT DIVIDEND DATE	VOLUMEIMPL. BD VL. x IMPL. ASK...	DELTA	DAYS
2.5	c0.00	x 0.05		x 92.134%	0.000	198
5	c0.00	x 0.15		x 55.260%	-0.021	198
7.5	c0.55	0.45 x 0.60		30.527% x 37.503%	-0.338	198
10	c2.30	2.10 x 2.20		26.012% x 35.439%	-0.773	198
12.5	c4.70	4.40 x 4.60		N/A x 47.291%	-0.970	198
15	c7.20	6.90 x 7.10		N/A x 60.712%	-1.000	198
17.5	c9.70	9.30 x 9.70		N/A x 79.468%	-1.000	198
20	c12.20	11.80 x 12.40		N/A x 102.737%	-1.000	198

Next Steps

- The demand environment seems to be shifting to in-house, rather than merchant solutions. It's not clear to me what is driving this shift – likely some combination of cost reduction and improvement of control for foundries and chipmakers. This company looks like it is dominant in its field, but we worry that its field is shrinking. What is the end game for this firm? Sell its assets to Samsung and / or UMC? Is there any terminal value to this company?
- This field seems very similar to the semiconductor packaging industry, which was a terrible business because it shifted the responsibility for meeting increased demand to the provider rather than the chipmaker. PLAB and DNP have formed a JV to service UMC, but must spend a great deal to build that factory, which is dependent on demand for the chips produced in UMC's plant. If demand for UMC's chips is weak, the burden of the capex falls on owners of PLAB. Semiconductor packaging companies had the same problem, and were very poor at building long-term value for their shareholders. Eventually, the chipmakers began co-investing with packaging companies. In the case of mask makers, it looks like the chipmakers are pulling this function in-house.

Options involve risk and are not suitable for all investors. For more information, please read the [Characteristics and Risks of Standardized Options](#).

Seminars and reports are provided to you for educational purposes only. No information presented constitutes a recommendation to buy, sell or hold any security, financial product or instrument discussed therein or to engage in any specific investment strategy. The content neither is, nor should be construed as, an offer, or a solicitation of an offer, to buy, sell, or hold any securities. IOI Investment Services, LLC, d/b/a Framework Investing ("Framework") does not offer or provide any opinion regarding the nature, potential, value, suitability or profitability of any particular investment or investment strategy, and you are fully responsible for any investment decisions you make. Such decisions should be based solely on your evaluation of your financial circumstances, investment objections, risk tolerance and liquidity needs.