

LG Innotek (011070 KS)

 Target price: **KRW240,000**

 Share price (7 Sep): **KRW173,500** | Up/downside: **+38.3%**

5 4 3 2 1


Buy
 (initiation)

Initiation: key beneficiary of new optical solution trend

- Forecasting strong EPS growth in 2018E driven by optics solutions
- Increasing adoption of dual cameras/3D sensors positive for LGI
- Initiating coverage with a Buy (1) call and TP of KRW240,000

SK Kim

 (82) 2 787 9173
 sk.kim@kr.daiwacm.com

Henny Jung

 (82) 2 787 9182
 henny.jung@kr.daiwacm.com


Investment case: We initiate coverage of LG Innotek (LGI), a major supplier of dual-camera modules (currently used in Apple's iPhone and the LG G-series) and 3D-sensing modules, with a Buy (1) rating. We believe the company will be a front-line beneficiary of the increasing adoption of dual-camera and 3D-sensing modules over the next 2-3 years.

We forecast LGI to realise a revenue CAGR of 23% for 2016-19 and see its operating margin widening from 1.8% in 2016 to 5.7% in 2018E, driven by its optics solutions (OS) business, which we expect to contribute 62% of revenue by 2018, from 50% in 2016. Our assumptions call for dual-camera penetration of the mobile market to reach 26% in 2018E, from 5% in 2016. As LGI has been making dual-camera modules since 2016 and has strong ties with its key customers, we believe it will maintain a 50% share of such business with Apple while expanding its client base to include companies in China. Further, with Apple widely expected to adopt 3D sensors in its forthcoming iPhone models, LGI looks set to realise a new revenue stream.

Catalysts: Faster-than-expected dual-cam and 3D-sensor adoption.

We forecast a 40% CAGR in LGI's dual-cam revenue related to Apple business for 2016-19E, and 3D-sensing module revenue to reach KRW1.56tn by 2019 (from zero currently). In addition, faster-than-expected dual-camera/3D-sensor adoption by China smartphone makers would be a share-price catalyst, in our view.

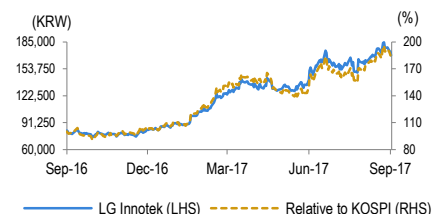
New opportunities for automotive & electronics (A&E) segment.

LGI's A&E division has a rising order backlog (end-1H17 of KRW8.7tn, vs. end-2015 of KRW6.2tn). Riding on the emerging themes of advanced driver assistance systems (ADAS) and connected cars, we expect LGI to step up its sales of products such as motor sensors and communication modules.

Valuation: We initiate coverage with a Buy (1) call and 12-month TP of KRW240,000, based on a target PER of 18.4x applied to our average 2017-18E EPS. Our target multiple is in line with the stock's peak PER level in 2010, a record year for its earnings, as we believe LGI is on track to enjoy a similarly strong 2017-18E. Yet, given our 49%YoY EPS growth for 2018E, current PEG for LGI is only 0.28x, well below the peer average of 0.72x (Bloomberg data). Our 2017-19E EPS are 11-15% above consensus, which we attribute to our more upbeat stance on 3D-sensor and dual-cam adoption.

Risks: 1) LGI experiencing lower-than-expected production yields at new production facilities, and 2) Apple further diversifying its suppliers of dual-cam and 3D-sensing modules.

Share price performance



12-month range	74,500-184,500
Market cap (USDbn)	3.64
3m avg daily turnover (USDm)	29.53
Shares outstanding (m)	24
Major shareholder	LG Electronics (40.8%)

Financial summary (KRW)

Year to 31 Dec	17E	18E	19E
Revenue (bn)	7,594	9,368	10,600
Operating profit (bn)	402	530	581
Net profit (bn)	248	370	401
Core EPS (fully-diluted)	10,473	15,645	16,961
EPS change (%)	n.a.	49.4	8.4
Daiwa vs Cons. EPS (%)	10.7	15.4	11.4
PER (x)	16.6	11.1	10.2
Dividend yield (%)	0.2	0.2	0.3
DPS	350	400	500
PBR (x)	2.0	1.7	1.4
EV/EBITDA (x)	6.6	5.3	4.6
ROE (%)	13.0	16.4	15.0

Source: FactSet, Daiwa forecasts

Table of contents

Company background.....6
 One of the original total solution providers of electric parts6

Optics solutions – opportunities aplenty7
 A core business for LGI7
 Dual-cam: a major growth driver7
 Optics solutions earnings forecasts.....11

Other electric parts: seeking new opportunities13
 Substrate & materials: revamping each segment13
 Automotive and electronics: a fast-growing segment15
 LED: a gradual recovery16

Earnings outlook18
 Optics solutions-driven earnings growth18

Capital expenditure19
 Ongoing active investment19

Valuation and risks20
 Good times returning after 7 years.....20
 Dividends forecast to increase gradually.....22
 Key risks.....22

5 4 3 2 **1**

How do we justify our view?

Buy
(initiation)

Growth outlook



Valuation



Earnings revisions

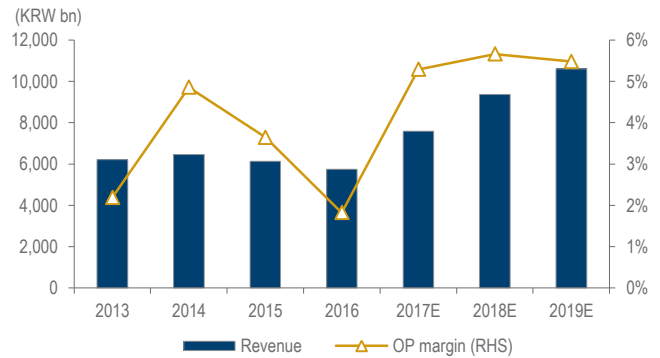


Growth outlook



We see a favourable outlook for LGI's earnings growth over the next 3 years, driven mainly by the new opportunities for its OS business. We forecast the company's revenue and operating profit to rise at 23/77% CAGRs for 2016-19, respectively. In addition to its robust top-line growth, we expect operating-margin improvements in all segments to support impressive operating-profit growth for the next 3 years. In our view, the OS business will be a key positive for LGI's share-price momentum, and we forecast this division's operating profit to quadruple in 3 years (to KRW467bn in 2019E from KRW113bn in 2016), accounting for 80% of the company's total operating profit.

LGI: revenue and operating-profit margin forecasts



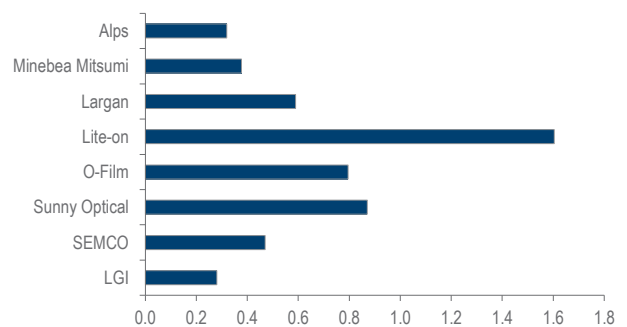
Source: Company, Daiwa forecasts

Valuation



LGI stock is trading currently at a 13.3x PER based on the average of our 2017-18E EPS. Although the share price has soared by 96% YTD, we see even further upside over the next 12 months. Comparing its current situation to that in 2010, which was a record-high earnings year for LGI, numerous indicators are pointing the same way, and we believe its share price could be rerated to its highest PER level of 2010 (18.4x) over the next 12 months. As such, we apply a target PER of 18.4x to our average 2017-18E EPS to derive our 12-month TP of KRW240,000. Considering that our target price implies a PEG of 0.37x, far below the standard 1.0x and the peer average (0.72x), we believe our TP is achievable within 12 months.

