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Hardware Technology

LED Lighting: Right Strategic Positioning Required to Capture Rapid Growth

We like Epistar and Edison Opto for their clear position in LED lighting: LED lighting proliferation has become the consensus, and we expect an 81% revenue CAGR through 2013E, off the current low base. In the initial LED lighting introduction stage in 2011-13, low-cost offerings and design flexibility are valued most. Therefore, we believe LED component vendors with a dedicated focus and strong profitability are the best positioned – **Epistar,** with its superior low-cost capability and dual exposure to global-tier lighting brands (OEM business) and local white brands; and **Edison Opto,** with its differentiated focus in local-tier lighting brands offering value-added LED light component/modules. (Please see *Edison Opto: Distinctive Positioning in LED Lighting Field; Initiate at OW*, April 8, 2011.)

Where we are in LED lighting cycle? Introduction stage needs cost down and government support: We expect LED lighting adoption to reach 20% globally by 2013E, driven mainly by cost reduction efforts (from chip performance to system efficiency) and government incentive programs and standards being set up.

LED lighting developments shifting to market focus: Unlike previous product/technology focus, LED lighting developments are matching the market's need for both attractive prices and quality energy-saving light devices.

Low-cost offerings and design flexibility the major success factors in 2011-13: Despite various strategic moves announced by the LED supply chain and new entrants, we believe that those with the right customer segment focus and cost competitiveness will do best.

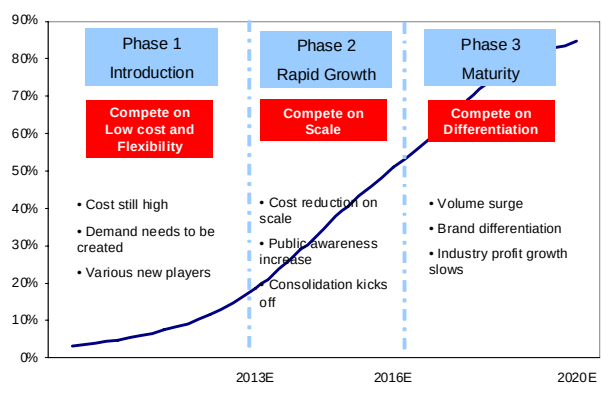
Favor LED components over lighting brands: Our analysis shows that LED components had a 13-21% OpM and 13-18% ROE in 2010 vs. traditional lighting brands' 3-12% OpM and 5-11% ROE. This implies that the LED component focus offers greater profitability than building own-brand lighting business, especially amid the initial stage of LED lighting uptake.

Companies Featured

Company	Rating
Epistar (2448.TW, NT$109.0)	Overweight
Everlight (2393.TW, NT$84.5)	Overweight
Edison Opto (3591.TW, NT$170.5)	Overweight

Stock price as to April 7, 2011

LED lighting life cycle – Introduction stage needs low cost and design flexibility



e = Morgan Stanley Research estimates
Source: Company data, Morgan Stanley Research estimates

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Investment Case

Summary & Conclusions – Overweight Epistar and Edison Opto

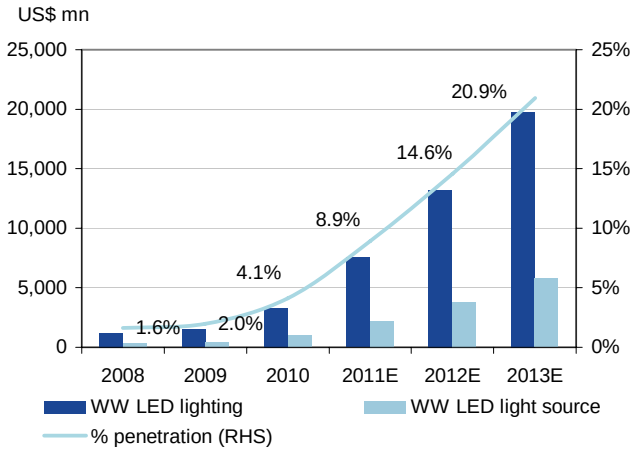
We estimate that LED lighting will see an 81% revenue CAGR through 2013E, off the current low base. We estimate that LED lighting adoption will reach 20% by 2013E, mainly driven by cost-reduction efforts (from chip performance to system efficiency) and government incentive programs and standards being set up. Despite various strategic moves announced by existing LED supply chain and new entrants, we believe that those with the right customer segment focus and cost competitiveness are the best positioned. Our analysis shows that LED components had a 13-21% OpM and 13-18% ROE in 2010, vs. traditional lighting brands' 3-12% OpM and 5-11% ROE.

Therefore, we believe that LED component vendors with a dedicated focus and strong profitability are the best positioned – such as **Epistar**, with its superior low-cost capability with dual exposure to both global-tier lighting brands and local white brands; and **Edison Opto**, with its differentiated focus in local-tier lighting brands offering value-added LED lighting products. We least prefer **Everlight,** as its efforts to build its own lighting brand might take longer to bear fruit, despite shipment momentum being likely to grow along with the roll-out of new tablet / smartphone / TV models.

Lighting Application Showing the Robust Growth Prospects

On top of a substantial increase in LED adoption for display backlights, to 50% in 2011E from 19.3% in 2010, LED industry growth is also being driven by the ramping-up of LED lighting applications. We estimate that the worldwide LED lighting market will more than double YoY to US$7.5 bn in 2011E, thanks to ongoing improvements in luminous efficacy, cost reduction and government support. We expect the LED light source market, including LED components (packaged LEDs), and LED modules and engines, to reach US$2.2 bn in 2011E, or 8.9% penetration of the global light source market, up from 4.1% in 2010 (see Exhibit 1). This represents 14% of overall LED demand vs. 54% for display backlights and 17% for handsets, implying that LED lighting proliferation is now an irreversible trend (see Exhibit 2).