LGI: peer PEG (x) comparison



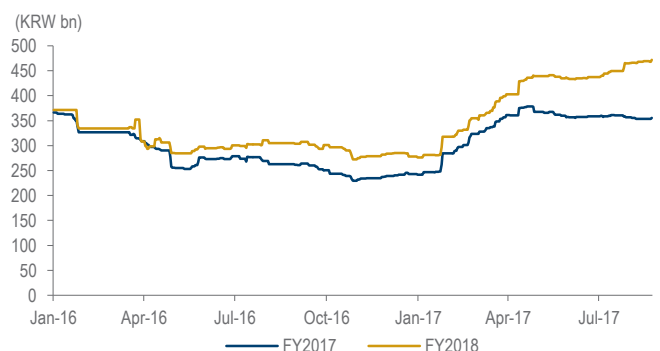
Source: Bloomberg, Daiwa forecasts

Earnings revisions



The consensus operating-profit forecasts for 2017-18E were revised up from January-April 2017, due we believe to the street's positive outlook for LGI's OS business, in part on rising expectations that LGI would supply new 3D-sensing modules to Apple as well as supplying most of the dual-camera module for iPhones. However, over the past 4 months the consensus has revised down its 2017E operating-profit forecast slightly due to unconfirmed reports that Apple could delay production of its new flagship model.

LGI: Bloomberg-consensus operating-profit revision trend



Source: Bloomberg

Financial summary

Key assumptions

Year to 31 Dec	2012	2013	2014	2015	2016	2017E	2018E	2019E
Camera module shipment (m units)	n.a.	n.a.	151.9	173.0	147.6	175.3	189.3	201.6
Camera module blended ASP (USD)	n.a.	n.a.	15.7	14.8	16.4	20.7	20.7	19.7
3D-sensing module shipment (m units)	n.a.	n.a.	0.0	0.0	0.0	26.4	82.1	105.0
3D-sensing module ASP (USD)	n.a.	n.a.	0.0	0.0	0.0	13.0	13.5	12.9

Profit and loss (KRWbn)

Year to 31 Dec	2012	2013	2014	2015	2016	2017E	2018E	2019E
Optics Solution	n.a.	n.a.	2,746	3,024	2,871	4,593	5,779	6,111
Substrate & Material	n.a.	n.a.	1,699	1,468	1,152	1,137	1,275	1,332
Other Revenue	n.a.	n.a.	2,021	1,646	1,731	1,864	2,313	3,156
Total Revenue	5,316	6,212	6,466	6,138	5,755	7,594	9,368	10,600
Other income	0	0	0	0	0	0	0	0
COGS	(4,754)	(5,522)	(5,603)	(5,365)	(5,102)	(6,659)	(8,247)	(9,332)
SG&A	(484)	(554)	(549)	(549)	(548)	(533)	(590)	(687)
Other op.expenses	0	0	0	0	0	0	(0)	0
Operating profit	77	136	314	224	105	402	530	581
Net-interest inc./exp.)	(94)	(93)	(66)	(40)	(30)	(25)	(23)	(20)
Assoc/forex/extraord./others	(1)	(21)	(57)	(62)	(64)	(37)	(16)	(26)
Pre-tax profit	(18)	22	192	122	11	340	491	535
Tax	(7)	(6)	(79)	(27)	(6)	(92)	(121)	(134)
Min. int./pref. div./others	(4)	4	4	0	0	0	0	0
Net profit (reported)	(29)	20	117	95	5	248	370	401
Net profit (adjusted)	(29)	20	117	95	5	248	370	401
EPS (reported)(KRW)	(1,237)	771	4,761	4,018	209	10,473	15,645	16,961
EPS (adjusted)(KRW)	(1,237)	771	4,761	4,018	209	10,473	15,645	16,961
EPS (adjusted fully-diluted)(KRW)	(1,237)	771	4,761	4,018	209	10,473	15,645	16,961
DPS (KRW)	200	200	400	400	250	350	400	500
EBIT	77	136	314	224	105	402	530	581
EBITDA	549	665	849	706	456	747	952	1,011

Cash flow (KRWbn)

Year to 31 Dec	2012	2013	2014	2015	2016	2017E	2018E	2019E
Profit before tax	(18)	22	192	122	11	340	491	535
Depreciation and amortisation	471	529	535	482	351	345	422	430
Tax paid	(7)	(6)	(79)	(27)	(6)	(92)	(121)	(134)
Change in working capital	139	(230)	77	35	95	(121)	(379)	(83)
Other operational CF items	(205)	120	19	66	(119)	75	(38)	12
Cash flow from operations	381	436	743	678	332	547	375	760
Capex	(350)	(383)	(261)	(262)	(319)	(712)	(510)	(460)
Net (acquisitions)/disposals	23	17	17	9	18	60	60	60
Other investing CF items	(56)	(39)	(65)	(54)	(55)	(14)	0	0
Cash flow from investing	(383)	(405)	(309)	(306)	(356)	(666)	(450)	(400)
Change in debt	(77)	(7)	(700)	(396)	17	176	25	(238)
Net share issues/(repurchases)	1	23	279	0	0	0	0	0
Dividends paid	0	0	0	(6)	(8)	(6)	(6)	(8)
Other financing CF items	(3)	1	(19)	(7)	(2)	8	7	12
Cash flow from financing	(79)	16	(440)	(408)	6	179	26	(234)
Forex effect/others	(2)	(0)	3	0	0	0	0	0
Change in cash	(83)	47	(3)	(36)	(18)	59	(49)	125
Free cash flow	30	52	482	417	13	(165)	(135)	300

Source: FactSet, Daiwa forecasts

Financial summary continued ...

Balance sheet (KRWbn)

As at 31 Dec	2012	2013	2014	2015	2016	2017E	2018E	2019E
Cash & short-term investment	353	400	396	360	341	397	348	474
Inventory	478	376	354	303	403	451	605	659
Accounts receivable	1,147	1,166	1,264	1,085	1,292	1,448	1,945	2,111
Other current assets	95	65	68	41	48	44	44	44
Total current assets	2,073	2,007	2,082	1,789	2,084	2,341	2,943	3,287
Fixed assets	2,375	2,105	1,898	1,647	1,729	1,990	2,091	2,132
Goodwill & intangibles	1,222	168	181	207	213	293	352	411
Other non-current assets	(784)	302	268	271	280	436	305	154
Total assets	4,886	4,581	4,429	3,914	4,324	5,060	5,691	5,984
Short-term debt	670	633	495	366	395	223	230	187
Accounts payable	740	564	653	502	805	971	1,252	1,388
Other current liabilities	599	432	499	427	533	447	438	437
Total current liabilities	2,009	1,629	1,647	1,295	1,734	1,641	1,920	2,013
Long-term debt	1,498	1,527	965	698	686	1,034	1,052	857
Other non-current liabilities	111	108	120	156	125	344	247	233
Total liabilities	3,618	3,264	2,732	2,149	2,545	3,020	3,219	3,102
Share capital	101	101	118	118	118	118	118	118
Reserves/R.E./others	1,167	1,216	1,578	1,647	1,660	1,922	2,353	2,763
Shareholders' equity	1,268	1,317	1,696	1,765	1,778	2,040	2,472	2,881
Minority interests	0	0	0	0	0	0	0	0
Total equity & liabilities	4,886	4,581	4,429	3,914	4,324	5,060	5,691	5,984
EV	5,921	5,866	5,170	4,810	4,846	4,966	5,040	4,676
Net debt/(cash)	1,815	1,761	1,064	704	740	860	934	571
BVPS (KRW)	62,905	65,298	77,407	74,587	75,154	86,208	104,441	121,752

Key ratios (%)

Year to 31 Dec	2012	2013	2014	2015	2016	2017E	2018E	2019E
Sales (YoY)	16.8	16.8	4.1	(5.1)	(6.2)	32.0	23.4	13.2
EBITDA (YoY)	46.8	21.3	27.5	(16.8)	(35.5)	63.9	27.5	6.1
Operating profit (YoY)	n.a.	76.1	130.6	(28.8)	(53.1)	283.2	32.0	9.6
Net profit (YoY)	n.a.	n.a.	489.3	(18.4)	(94.8)	4,904.0	49.4	8.4
Core EPS (fully-diluted) (YoY)	n.a.	n.a.	517.5	(15.6)	(94.8)	4,911.1	49.4	8.4
Gross-profit margin	10.6	11.1	13.3	12.6	11.3	12.3	12.0	12.0
EBITDA margin	10.3	10.7	13.1	11.5	7.9	9.8	10.2	9.5
Operating-profit margin	1.5	2.2	4.9	3.6	1.8	5.3	5.7	5.5
Net profit margin	(0.5)	0.3	1.8	1.5	0.1	3.3	4.0	3.8
ROAE	n.a.	1.5	7.7	5.5	0.3	13.0	16.4	15.0
ROAA	n.a.	0.4	2.6	2.3	0.1	5.3	6.9	6.9
ROCE	2.2	3.9	9.5	7.5	3.7	13.0	15.0	15.1
ROIC	3.5	3.1	6.3	6.7	2.0	10.8	12.7	12.7
Net debt to equity	143.1	133.7	62.7	39.9	41.6	42.2	37.8	19.8
Effective tax rate	(42.5)	29.4	41.2	22.1	53.6	27.1	24.7	25.0
Accounts receivable (days)	68.7	68.0	68.6	69.8	75.4	65.9	66.1	69.8
Current ratio (x)	1.0	1.2	1.3	1.4	1.2	1.4	1.5	1.6
Net interest cover (x)	0.8	1.5	4.8	5.7	3.5	16.1	22.9	29.7
Net dividend payout	n.a.	25.9	8.4	10.0	119.6	3.3	2.6	2.9
Free cash flow yield	0.7	1.3	11.7	10.2	0.3	n.a.	n.a.	7.3

Source: FactSet, Daiwa forecasts

Company profile

Established in 1976, LG Innotek is one of largest electric part manufacturers in Korea. The company covers various electric components from camera module, HDI, tape substrates, LED and recently expanded its business opportunities to 3D-sensing module. Its largest customers include US's largest smartphone maker, as well as its parent company, LG Electronics, which owns a 41% stake in LG Innotek.

Company background

One of the original total solution providers of electric parts

LGI is an all-round electric-parts supplier

LGI is a global electric-components manufacturer, whose main products are optical solution components and composite materials for semiconductor and display. Founded in 1976, LGI was established as a manufacturing and sales company for electric parts. Listed on the KOSPI in 2008 and merged with LG Micron in 2009, it has expanded its product coverage to include diverse electric components which are essential for developing up-to-date and high value-added electric devices, such as 3D sensors and dual cameras.

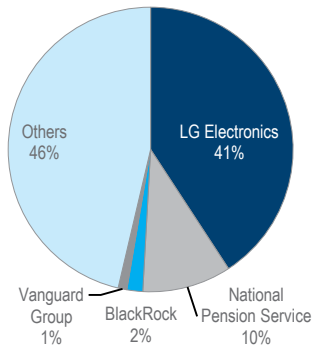
As of July 2017, the product portfolios of LGI included substrate materials, electric-components and optical solutions which are mostly camera modules. LGI is the largest supplier of camera modules for Apple's iPhone. Also, the company is the world's predominant manufacturer of tape substrate and photomask used in the display panel producing process. It also focuses on rigid-flex PCBs (RF-PCBs) which help keep electric goods thin and lightweight. Its main customers are LG Electronics (066570 KS, KRW85,300, Outperform [2]), LG Display (034220 KS, KRW31,950, Buy [1]) and Apple (AAPL US, USD161.26, Outperform [2]).

Earnings growth forecast to come mainly from the OS and A&E businesses

In 2016, 50% of LGI's revenue came from OS, 20% from substrate & materials, 19% from A&E and the rest 12% from LED. We believe the OS business will be a strong earnings-growth driver for the company over the next 2-3 years, and expect the revenue contribution from this business to rise to 62% by 2018E, from 49% in 2016. We also see earnings upside for its A&E segment over the next 3 years, riding on the themes of IoT, ADAS, etc.

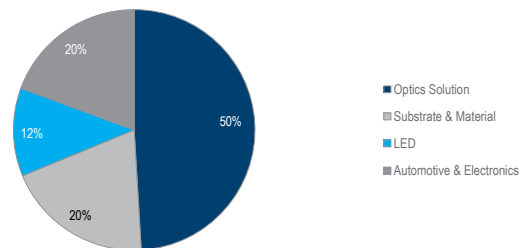
The largest shareholder in LGI is LG Electronics, with a 40.79% stake.

LGI: shareholding structure (as of Sep 2017)



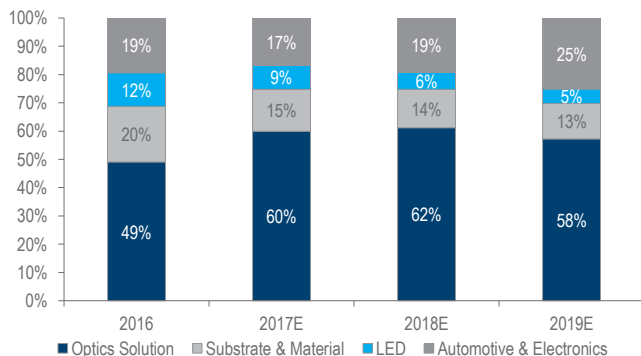
Source: Company, Bloomberg

LGI: revenue breakdown (2016)



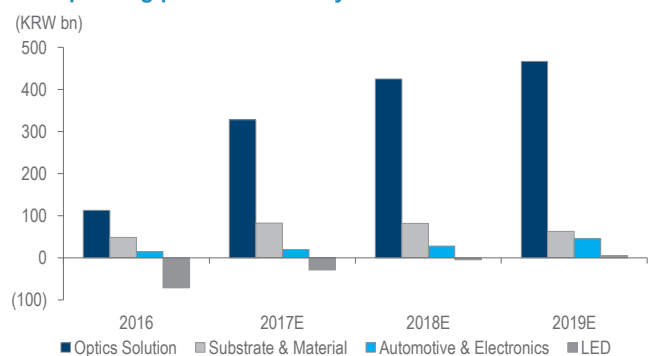
Source: Company

LGI: revenue breakdown forecasts



Source: Company, Daiwa forecasts

LGI: operating-profit forecasts by division



Source: Company, Daiwa forecasts

Optics solutions – opportunities aplenty

A core business for LGI

OS business is the cash cow for LGI

The OS business has been a major cash cow for LGI since 2010, with its revenue contribution rising continually from 16% in 2010 to 50% in 2016. And we forecast this portion to rise further to 58-62% in 2017-19E, reflecting our view of the importance of this core business to LGI. The company has been a major camera module supplier to the US's largest smartphone manufacturer (Apple) since 2010, maintaining a 30-50% share of such business with Apple ever since. Moreover, when Apple launched its first dual-cam-adopted flagship model in 3Q16, LGI obtained 100% of the business thanks to its competitor experiencing problems with its production facilities. Although LGI will not remain the sole vendor for Apple's dual-cam, we still expect it to maintain more than 50% of the orders for the next 2-3 years.

Moreover, 3D-sensing modules represent a new business opportunity for LGI, and suggest further earnings upside for its OS division. We expect Apple's next flagship smartphone to adopt a 3D-sensing camera and LGI to be chosen as a 3D-sensing module supplier of the camera. The camera in this new smartphone model will not be replaced entirely, but rather will adopt a 3D-sensing module as an additional component. As such, the revenue pie itself will be enlarged with the adoption of this 3D sensor. We expect smartphone makers to eventually adopt 3D-sensors in rear cameras as well as front cameras, as the trend leader, Apple, fuels the new trend, which then becomes an irrepressible tide. We are optimistic about LGI's OS business due to: 1) the growing revenue pie, 2) its product quality, and 3) its long and close relationship with Apple.

Dual-cam: a major growth driver

Recent consumer trend – what has evoked camera spec upgrades?

The camera is becoming a key differentiator for high-end smartphones

As the basic functions of many smartphone devices have been enhanced to such a level that consumers can discern tangible differences, the quantitative growth of the smartphone manufacturing industry has shrunk over the years. Nevertheless, smartphone makers continue to differentiate their flagship models using cutting-edge technology.