Exhibit 1
LED Lighting Penetration on the Rise



E = Morgan Stanley estimates
Source: Morgan Stanley Research estimates

Exhibit 2
Worldwide LED Demand Forecast – LED Lighting Offers 81% 4-year CAGR

	2009	2010	2011E	2012E	2013E	10-13E CAGR
WW LED demand (US$ m)	**6,795**	**10,770**	**15,864**	**20,327**	**25,225**	**33%**
- YoY %	***25%***	***59%***	***47%***	***28%***	***24%***	
Handset	2,845	2,810	2,684	2,690	2,743	-1%
Display backlight	2,662	5,615	8,533	9,486	9,852	21%
Automotive	617	1,069	1,904	3,442	5,040	68%
Street light	229	308	511	878	1,808	80%
Lighting	442	968	2,231	3,832	5,783	81%
Application mix						
Handset	42%	26%	17%	13%	11%	
Display backlight	39%	52%	54%	47%	39%	
Automotive	9%	10%	12%	17%	20%	
Street light	3%	3%	3%	4%	7%	
Lighting	7%	9%	14%	19%	23%	
YoY Growth						
Handset	-15%	-1%	-4%	0%	2%	
Display backlight	187%	111%	52%	11%	4%	
Automotive	-2%	73%	78%	81%	46%	
Street light	12%	34%	66%	72%	106%	
Lighting	25%	119%	130%	72%	51%	

E = Morgan Stanley estimates
Source: Company data, Morgan Stanley Research

We see three major forces driving LED lighting industry – manufacturers (ongoing performance improvements and cost reduction), government (standard enforcement and subsidy program), and end-user markets (cost/performance and energy savings):

- **Manufacturers – Focus on performance and cost reduction:** LED performance is close to a reasonable level of 120-150 lm/W at the packaged level, but the current cost is still high at 100-150 lm/$, far from the US Department of Energy's ultimate target of 1,000 lm/$ (see Exhibit 3). Therefore, the LED industry has shifted its development focus to cost reduction – e.g., MOCVD tool makers offering high-volume tool clusters to raise output efficiency by 30-40%, sapphire substrate makers upsizing to 6" while 4" gradually becomes the mainstream, LED wafer/chip producers producing innovative designs for laser lid-off, vertical structure or AC/HV LEDs, etc. to enhance output yield and efficiency, and LED component/module suppliers emphasizing the integration capability of light, power and thermal management.

Exhibit 3
US DoE Roadmap on LED Performance – 500 lm/$

	2009	2010	2012	2015	2020
Cool white					
- Efficacy (lm/W)	113	134	173	215	243
- Price (US$/'000lm)	25	13	6	2	1
- lm/$	40	77	167	500	1,000
Warm white					
- Efficacy (lm/W)	70	88	128	184	234
- Price (US$/'000lm)	36	25	11	3.3	1.1
- lm/$	28	40	91	303	909

Source: US DoE, Morgan Stanley Research

- **Government – Standard enforcement and subsidy program:** We note that most governments worldwide list energy saving as major policy focus and have implemented standard enforcement and subsidy programs to encourage replacement. Japan's Eco-point program in 2010 is one of the best examples, while the Chinese government is dedicating its efforts on solid state lighting promotion, with LED lighting certification criteria officially set up by the China Quality Certification Center (CQC) as a first step. All the government efforts and support should help unify LED lighting standards through various levels of certification mechanisms (see Exhibit 4). Certification serves not only as an explicit standard for government subsidy programs, but also as a credibility enhancement for LED lighting products. It is our firm belief that developing standards will help accelerate the pace of LED lighting adoption in addition to industry's efforts to reduce costs.

Exhibit 4
Major LED Lighting Certification Worldwide

	Location	Compulsory/ Optional	Chip	Package	Module	Fixture
ROHS	EU	Compulsory	V	V	V	V
CE	EU (EEA)	Compulsory			V	V
CCC	China	Compulsory			V	V
PSE	Japan	Compulsory				V
PSE	Japan	Optional			V	V
Zhaga	Worldwide	Optional				V
GS	EU	Optional			V	V
ETL	Northa America	Optional			V	V
UL	North America	Optional			V	V
Energy Star	North, Japan, NZ, Taiwan	Optional		V	V	V
CQC	China	Optional			V	V

Source: Company data, Morgan Stanley Research

- **End users – Cost/performance and energy saving:** Globalization and urbanization are driving demand for LED lighting, given the rising need for energy saving and lighting upgrade. We note that the speed of LED lighting adoption for outdoor application (e.g., street and tunnel lighting) and for commercial buildings has shown the best progress thus far. Outdoor lighting is supported by government fiscal stimulus for the public sector, such as the Chinese government's dedicated focus on energy saving, which it has highlighted as one of the key

development guidelines in its 12th Five-year Plan. Commercial buildings, especially those that have to be lit for more than 12 hours per day, are keen to look for alternative light solutions to save on utility costs, and most believe the payback period of 18-24 months is right at the tipping point for LED light proliferation in the segment.

Given that Europe (EU) plans to ban the sale of 60-watt incandescent lamps starting from this September (Exhibit 5), most LED lighting brands (e.g., OSRAM, Philips, Toshiba) are focusing on 60-watt LED lamp replacement demand. Based on the current pricing for 60-watt replacement LED lamps, there is still a 20-30x pricing gap vs. incandescent lamps and a 6-7x vs. compact fluorescent lamps (CFL), implying that immediate mass adoption is unlikely, at least in 2011. However, our view is that the sweet spot for a surge in LED lamp volume could be at 9-12x the price of incandescent lamps and 3-4x CFL, which we believe should be reached gradually by 2012-13 with continuous cost reduction and performance enhancement.

Exhibit 5

Worldwide Incandescent Lamp Ban Schedule

Effective Date	Country	Regulation
2009	India	Switched all light bulbs to florescent starting 2009; now in evaluation of LED bulbs
2010	Australia	Terminate production in 2009; prohibit usage in 2010
2012	Taiwan	Prohibit usage in retail facilities and hospitals in 2010; prohibit import or production in 2012
	Japan	Prohibits prodution and sale of incandescent in 2012
	USA	Gradually stop usage between 2012-2014
	EU	Prohibit selling 100w in Sep09, 75w in Sep10, 60w in Sep11 and all wattage in 2012
	Canada	Terminates usage in 2012
	France	Prohibit selling 100w in Sep09; prohibit all wattage in 2012
2013	Korea	Prohibits usage in 2013
2018	China	Prohibition of incandescent lamp in the next 10 years

Source: Company data, Morgan Stanley Research

How are players positioned for LED lighting?

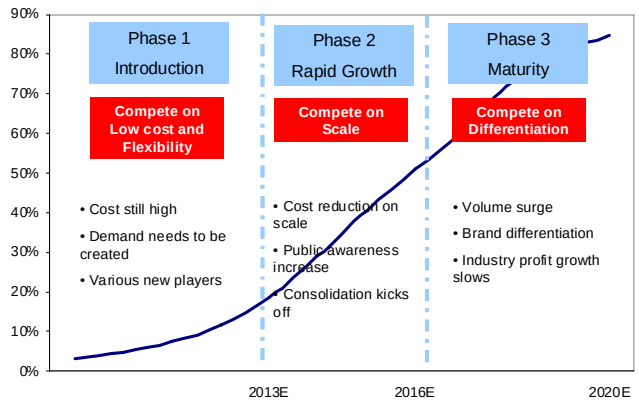
Where we are in the LED lighting cycle?