Development of dual-camera equipment likely to be a key factor in determining the competitiveness of the next smartphones

The global sensation that is Nintendo's innovative mobile game, Pokemon Go, proves the feasibility of both the commercialisation and popularisation of augmented reality (AR) technology. A premium smartphone equipped with a dual camera is the key component needed to play Pokemon Go. In addition to AR, with the increasing pixel size of image sensors and general adoption of optical image stabilisers, it has now become possible for smartphones to be a powerful substitute for digital single-lens reflex. Not just the merger of 2 cameras, dual cameras are now being developed to be integrated with PCB and actuators to provide a stable (ie, no swaying) and good quality high-end camera function.

With the increasing possibility of smartphone innovation taking off, the development of dual camera equipment will be a key factor determining the competitiveness of the next generation of smartphones.

Dual-cams enable advanced picture quality through 2 eyes

Dual-cameras can achieve enhanced picture quality without adding thickness to the phone

Camera specs (pixel size, aperture, sensor size, etc.) have been upgraded continuously over the past decade. However, spec upgrades slowed at a certain point because many upgrades were adding thickness and weight to the smartphone. However, in the case of the dual camera, smartphones equipped with 2 separate camera modules can achieve enhanced picture quality without adding to the thickness of the device. By adding the secondary camera horizontally or vertically (as opposed to alongside the primary camera), the smartphone cameras can either capture additional light or increase the field of view.

Global Pokemon Go fever



Source: Google

Dual-cam adoption in iPhone 7 Plus



Source: Appleinsider

Adoption of dual cameras likely to accelerate
Apple is leading the trend

Apple’s dual-cam adoption has led to a sharp increase in global dual-cam penetration

The first dual-cam smartphone model was Huawei’s P9/P9+, which was released in April 2016. Xiaomi and LG followed suit with their own dual-cam smartphones, and Apple launched its first dual-cam model, the iPhone 7 Plus, in October 2016. Given its leading position in the smartphone industry, Apple’s adoption of dual-cam modules led to a sharp increase in global dual-cam penetration. Oppo, Vivo and Samsung, among others, have rolled out new flagship models with dual-cam functionality, and we expect dual-cam penetration of the mobile market to balloon from 5% in 2016 to 26% in 2018.

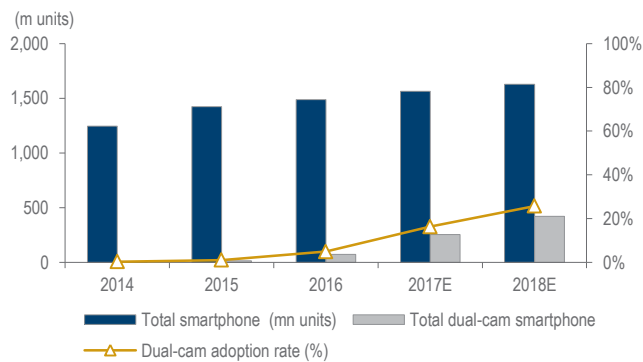
According to iHS, more than 40m dual-cam mobile phones had been shipped by end-2016 (China makers alone accounted for 28.7m units). In the quarter immediately after its launch, the iPhone 7 Plus sold 28m units, further accelerating global dual-cam adoption.

Global smartphone makers’ dual-cam adoption

Model	Huawei P10/P10+	Huawei Honor V9	LG G6	Vivo V5 Plus	ZTE Blade V8	Oppo R11	Apple iPhone 7 Plus
Launch date	Feb-17	Feb-17	Feb-17	Jan-17	Jan-17	Jun-17	Sep-16
Dual-cam resolution	20MP + 12MP	12MP + 12MP	13MP + 13MP	16MP	13MP + 2MP	20MP + 16MP	12MP + 12MP
Front cam resolution	8MP	8MP	5MP	20MP + 8MP	13Mp	20Mp	7MP

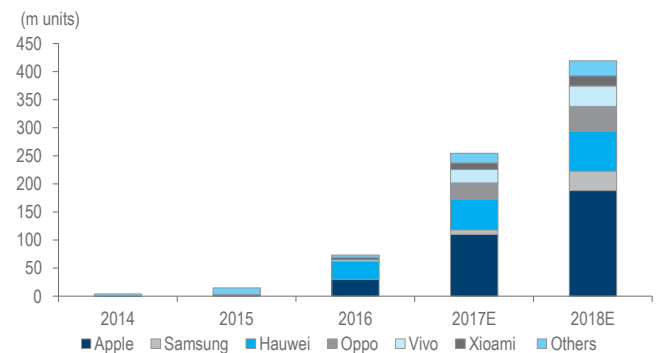
Source: PhoneArena

Dual-cam penetration



Source: Daiwa estimates

Dual-cam smartphone shipment forecasts by company



Source: Daiwa estimates

3D-sensing cameras

New eco-system forming around 3D-sensing cameras

Apple: likely to introduce flagship with 3D sensors

Apple's likely adoption of 3D sensors in its next iPhones would almost certainly kick off a new trend

There is growing expectation in the market that Apple's flagship new iPhone (likely to be unveiled on 12 September) will sport 3D-depth sensors. Certainly, Apple's acquisitions and investments in related companies and start-ups suggest it has been preparing for a shift to 3D sensing for a number of years (see table below). We believe that if Apple does indeed adopt 3D sensors in its top-of-the-line iPhone (perhaps to be known as the iPhone 8 or iPhone X), it will jumpstart another new trend that would have positive share-price momentum for the related supply chain.

The main components of 3D sensing camera modules are blue filters, lens, image sensors, and infrared-light transmitting devices. With the overall camera spec updated, each electronic part of the camera module likewise needs to be enhanced technically. However, updated cameras tend to require bigger and thicker components. This is a concern for device makers, since heavy and thick mobile phones would run counter to market trends.

In addition, increasing the number of pixels for a higher-definition camera image could interrupt normal functioning of many camera module components.

For blue filters, the latest version of the product is being manufactured as a film type. Considering the original main role of blue filters is to enhance the sharpness of an image by adjusting any distortion caused by absorption of unnecessary light, the importance of well-functioning film-type blue filters has increased over the years as users have sought ever-more realistic pictures from their smartphone cameras. Optron-tech (082210 KS) and Nanos (151910 KS) are currently the 2 largest manufacturers of blue filters in Korea.

For camera lenses, high-definition photographs taken on cameras or dual cameras require a higher number of lenses. Besides, as upgraded versions of camera modules are launched, so rises the ASP of the lens itself. As such, with the increase in both price and quantity, we expect the revenue pie to grow exponentially as we enter the age of the smartphone camera. In our view, lens manufacturers like Sekonix (053450 KQ, not rated), Largan Precision (3008 TT, TWD5,945, Buy [1]), Sunny Optical (2382 HK, HKD111.0, Buy [1]) and Haesung Optics (076610 KQ, not rated) would be the front-line beneficiaries of this trend.

3D sensing with derivative systems such as facial recognition or 3D scanning have many connected applications, for example mobile biometric systems or automobile 3D sensors. Apple released its AR-based programming software named "AR Kit" in June 2017. Since Apple possesses both hardware (iPhone) and software (iOS) platforms, the AR kit would be the key catalyst for expanding its own AR ecosystem, which in turn is likely to have a big impact on the broader industry in terms of revenue. We expect this AR trend, led by a few innovative electronics companies to drive potential demand for electric components necessary for realising AR systems in comprehensive industries.