We believe we are just at the early stage of the LED lighting cycle, given low penetration at 8.9% in 2011E, based on our estimates (see Exhibit 6). The current initial installation cost of an LED lamp remains high at 6-7x that of traditional lighting, i.e., compact fluorescent light, despite continuous efficiency improvement of 30% per annum and cost reduction of 25-30% per annum. The high upfront cost is likely to prove the major hurdle for end-users in switching to energy-efficient LED lighting, but acceptance should be easily stimulated by government subsidy programs or promotional schemes. For example, the Eco-point program promoted by the Japanese government in 2010 led to a rapid 19% surge in adoption of LED lamps in seven months.

Interesting to note, various players have started to tap into the LED lighting business in order to pursue the substantial potential revenue CAGR of 81% through 2013E, on our estimates. We categorize the related players as follows: 1) Traditional lighting brands, such as Philips, OSRAM, and GE Lighting; 2) LED supply chain, such as Cree, Samsung LED, and Epistar; and 3) Manufacturing conglomerates, including TSMC, GCL Poly and Delta Electronics. This is not to mention hundreds of small, local lighting brands worldwide. We tend to believe that most players will benefit from the incremental contribution from the newly ramping LED lighting business during the first phase of LED lighting uptake, mainly through 2013, before a massive consolidation wave kicks off once lighting standards are unified and price trends more attractive in the second phase of rapid growth after 2013E.

Exhibit 6

LED Lighting Life Cycle – Now Just at the Introduction Stage



Source: Company data, Morgan Stanley Research

What is the current development focus for LED lighting?

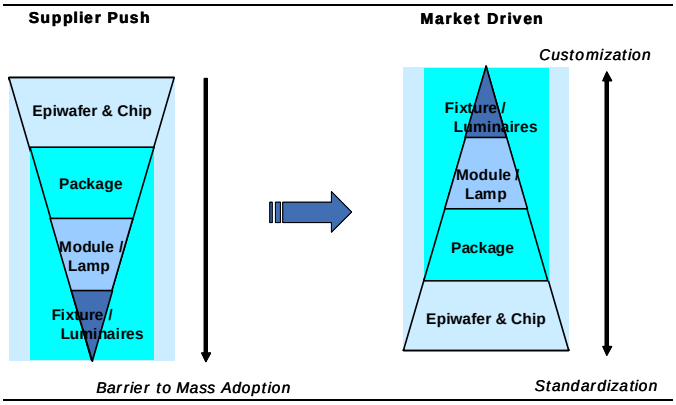
Based on our talks with the LED lighting supply chain, we note that the business development focus has been shifting to market demand from supplier push (see Exhibit 7). The prior focus centered mainly on light efficacy enhancement at the

LED chip and package level, but lacked innovative design in light modules / lamps, instead simply following the designs of incandescent and fluorescent light sources. This overshadows the energy-saving merits of LED lighting and thus slows the proliferation speed, in our view. Encouraging to note is that more and more LED lighting suppliers are starting to focus on light fixture / luminaire design based on end-customers' needs, and to look for optimized solutions for light module/lamps from LED chip/components. A few dedicated LED wafer/chip makers in Taiwan, e.g., ForEpi (3061.TW) and Genesis (3383.TW), have set up alliances in light fixtures/ luminaires and the distribution channel with the aim that it will help them understand better what the market needs.

The shift of focus in LED lighting has also led to the new industry consensus seeking for standardization at the LED component/module level with the capability of producing a full range of offerings while allowing scope for design flexibility in light fixtures and light solutions (see Exhibit 8). We view this as the optimized business model for the LED supply chain to move into the lighting segment: either dedicating development/production focus at the LED component/module level – companies building brands at the component level, such as Epistar and Edison Opto; or seeking JV/strategic alliances with traditional lighting brands/distribution channels (such as Nichia with GE Lighting, and Samsung LED with Acuity Brands). A few exceptions are the established LED suppliers dedicated in the lighting segment, e.g., Cree and Seoul Semi.

Exhibit 7

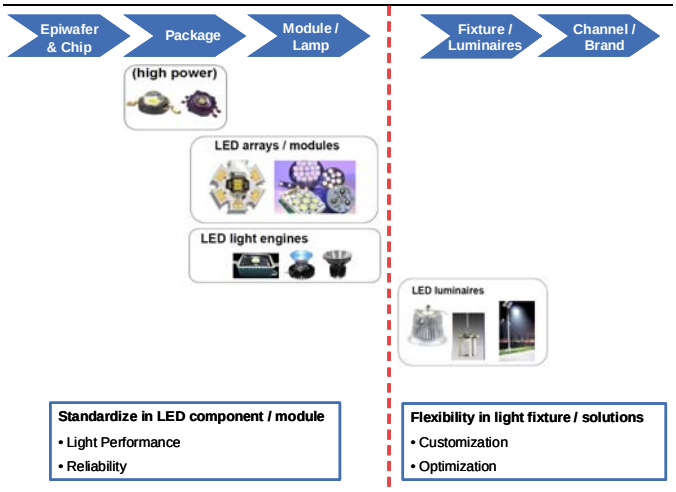
LED Lighting Development Focus Shifting to Market Demand from Previously Supplier Push



Source: Company data, Morgan Stanley Research

Exhibit 8

LED Lighting Development Focus: Standardization at Module/Lamp While Differentiation at Fixture



Source: Company data, Morgan Stanley Research

What does the recent strategic alliance move imply?

As summarized in Exhibit 10, we note that most global-tier lighting brands are building up new alliances both upward and downward along the supply chain in order to extend product offerings for LED lighting. For example, Philips Lighting, the worldwide leading lighting brand with a 25-30% market share in the lamp segment, leverages its LED component / module subsidiary, Lumileds (acquired in 2005-2006), and builds upon specific LED-related module, driver and fixture capability through various acquisitions, such as Bodine (US, acquired in 2006) for LED modules and drivers, and Color Kinetic (US, acquired in 2007) for LED light fixtures. GE Lighting is another example, teaming up in 2006 with Nichia, the leading LED component supplier in Japan, in order to tap into the LED lighting market. It is worth noting that the leading lighting brands in China have forged alliances with worldwide LED component suppliers, such as Cree and Epistar, in preparation for increased LED lighting uptake.

Smart companies think alike. The major LED component vendors have also started to look at extending their business service offerings to light modules / fixtures through acquisitions or strategic alliances. Cree, the worldwide leading producer of power LED components / modules with a dedicated focus on LED lighting, acquired LLF in 2008 for light fixture / luminaire exposure and also formed a strategic alliance with Zumtobel Group in Europe in 2008 to expand into lighting distribution channels in Europe. Samsung LED has formed a few strategic alliances in the lighting area, including buying a 15% stake in

Taewon Lighting in Korea, but has yet to showcase a complete LED lighting portfolio thus far.

We have compiled a table to show the strategic moves made by Taiwan's LED supply chain (see Exhibit 11). Our findings are: 1) Dedicated suppliers, such as Epistar, are continuing their horizontal expansion in both Taiwan and China in order to focus on LED chip offerings, with extended exposure to both global-tier lighting brands and local-tier white-brand lighting vendors. 2) Most LED packagers, such as Everlight and Unity Opto, have extended their offerings to light modules / lamps and have teamed up with lighting distributors in China. 3) Traditional conglomerates, such as Delta, are looking to build on their own-brand lighting business with investments in upstream-related components. 4) Differentiated LED light component/module suppliers, e.g., Edison, have a differentiated focus, aiming in order to offer one-stop service offerings to those non-tier local lighting brands lacking strong know-how in LED.

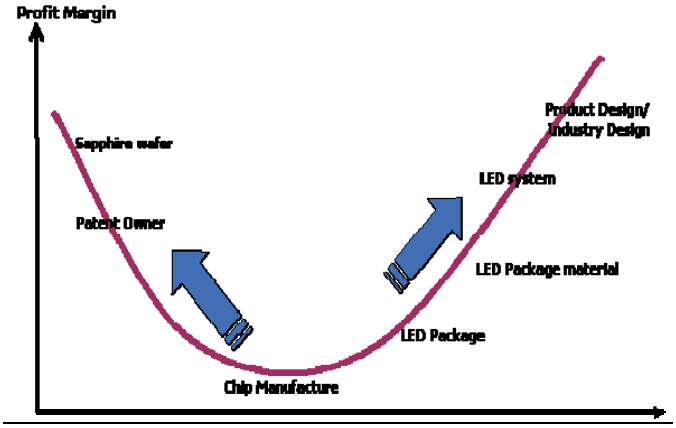
In sum, we believe the overall LED lighting competitive landscape will continue to evolve over the next two years, and that we are only at the early introduction stage of the LED lighting cycle. Among all the strategic moves, we tend to believe that those with a focus on low-cost offerings and with high design flexibility will be able to capture some of the upside of the initial LED lighting uptake opportunity, which offers a potential 81% revenue CAGR through 2013E.

Where creates the most profitability?

LED lighting creates better value than the other applications: The high-power LED chips adopted in LED lighting require different production formulae, composite of layers and specific set-up of MOCVD reactors to the high-brightness LED chips used for display backlights. In view of their greater design complexity and higher level of technological requirements, high-power LED chips remain at the initial ramping stage, so all the leading LED wafer/chip makers, including Cree in the US, Lumileds in Europe, and Epistar in Taiwan, are devoting heavy R&D efforts to obtaining critical production intellectual property (IP) rights and so enjoy an early-mover advantage with higher ASP and profitability. For the downstream LED packagers, LED lighting offers a fresh opportunity to extend their range of offerings from components to the module/system level, with better profitability (see Exhibit 9).

Exhibit 9

LED Lighting Creates Higher Value Proposition for Existing LED Supply Chain



Source: Display Search, LEDinside, Morgan Stanley Research

Lighting components vs. brands: We note that most of the LED supply chain is looking for vertical integration moves in order to capture the LED lighting upcycle, but whether it is necessary to establish their own lighting brands remains debatable. We offer the financial analysis (see Exhibit 12) to compare the profitability and return on investment for both traditional lighting brands and dedicated LED component names, based on financial results for calendar year 2010. Our major findings are as follows:

- **Operating margin:** The LED component group showed a higher operating margin at 13-25% in 2010, vs. 3-12% for traditional lighting brands. We attribute this to the greater expenditure in sales promotion and distribution for the traditional lighting brand businesses. While some might argue that 2010 was a good year for most of the LED component supply chain, we believe that the long-term operating margin will remain in the range of 15-20%, still higher than Philips Lighting's long-term EBITA target of 12-14% by 2015.

- **Return on Equity:** In the comparison, the ROE for LED component names ranged from 13-18% in 2010, vs. 5-11% for traditional lighting brands – thanks mainly to their greater profitability, despite lower asset turnover and operating leverage magnitude.

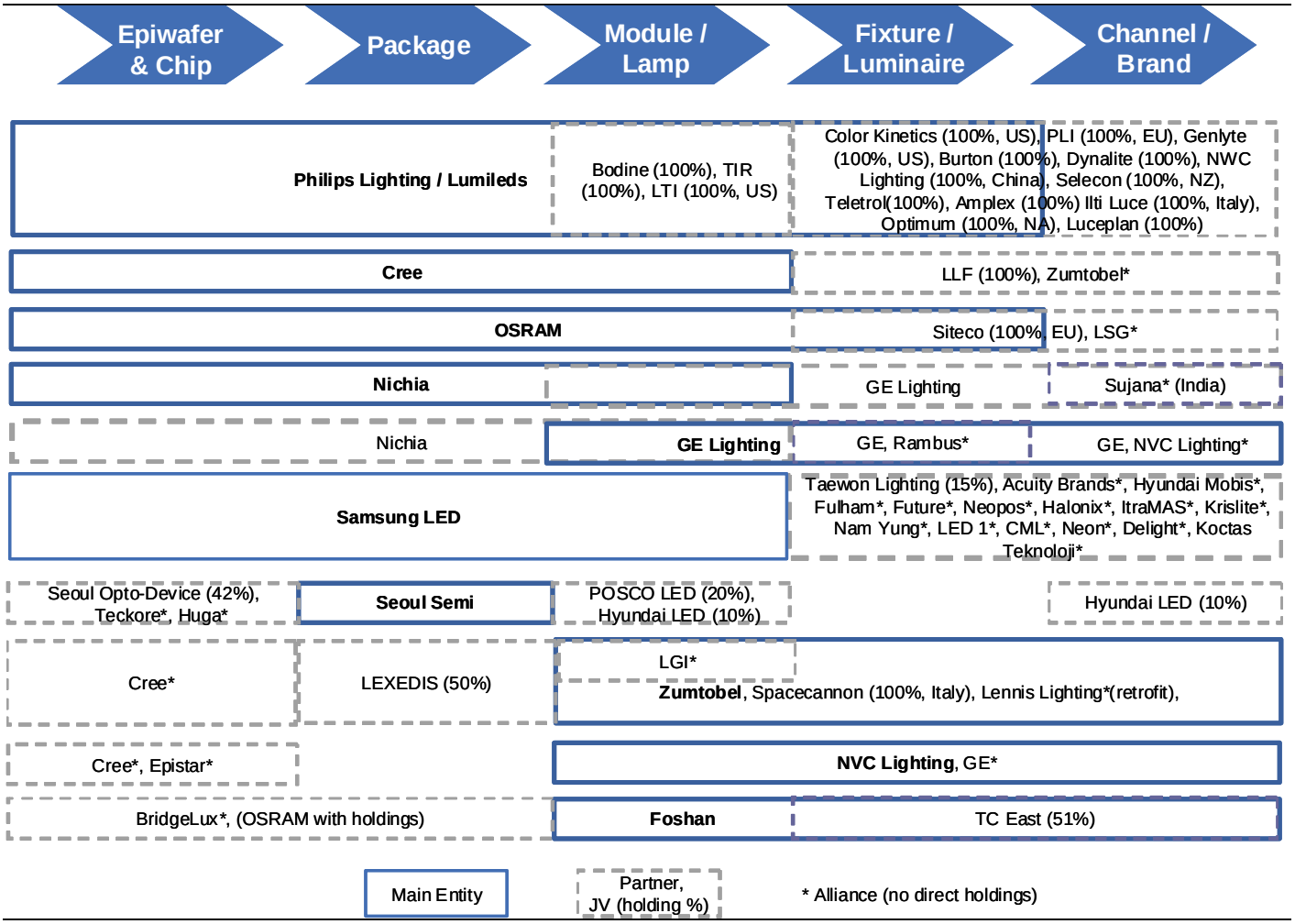
- **Return on Capital Employed:** Despite the lighting brand business taking a small amount of capital expenditure for fixed asset investment, its lower profitability led to less capital investment efficiency, for an average ROIC of 3-8% vs. 15-29% for the LED component group.