Apple's M&A for 3D sensing, augmented reality (AR) and facial recognition

No	Date	Company	Description
1	Sep-10	IMSense	IMSense developed technology which improved HDR picture quality by adjusting image tones.
2	Sep-10	Polar Rose	Polar Rose is renowned for its technology which recognises faces in photos and links each face with a name.
3	Aug-11	C3 Technologies	C3 Technologies produces 3D maps.
4	Mar-13	WiFiSlam	WiFiSlam developed a technology which detects the location inside the building using a wifi signal as its company name implies.
5	Jul-13	Locationary	Locationary tries to enhance the information update process by using data acquired by crowd-sourcing and other companies and manages the entire database so that it is up to date. This technology was expected to enhance the functionality of Apple's mapping service.
6	Jul-13	HopStop.com	HopStop.com offers the best route to a destination for hundreds of cities
7	Aug-13	Embark	Embark provides information regarding public transportation in major cities in the US.
8	Nov-13	PrimeSense	PrimeSense is an Israeli company that specialises in developing 3-dimension augmented reality and virtual reality technologies.
9	Dec-13	Broadmap	Broadmap develops systems for digital mapping and geographical information services (GIS). Its products are capable of marking various geographical features and producing comprehensive maps.
10	Jan-14	SnappyLabs	SnappyLabs developed a camera application service which enables users to take pictures at 20-30 frames per second.
11	May-15	Coherent Navigation	Coherent Navigation is a specialised enterprise for high precision GPS. It appears that the company's speciality would be used for raising the accuracy of GPS on "Apple Maps" application. Later, its technology is expected to be adopted for use in dashboards of 'Apple-cars'. The company's GPS technology enjoys great superiority given its high degree of precision and integrity with the combination of middle or low trajectory satellite GPS technology and data communication system.
12	Apr-15	LinX	LinX develops various types of cameras for tablets, PC or laptop computers, as well as sub-miniature multi-lenses for mobile devices.
13	May-15	Metaio	Metaio is a German company which aims to organise AR software that connects the real world with digital content on visual interactive solutions.
14	Sep-15	Mapsense	Mapsense produces mobile device solutions for spotting and visualising a specific space, which is anticipated to be utilised for enhancing user experience of Apple's mapping service.
15	Oct-15	VocallQ	VocallQ is an AI-specialised enterprise for processing the natural language.
16	Oct-15	Perceptio	Perceptio's technology enables each smartphone to recognise and identify images by itself regardless of external database with its own deep-learning process.
17	Nov-15	Faceshift	Faceshift is known for its outstanding real-time face-recognition technology using a 3D sensor and camera.
18	Jan-16	Emotient	Emotient develops technologies which can interpret the emotional state of the user by analysing facial expressions.
19	Jan-16	Flyby Media	Flyby Media is known for its 'V-Fusion' technology and is expected to contribute to the development of VR and AR head-mounted display prototypes. Also, there is a possibility that this technology may be applied in Apple's Car project (<i>Titan</i>).
20	Aug-16	Turi	Turi produces the framework which provides programmers with machine-learning and AI solutions for their own customised use.
21	Sep-16	Tuplejump	Tuplejump's products facilitate the data management process with machine-learning technology.
22	Dec-16	Indoor.io	Indoor.io is expected to enhance the functioning of Apple's mapping service.
23	May-17	Beddit	Beddit is a Finnish company known for its signature device which measures sleep patterns.
24	Jun-17	SensoMotoric Instruments	SMI's products include eyes-tracking technologies which are expected to be expansively utilised for AR and VR technologies.

Source: Various media (Ipnomics, Swifter, Business Insider, Hellot, Mac Rumors, Bodhara, Techneedle, HanKyung)

Camera supply chain: ASP hikes lie ahead ...

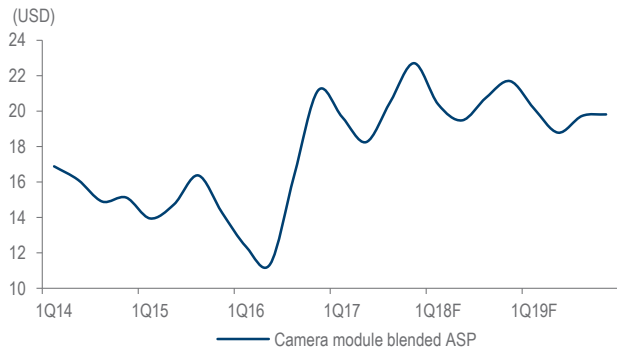
... led by dual-cam and 3D-sensor spec upgrades

Dual-cam and 3D-sensor spec upgrades should drive ASP hikes

With camera spec upgrades, companies in the camera supply chain also enjoy ASP hikes as every single camera part is required to be upgraded to complete a higher-spec camera. Camera module suppliers such as LGI and SEMCO (009150 KS, KRW101,000, Buy [1]) have been key beneficiaries of such continuous smartphone camera spec upgrade cycles. However, until now, there have been cycles of camera module ASP hikes and stabilisation, whereby ASPs rise in 4Q as a new flagship iPhone is launched, and remain stable throughout the year as: 1) smartphone companies put pressure on ASPs, and 2) the yield on higher-spec camera parts/module stabilises.

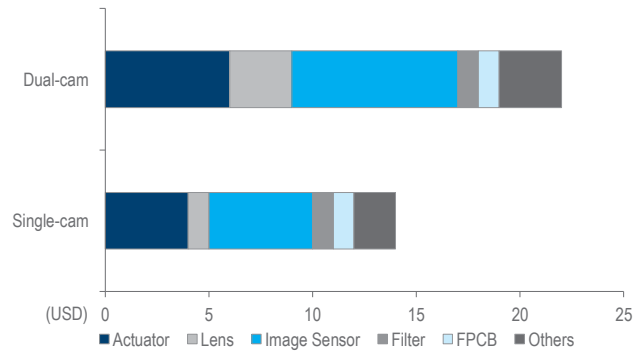
However, the rise of dual-cams has led to a step-up in overall camera part/module ASPs. Looking at LGI's quarterly ASP trend, there was a big jump in 4Q16 with the start of dual-cam production. Even though the dual-cam ASP eventually stabilised at around USD20, the 3D-sensing module added additional revenue for the company. We believe the rise of dual-cams and 3D-sensors will be a game-changer for the smartphone camera supply chain. As dual-cam ASPs begin to stabilise, likely from 2H18E, 3D-sensor revenue should generate additional revenue for LGI's OS division.

LGI: camera module ASP trend (excluding 3D-sensing module)



Source: Daiwa estimates and forecasts

BoM cost comparison: dual-cam vs. single-cam



Source: Daiwa estimates

Optics solutions earnings forecasts

Dual-cams and 3D-sensing modules to drive growth

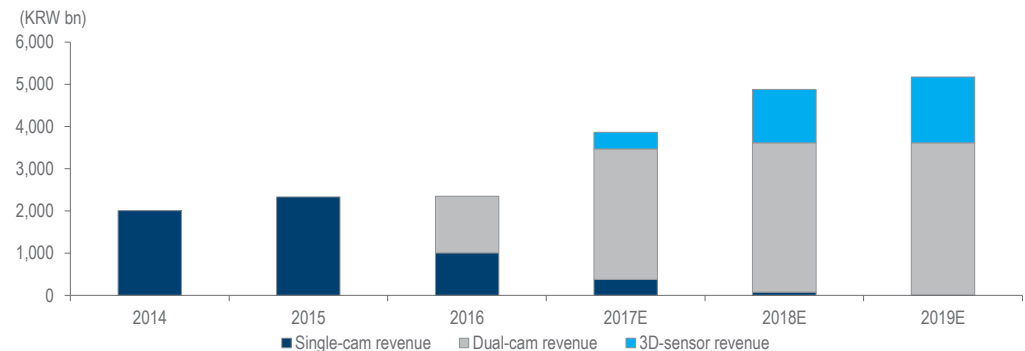
We expect dual-cams and 3D-sensing modules to drive earnings for LGI's OS division

In addition to Apple's dual-cam adoption, increasing dual-cam adoption by Chinese smartphone makers offers additional upside for LGI. We forecast LGI's revenue exposure to China customers to increase to 5.8% in 2019E (from 1.5% in 2016). However, faster-than-expected adoption by China smartphone makers such as Huawei could result in further upside to our forecasts.

Similarly for 3D-sensing modules, we believe there will be additional opportunities from new areas/customers. With AR adoption on the rise, we expect applications to be expanded to AR kit, given that Apple is focusing on AR for its next innovative product segment. Furthermore, with the rise in demand for autonomous vehicles, we expect demand for 3D-sensing modules to increase exponentially over the next few years. To that end, although LGI currently specialises in module assembly, it is preparing to expand its OS business by bringing production of some key parts (eg, lasers) in-house.