Established traditional lighting brands have well-built, worldwide distribution networks and scale merits, which gives them a good edge in crossing over into LED lighting applications. For the LED component group, we believe that clear positioning in lighting, such as focusing on the right customer segment, should help sustain higher profitability and return on investment than that of lighting brands, especially during the LED lighting introduction stage, where low-cost offerings and design flexibility are likely to be the major success factors.

Therefore, we believe that LED component vendors with a dedicated focus and strong profitability are the best positioned, at least in the next two years – such as Epistar, with its superior low-cost capability with dual exposure to both global-tier lighting brands and local white brands; and Edison Opto, with its differentiated focus in local-tier lighting brands offering value-added LED lighting products. We least prefer **Everlight,** as its efforts to build its own lighting brand might take longer to bear fruit, despite shipment momentum being likely to grow along with the roll-out of new tablet / smartphone / TV models.

Exhibit 10

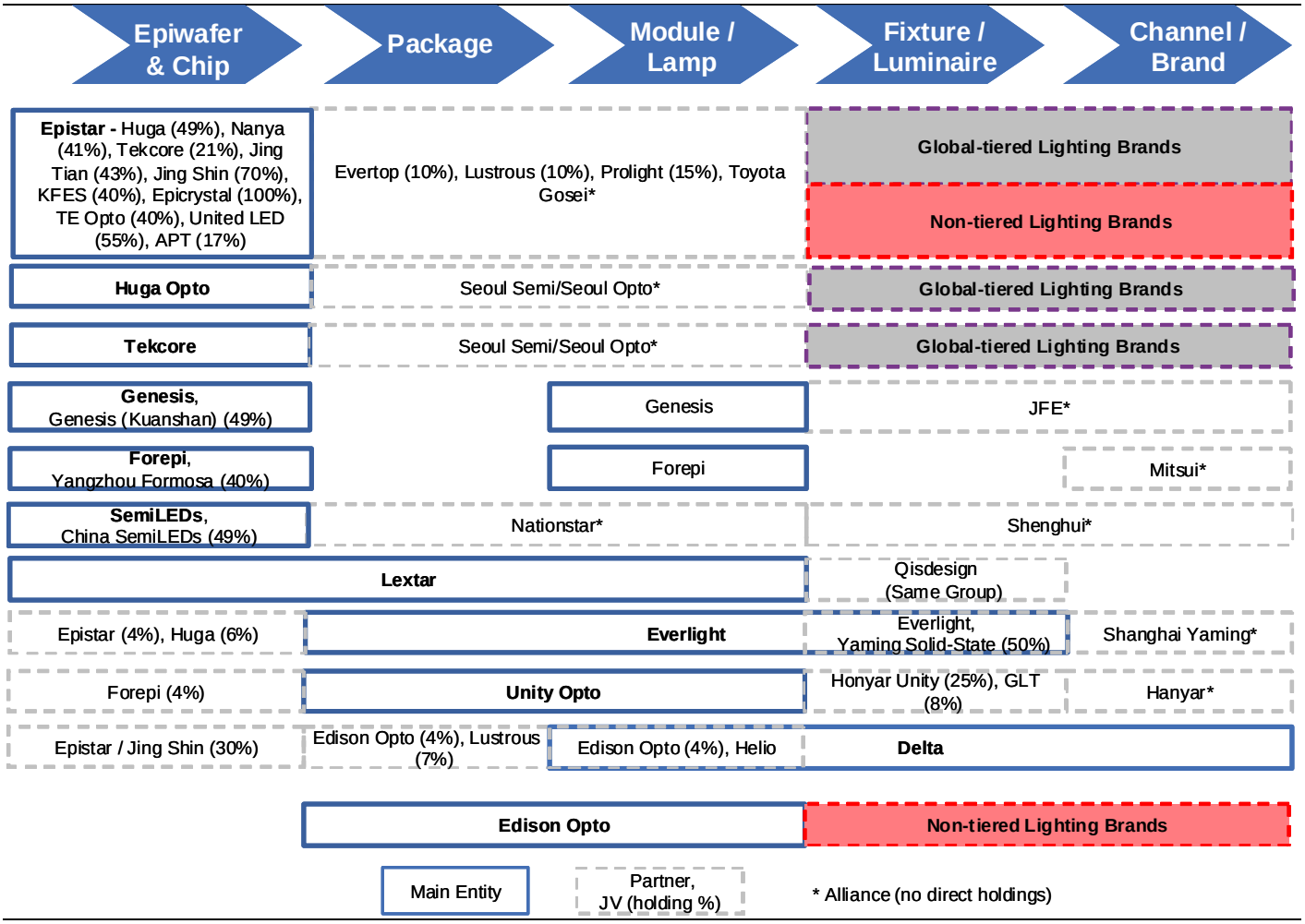
Global Lighting Supply Chain's Strategic Moves toward LED Lighting



Source: Company data, Morgan Stanley Research

Exhibit 11

Taiwan LED Supply Chain Strategic Moves Toward LED Lighting



Source: Company data, Morgan Stanley Research

Exhibit 12

LED Component Group Yielding Higher Return and Profitability as Comparing to Traditional Lighting Brands (Calendar 2010 Financials)

US$ mn	Revenue	D&A	GPM	SG&A	R&D	OPM	NPM	Capex	Working Capital	BV	Asset Turnover	Operating Leverage	ROE	ROIC
Established lighting brands														
Philips Lighting	11,016	3%	--	--	5%	9%	--	180	--	--	--	--	--	--
OSRAM	6,871	--	--	--	7%	12%	12%	--	--	--	--	--	--	--
Acuity Brands	1,627	2%	41%	8%	2%	10%	5%	22	305	694	1.1	2.2	11%	8%
Zumtobel Group	1,689	6%	33%	26%	5%	3%	2%	77	140	572	1.1	2.6	5%	3%
LED lighting														
Cree	1,024	9%	48%	22%	9%	25%	20%	238	1,318	2,189	0.5	1.1	10%	18%
LED components														
Epistar	670	12%	36%	7%	4%	25%	29%	169	476	1,575	0.3	1.4	13%	15%
Seoul Semi	756	3%	23%	10%	1%	13%	11%	83	350	514	1.0	1.4	16%	15%
Everlight	592	7%	30%	12%	5%	13%	13%	125	73	528	0.6	1.9	15%	16%
Edison	103	3%	31%	7%	2%	21%	16%	13	76	116	0.8	1.3	18%	29%

Source: Company data, Morgan Stanley Research

Exhibit 13

Valuation Comparisons: Global LED Industry

		Closing Price		Price	Market Cap	EPS (Local Dollar)			P/E (X)		P/S (X)		P/B (X)		EV/EBITDA		ROA (%)		ROE (%)	
Ticker	Company	4/7/2011	Rating	Target	(US$ m)	09	10E	11E	10E	11E	10E	11E	10E	11E	10E	11E	10E	11E	10E	11E
Taiwan Upstream																				
2448.TW	Epistar	109.00	O	142.0	3,187	2.25	6.80	7.50	16.0	14.5	4.7	3.7	2.2	2.2	8.9	9.1	12.3	12.6	15.1	15.2
2340.TW	Opto Tech	21.05	NC	--	398	0.39	1.34	1.73	15.7	12.2	1.5	1.2	1.7	-	-	-	-	-	11.0	-
3061.TW	ForEpi	40.70	NC	--	675	0.64	2.70	2.75	15.1	14.8	4.2	3.1	1.7	2.1	7.9	6.6	-	-	11.3	14.2
3383.TW	Genesis	90.70	NC	--	544	-1.29	3.36	5.90	27.0	15.4	5.2	3.0	4.9	3.9	-	-	-	-	18.3	25.5
Taiwan Downstream																				
2393.TW	Everlight	84.50	O	135.0	1,221	4.40	7.32	8.55	11.5	9.9	2.2	1.6	2.2	2.1	7.8	6.1	11.7	12.3	20.2	21.7
2301.TW	Lite-On	37.00	NC	--	2,842	3.18	3.92	3.95	9.4	9.4	0.7	0.6	1.1	1.1	6.6	6.3	-	-	12.2	11.7
2499.TW	Unity Opto	55.00	NC	--	635	2.71	3.15	3.98	17.5	13.8	2.6	2.0	2.6	2.5	-	-	-	-	14.9	18.0
3031.TW	Bright LED	34.70	NC	--	235	1.23	2.16	3.70	16.0	9.4	1.3	1.2	2.0	1.9	-	-	-	-	12.6	14.5
3591.TW	Edison Opto	170.50	O	210.0	460	5.31	5.53	7.76	30.8	22.0	4.4	3.1	6.7	5.2	-	-	16.6	16.7	22.5	24.2
China Peers																				
1868.HK	Neo-Neon	3.2	NC	--	373	0.19	0.17	0.25	18.5	12.7	1.8	1.4	0.9	0.8	12.8	7.5	-	-	4.7	6.3
000055.SHE	Fangda	10.7	NC	--	826	0.10	-	0.12	NM	92.3	-	4.2	-	-	-	-	-	-	-	-
002005.SHE	Elec-Tech Intl.	19.17	NC	--	1,471	0.18	0.65	1.09	29.4	17.6	3.1	2.0	-	-	-	-	-	-	26.3	29.1
200541.SHE	Foshan Lighting	8.62	NC	--	993	0.25	0.29	0.36	29.2	24.3	6.8	6.1	-	-	-	-	-	-	8.9	9.3
600100.SHG	Tsinghua Tongfang	26.8	NC	--	3,996	0.36	0.55	0.85	48.7	31.7	-	-	-	-	-	-	-	-	-	-
600261.SHG	Zhejiang Yankon	33.81	NC	--	1,291	-49.97	0.73	0.98	46.3	34.4	3.9	2.8	7.6	6.5	32.2	19.1	8.2	9.2	16.3	18.9
600460.SHG	Hangzhou Silan	20.3	NC	--	1,348	0.48	0.60	0.79	34.1	25.6	5.8	4.2	5.3	4.5	18.8	15.1	-	-	15.6	17.4
600703.SHG	Sanan Opto	45.1	NC	--	4,338	72.19	0.70	1.13	64.8	39.8	28.1	14.1	-	-	-	-	-	-	20.4	27.7
Global Peers																				
001210.KS	Kumho Electric	34,800	NC	--	189	2,465	2,884	4,340	12.1	8.0	0.6	0.5	0.8	0.8	6.8	5.0	5.3	6.8	8.6	11.0
009150.KS	SEMCO	118,000	O	160,000	8,098	3,727	7,425	8,360	15.9	14.1	1.3	1.1	2.8	2.4	7.7	6.6	8.9	8.7	18.4	17.9
011070.KS	LG Innotek	115,000	O	155,000	2,120	6,382	9,756	8,179	11.8	14.1	0.7	0.4	1.8	1.4	7.1	5.3	5.6	3.8	16.7	10.6
038060.KQ	Lumens	9,710	NC	--	356	146	336	898	28.9	10.8	1.5	0.9	3.7	2.8	12.1	7.9	-	-	12.7	25.6
046890.KQ	Seoul Semi	43,500	O	54,000	2,307	489	1,579	2,571	27.6	16.9	2.8	1.9	4.1	3.6	16.0	11.6	13.7	16.3	17.9	23.5
6963.OS	Rohm	4,985	E	5,400	6,411	172	245	341	20.4	14.6	1.6	1.5	0.8	0.8	3.1	2.4	2.0	3.4	3.8	5.2
6923.T	Stanley	1,257	E	1,700	2,570	76	125	139	10.0	9.0	0.9	0.8	1.1	1.0	2.9	2.2	6.5	7.1	11.0	11.1
7282.T	Toyoda Gosei	1,569	E	2,200	2,383	122	137	169	11.4	9.3	0.4	0.4	1.0	0.8	3.0	2.4	4.0	4.9	8.2	9.4
CREE	Cree	46.44	U	36.0	5,152	0.34	1.45	1.43	31.9	32.5	7.6	5.2	3.2	2.2	19.3	13.7	8.5	6.8	9.4	7.3
LEDS	SemiLEDS	11.97	NC	--	466	-0.01	0.33	-0.01	36.3	NM	9.1	7.9	1.3	1.8	20.4	39.8	-	-	3.6	-0.1
Global Lighting Manufacturers																				
6502.T	Toshiba	381	O	620	21,211	-2	24	37	15.8	10.4	0.3	0.3	2.0	1.7	6.5	4.6	1.8	2.9	12.9	17.7
6752.T	Panasonics	1,019	E	1,200	24,766	-50	38	38	26.7	26.6	0.3	0.2	0.8	0.7	4.0	3.6	1.0	1.1	2.9	2.9
AYI	Acuity Brands	61.12	NC	--	2,647	2.45	2.08	2.45	29.4	24.9	1.6	1.5	3.8	3.3	14.9	13.1	-	-	12.9	13.1
PHG.AS	Philips	21.92	O	28.0	29,895	0.15	1.53	1.65	14.4	13.2	0.9	0.8	1.4	1.3	5.7	5.3	4.6	5.1	9.8	10.2
SIEGn.DE	Siemens	96.29	O	110.0	120,288	2.60	4.52	7.98	21.3	12.1	0.9	1.0	2.4	2.6	6.6	5.9	4.1	6.8	14.4	23.1
CBE.N	Cooper Industries	67.98	O	71.0	11,292	2.52	3.20	3.75	21.3	18.1	1.9	2.2	3.0	3.2	11.7	11.7	7.0	9.1	17.6	19.0
GE.N	GE	20.55	O	23.0	218,824	1.02	1.16	1.30	17.7	15.8	1.3	1.6	1.6	1.7	4.8	5.1	1.5	1.8	9.8	10.4
HUBb.N	Hubbell	70.51	E	67.0	4,308	3.15	3.74	4.15	18.9	17.0	1.4	1.6	2.5	2.7	9.1	9.1	8.5	9.2	16.3	16.7
Equipment Manufacturers																				
4091.T	Taiyo Nippon Sanso	681	NC	--	3,196	39	45	51	15.1	13.3	0.6	0.5	1.3	1.3	7.4	6.9	-	-	8.8	9.4
6146.T	DISCO	5,650	U	4,300	2,270	87	296	241	19.1	23.4	2.1	2.1	2.0	1.8	8.8	9.3	8.2	6.4	11.3	8.5
AIXA.DE	Aixtron	30.19	NC	--	4,318	0.48	1.90	2.10	15.9	14.4	0.9	0.8	5.1	4.0	9.2	8.1	-	-	32.1	28.0
VECO	Veeco	48.81	NC	--	1,982	0.27	4.42	5.26	11.0	9.3	2.1	1.9	2.6	1.9	4.5	4.0	-	-	23.8	20.1