We expect LGI's OS division revenue to more than double in the next 3 years (to KRW6.1tn by 2019E from KRW2.9tn in 2016). OS revenue has stagnated over the past 3 years as global smartphone shipments have slowed and as camera module ASPs stabilised at the mid-to-high USD10 level. However, we forecast OS revenue to rise by 60% YoY for 2017E thanks to the increase in new dual-cam phones, and by 26% YoY for 2018E due mainly to increased customer adoption of 3D-sensors. We estimate LGI's revenue from 3D-sensing modules to be partially reflected from 2H17, with the recognition of <KRW500bn in revenue for 2017E. However, LGI guides for 3D-sensor revenue to reach KRW1tn in 2018E. Its current production capacity for 3D-sensing modules is KRW1.2tn/year, so KRW1tn in revenue is achievable as long as Apple's new flagship is successful, in our view.

LGI: revenue from Apple



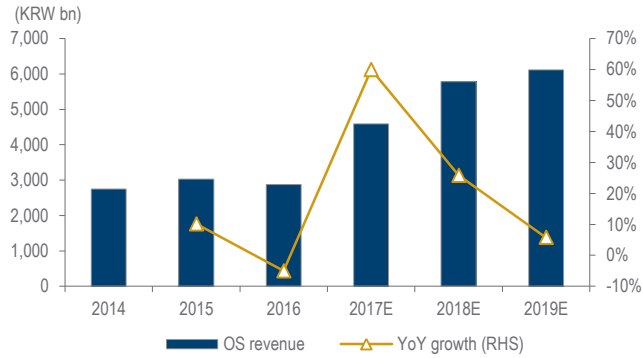
Source: Company, Daiwa forecasts

iPhone production volume estimates

(m units)	1Q16	2Q16	3Q16	4Q16	1Q17	2Q17	3Q17E	4Q17E	2016E	2017E	2018E
iPhone 5S/SE	6.0	9.0	8.0	7.5	5.5	5.5	0	0	30.5	11.0	0
iPhone 6/6 Plus	7.5	5.5	3.5	0	0	0	0	0	16.5	0	0
iPhone 6S/6S Plus	33.5	28.5	14.0	7.5	4.5	4.0	4.5	4.5	83.5	17.5	3.0
iPhone 7/7 Plus	0	0	22.5	61.0	38.0	32.0	20.5	11.0	83.5	101.5	11.5
iPhone 7S/7S Plus	0	0	0	0	0	0	26.0	37.0	0	63.0	42.0
iPhone 8	0	0	0	0	0	0	2.0	31.0	0	33.0	71.0
iPhone 8S/8S plus	0	0	0	0	0	0	0	0	0	0	85.0
iPhone 9/9S	0	0	0	0	0	0	0	0	0	0	0
Total	47	43	48	76	48	41.5	53	83.5	214	226	212.5

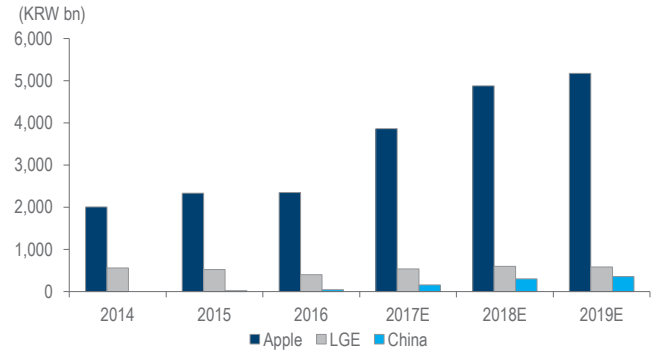
Source: Daiwa estimates

LGI: OS revenue forecasts



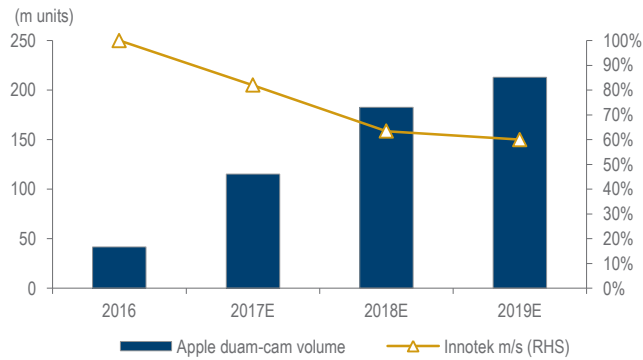
Source: Company, Daiwa forecasts

LGI: OS revenue forecasts by customer



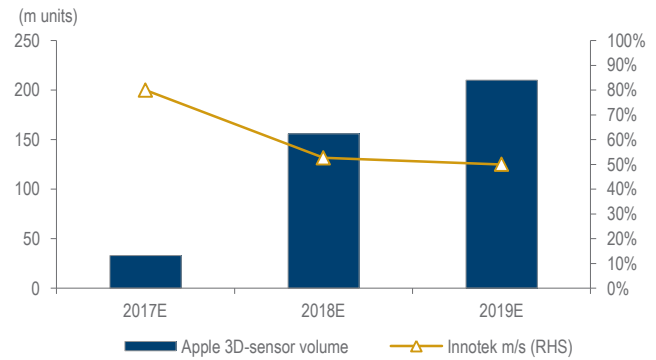
Source: Company, Daiwa forecasts

Apple dual-cam volume and LGI market-share forecasts



Source: Company, Daiwa forecasts

Apple 3D-sensor volume and LGI market-share forecasts



Source: Daiwa forecasts

Other electric parts: seeking new opportunities

LGI has a number of electric parts segments under its business, although each only accounts for a small proportion of total revenue compared to the OS business. The company has 3 other divisions (other than OS): substrate & materials, LED and A&E – and each division has various products under it.

- **Substrate & materials:** High density interconnect (HDI) PCBs (B-up, RF-PCB), Package (FC-CSP, CSP), tape substrate, touch window, photomask, lead frame
- **A&E:** Auto (motor sensors, communications, new business), electronics (power, tuner, Wifi, new business)
- **LED**

Each product generates yearly revenue of KRW10-300bn with not much volatility or significant upside. However, the company is still seeking new opportunities to grow revenue and improve the operating margin of some of these sub divisions or products. As such, it has been focusing since 2016 on removing or minimising items that are not competitive or profitable.

Substrate & materials: revamping each segment

A new chance in HDI: preparing for RF-PCB supply to Apple

A PCB is a core part of all electric devices. An RF PCB is an advanced PCB in that it consists of a rigid substrate and a flex substrate, and the flexibility of the flex components enables 3D-circuit connection. In addition, an RF PCB allows the size of the electric devices to be smaller and thinner than devices that use normal PCB, as an RF PCB does not require connectors between modules. Due to its features, an RF PCB is a necessary part in smartphones that adopt OLED panels.

The hottest topic in the tech scene this year was Apple's adoption of OLED panels for its 10-year anniversary flagship iPhone8. We estimate the total industrywide RF-PCB revenue from Apple to reach >KRW1tn in 2017 and >KRW2tn in 2018. The RF-PCB adopted in smartphones can be largely divided into 2 types: 1 for OLED panels and the other for touch screen panels (TSP). Most of the suppliers in both applications are Korean players, including Interflex (051370 KS, not rated), BH Co. (090460 KS, not rated) and SEMCO. The share prices of these companies have been remarkably strong this year, with Interflex's up 84% YTD and BH's rising by 155% on the back of Apple's OLED adoption theme. The suppliers of RF PCB to Apple in different applications include:

- For OLED panels: Interflex, BH, SEMCO
- For TSP: Interflex, YoungPoong Electronics (Not listed), UMT (3037 TT, not rated)

However, our research in the market suggests UMT's RF PCB currently has quality issues with a low production yield. According to various media reports, LGI is preparing to become the third vendor for Apple's TSP PCB. With its strong relationship with Apple and its long-standing know-how in FPCB, LGI certainly seems qualified as the vendor for Apple's TSP RF-PCB, in our view. If LGI succeeds in supplying Apple, LGI could secure 2 customers with the technology, Apple and LGD.