E = Morgan Stanley Research estimates for covered names, and FactSet consensus for non-covered (NC) companies
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(as of March 31, 2011)

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Stock Rating Category	Count	% of Total	Count	% of Total IBC	% of Rating Category
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Equal-weight/Hold	1153	40%	406	40%	35%
Not-Rated/Hold	114	4%	22	2%	19%
Underweight/Sell	389	14%	108	11%	28%
Total	2,851		1005		

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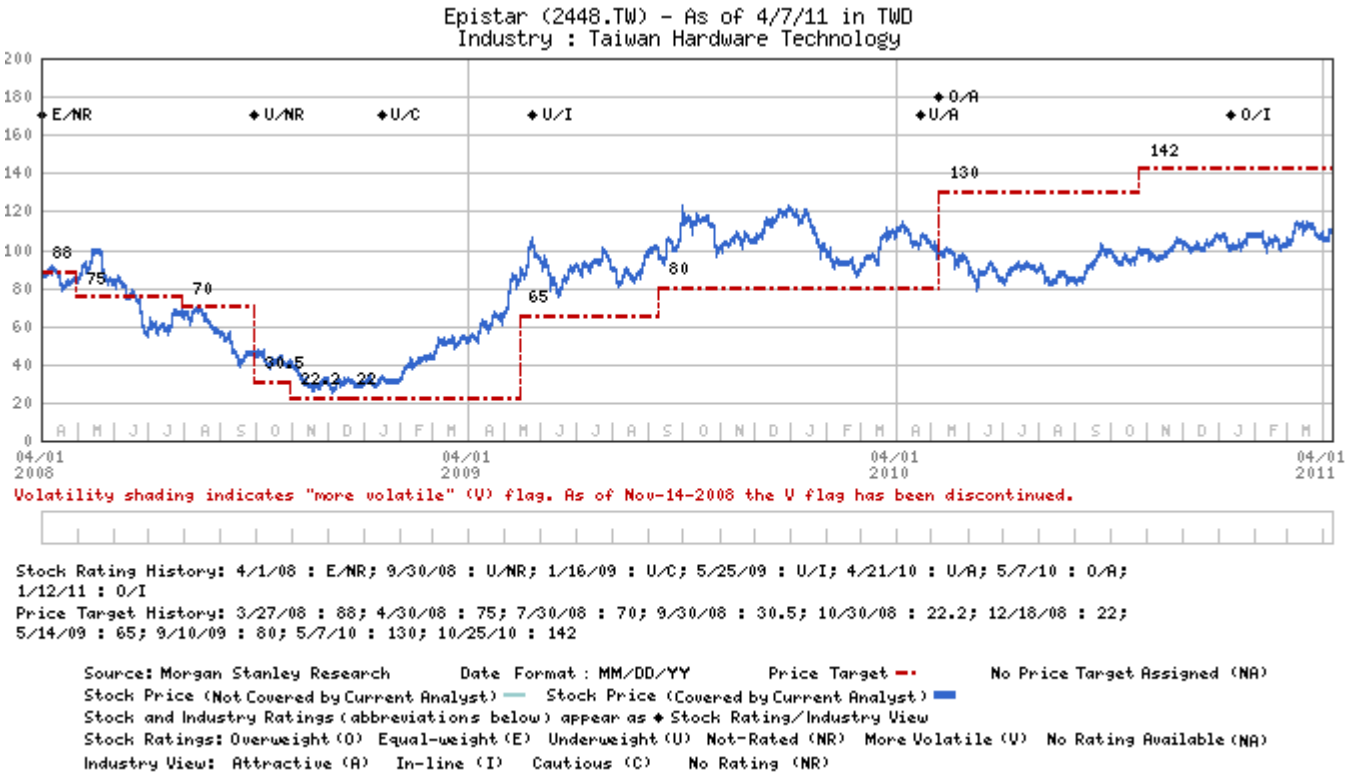
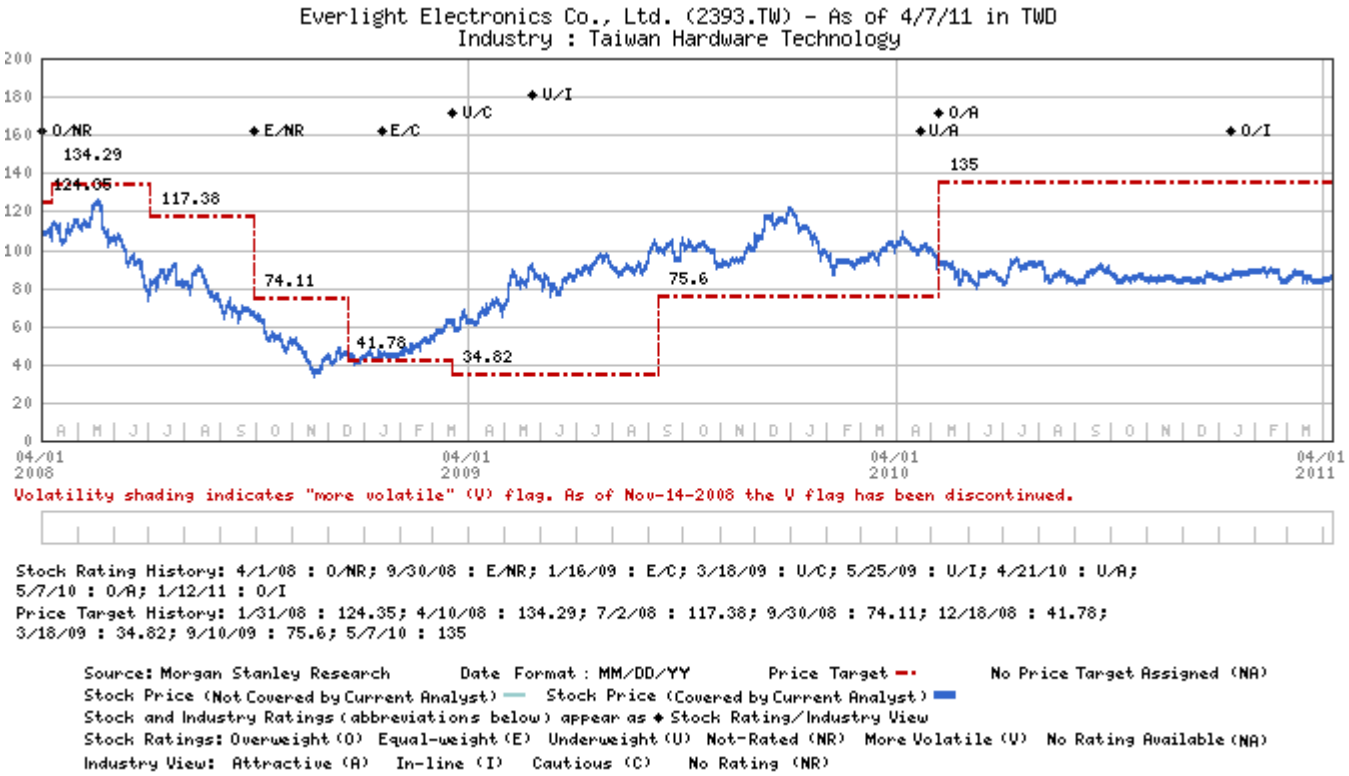
Stock Price, Price Target and Rating History (See Rating Definitions)





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Industry Coverage:China Hardware Technology

Company (Ticker)	Rating (as of)	Price* (04/07/2011)
Grace Chen		
Digital China Holdings Limited (0861.HK)	O (01/26/2010)	HK$14.46
Lenovo (0992.HK)	O (09/10/2010)	HK$4.52
Tim Hsiao		
Comba Telecom System Holdings Ltd. (2342.HK)	O (09/20/2010)	HK$9.21
ZTE Corporation (0763.HK)	E (10/28/2010)	HK$34.35
Jasmine Lu		
BYD Company Limited (1211.HK)	O (09/20/2010)	HK$30.4
BYD Electronics (0285.HK)	O (01/06/2011)	HK$5.08

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Industry Coverage:Taiwan Hardware Technology

Company (Ticker)	Rating (as of)	Price* (04/07/2011)
Grace Chen		
Acer Inc. (2353.TW)	E (03/28/2011)	NT$56.9
Asustek Computer Inc. (2357.TW)	E (10/27/2009)	NT$253
Compal Electronics (2324.TW)	E (08/30/2009)	NT$28.5
Delta Electronics Inc. (2308.TW)	E (11/02/2010)	NT$129.5
Pegatron Corporation (4938.TW)	U (06/24/2010)	NT$34
Quanta Computer Inc. (2382.TW)	E (09/10/2010)	NT$55.5
Synnex Technology International Corp. (2347.TW)	O (01/26/2010)	NT$73.5
Wistron Corporation (3231.TW)	O (07/21/2008)	NT$46.65
Jasmine Lu		
HTC Corporation (2498.TW)	E (01/12/2011)	NT$1,200
Hon Hai Precision (2317.TW)	E (06/30/2010)	NT$109.5
Largan Precision (3008.TW)	E (10/19/2010)	NT$847
Sharon Shih		
Catcher Technology (2474.TW)	U (09/10/2010)	NT$154.5
Cheng Uei Precision (2392.TW)	E (06/24/2009)	NT$58.5
D-Link Corporation (2332.TW)	E (09/30/2008)	NT$28.25
Epistar (2448.TW)	O (05/07/2010)	NT$109
Everlight Electronics Co., Ltd. (2393.TW)	O (05/07/2010)	NT$84.5
Foxconn Technology (2354.TW)	O (03/11/2009)	NT$116
Gemtek Technology (4906.TW)	E (02/17/2009)	NT$35.85
Kinsus Interconnect Tech. (3189.TW)	E (01/13/2011)	NT$89.2
Merry Electronics (2439.TW)	O (12/14/2009)	NT$45.5
Nan Ya PCB (8046.TW)	E (11/02/2009)	NT$95.8
Silitech Technology (3311.TW)	E (09/15/2010)	NT$76.2
Tripod Technology (3044.TW)	O (01/13/2011)	NT$136.5
Unimicron (3037.TW)	O (07/27/2009)	NT$49

Stock Ratings are subject to change. Please see latest research for each company.
* Historical prices are not split adjusted.

Industry Coverage:Singapore Hardware Technology

Company (Ticker)	Rating (as of)	Price* (04/07/2011)
Jasmine Lu		
Amtek Engineering Ltd (AMEL.SI)	O (01/11/2011)	S$1.27

Stock Ratings are subject to change. Please see latest research for each company.
* Historical prices are not split adjusted.

Industry Coverage:Hong Kong Hardware Technology

Company (Ticker)	Rating (as of)	Price* (04/07/2011)
Jasmine Lu		
AAC Acoustic (2018.HK)	E (11/02/2010)	HK$21.45
Foxconn Int'l Holdings (2038.HK)	E (09/15/2010)	HK$4.68

Stock Ratings are subject to change. Please see latest research for each company.
* Historical prices are not split adjusted.