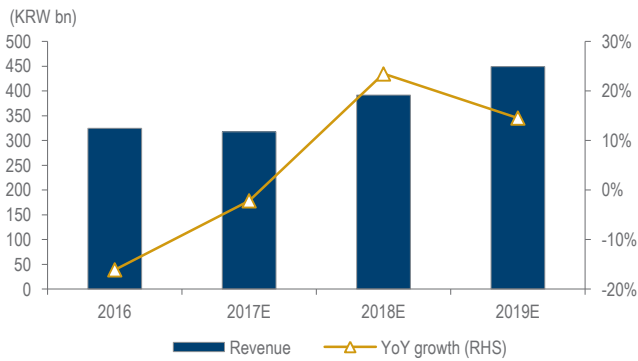
LGD commenced operations at its first OLED fab, E5, in July 2017 with capacity of 15k sheets/month (not fully ramped up yet). Targeting to be one of the 2 vendors of OLED panels to Apple, LGD is building a second Gen-6 OLED facility, E6, in the Paju 10 area. As LGD's OLED production volume gets larger, the captive RF-PCB volume diverted to LGI could be considerable from 2018.

Some 90% of LGI's HDI revenue currently comes from its affiliate and major shareholder LG Electronics, from mainly supplying high-end smartphones. LGI's HDI revenue shrank

RF PCB is necessary for OLED display-based smartphones

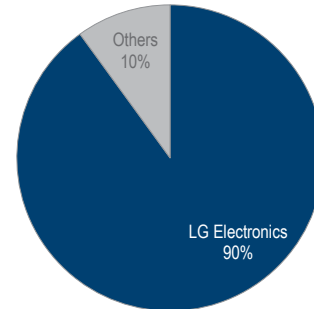
by 16% YoY for 2016 and we forecast it to decline further by 2% YoY for 2017 as LG Electronics' smartphone business has not been performing well. LGI's HDI division's operating loss in 2016 was also due to sluggish customer demand for LG Electronics' smartphones. However, we forecast LGI's HDI division to post revenue growth of 15-23% YoY for 2018-19 as the supply of RF-PCB to Apple becomes a growth driver.

LGI: HDI revenue forecasts



Source: Company, Daiwa forecasts

LGI: HDI revenue breakdown by customer (2016)



Source: Company

2-metal CoF likely to provide additional upside for the tape substrate business

2-metal Chip on Film (CoF): growing with OLED expansion

2-metal CoF is a new tape substrate item, which belongs to the substrate & materials segment. Tape substrate is one of the company's cash cows with a steady operating margin of >20%. Investors are now interested in its new product, 2 metal CoF, to see if it could provide additional upside for tape substrate earnings.

CoF is a type of package technology that loads semiconductor chips onto PCBs as a film format. The recent trend in electric device manufacturing is to make products small, thin and light. Therefore, the circuit structure of electric components especially loaded in mobile phones and display panels need to be highly concentrated and integrated. 2-metal CoF is actively involved in connecting running semiconductor chips and IC substrate which operate as parts of electric devices, such as personal computers and mobile display panels. Since it lays out minute circuits on both sides of the film, a considerably high level of technology and corresponding factory line are required. As a result of its capabilities in module miniaturisation and flexibility, CoF can decisively contribute to decreasing the thickness and overall size of an electric device, as well as increasing the range of product designs.

2-metal CoF will be largely adopted in OLED smartphones, and the company sees a bright outlook for this new business as it has experience in supplying a small amount of these products to Samsung in 2016 for use in its Galaxy 7 edge. As OLED panels become larger and curved, they will require more 2-metal CoF although the absolute number of tapes required for each panel is very small and the ASP is under USD1.

As LGI has a predominant level of technology competitiveness in HDI and tape substrate, potential synergy effects with 2-metal CoF could be a strong earnings driver for the electric material business. LGI's revenue from 2-metal CoF is marginal, but it guides for KRW50bn of yearly revenue by 2017. As mentioned above, the ASP and volume are small, but the company expects this business to turn in a high operating margin.

Photomask: beneficiary of OLED TV gaining popularity

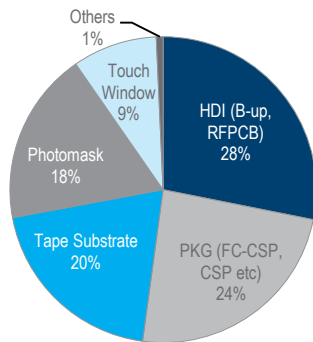
Recent investment decision is a positive

Demand for photomask has been growing fast from increased sales of W-OLED

Photolithography is one of the necessary steps in the chip/display manufacturing process. In this process, photomask is a key disposable material. LGI is one of the world's leaders in photomask for displays. The photomask business is one of LGI's cash cows with an operating margin of c.20% in 2016. LGI's largest customer in this business is affiliate LGD. The demand for photomask has been growing fast over the past 2-3 years as sales of W-OLED are accelerating and the average size of a TV is getting larger.

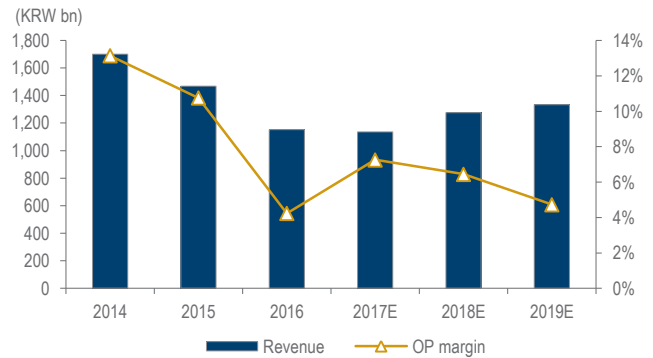
LGI recently decided to invest KRW106bn (KRW3bn in 2017 and the rest KRW103bn in 2018) in capacity expansion of its photomask production facilities. It currently has capacity for 4.6m units/year and is operating at a 93% utilisation rate (as of 1H17). Its recent investment decision is in preparation for the increasing demand for photomasks by LCD and OLED panel manufacturers, especially for >Gen-10 panels. LGI already has considerable market share in the photomask market, at 32% for 1H17, and we expect it to strengthen its leading position in large-size (>Gen-8) photomasks over the next 2-3 years.

LGI: revenue mix of substrate & materials division (2016)



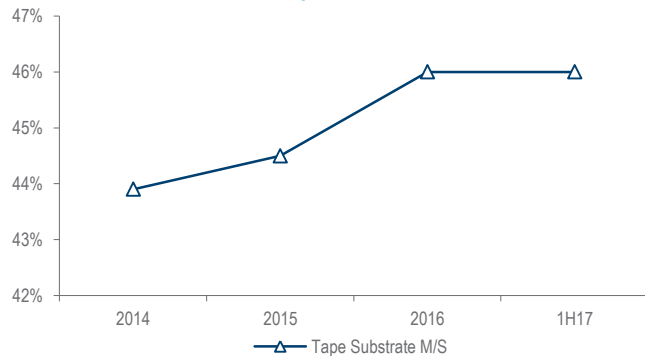
Source: Company

LGI: substrate & materials earnings forecasts



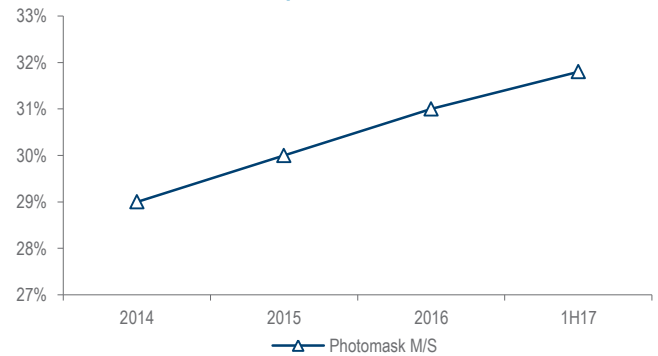
Source: Company, Daiwa forecasts

LGI: market-share trend in tape substrate



Source: Company

LGI: market-share trend in photomask



Source: Company

Automotive and electronics: a fast-growing segment

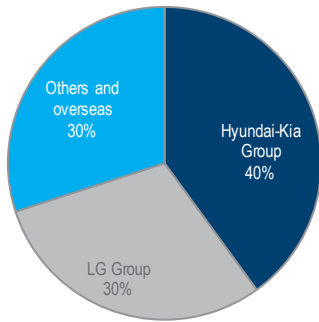
A steep increase in backlog orders

We expect the A&E business to be another growth driver

LGI's automotive and electronics division has become the second-largest division in terms of revenue from 2017, and we expect it to see a 33% CAGR over the 2016-19E. The company's yearly new orders and historical backlog trend reinforces our earnings forecasts as backlog orders have more than doubled in the past 3 years (from KRW3.3tn in 2013 to KRW7.3tn in 2016), with the company guiding for a backlog of KRW9.7tn at 2017 year end.

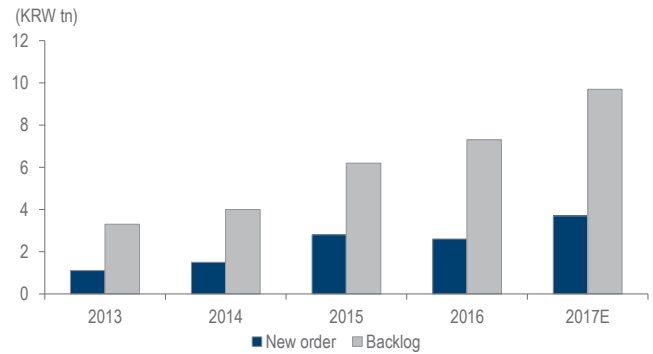
During 1H17, LGI recorded new orders of KRW1.8tn, which is already more than half of full-year new orders in 2016 (KRW2.6tn). This indicates to us that the automotive and electronics division could be one of LGI's growth drivers. We expect the division's 3Q17 revenue to grow 25% QoQ thanks to increased sales of electronics, especially wireless charging modules to a US accessories company.

LGI: automotive customer breakdown (2016)



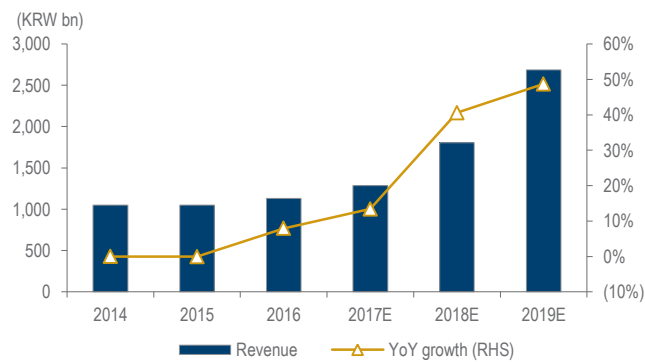
Source: Company

LGI: automotive and electronics new orders and backlog



Source: Company, Daiwa forecasts

LGI: automotive and electronics revenue growth



Source: Company, Daiwa forecasts

LGI: opportunities in new products



Source: Company

LGI's LED business has contracted over the past 2 years

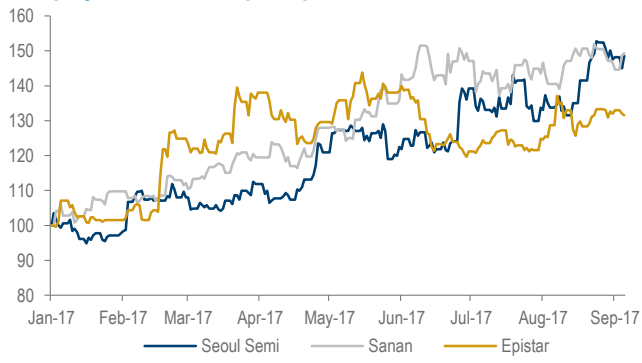
LED: a gradual recovery

We expect a price recovery in the LED segment

LGI's LED business has been operating since 2000 and provides total LED solutions by vertically integrating the entire LED manufacturing process from epi wafers, chips, packages, etc. Its LED products are used in various areas including automobiles, lights, displays and mobiles. However, LED revenue has fallen by more than 30% over the past 2 years (2014-16) as demand from TV manufacturers has been sluggish, and thus LED prices have declined.

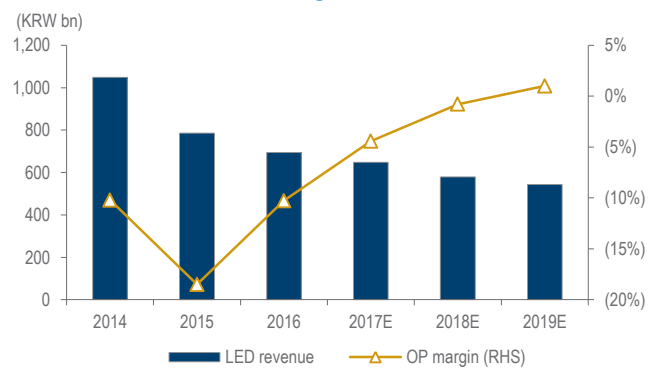
The division's operating margin has also deteriorated, from -10% in 2014 to -19% in 2015. There was a slight recovery back to -10% in 2016 thanks to a restructuring of the division. We expect LED revenue to continue to decline up to 2019E, but look for the operating margin to gradually recover to reach break-even in 2019E. As all other LED players have undergone restructuring, the fall in LED panel prices, which began in 2011, should begin to slow. The share prices of global LED players have risen in 2017 thanks to the effect of restructuring (see chart below). Although the LED division does not make up a significant portion of LGI's revenue (12% in 2016), a turnaround in this business would be a positive for the company.

LED players YTD share price performance



Source: Bloomberg
Note: 1 Jan 2017 = 100

LGI: LED revenue and OP margin forecasts



Source: Company, Daiwa forecasts

Earnings outlook

Optics solutions-driven earnings growth

OS business forecast to drive LGI's earnings in 2017-19E

We forecast LGI's earnings to improve in 2017-19E, largely driven by its OS business. We forecast revenue to increase by 32%/23% for 2017/18, the operating-profit margin to improve to 5.7% in 2018 from 1.8% in 2016, and for LGI to maintain an operating profit margin of over 5% in 2019. The revenue portion from the OS business is expected to increase to 62% in 2018 from 50% in 2016, on our forecasts.

For LGI's OS division, we forecast revenue to increase 60%/26% YoY in 2017/18 and the operating margin to improve to 7.3% in 2018 from 3.9% in 2016. While dual-camera modules are likely to lead earnings in 2017-18, we expect 3D-sensing modules to be the next growth driver for earnings in 2018-19. We forecast revenue for dual-camera modules to increase to KRW3.1tn in 2017 from KRW1.3tn in 2016. We forecast revenue for 3D-sensing modules to reach KRW1.3tn in 2018 from KRW395bn in 2017.

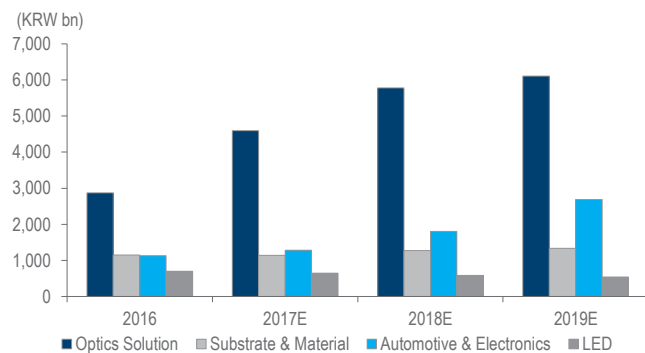
We also expect LGI's A&E business to show high earnings growth over the next 3 years (CAGR: 33% for 2016-19E). As ADAS requires more IT components than that for conventional cars, LGI has accumulated an order backlog from car OEMs. In addition, we believe its substrate and materials business has growth potential due to potential orders for RF-PCB. LGD recently announced a sizeable investment plan for plastic OLED and we expect LGI to supply RF-PCBs to Apple via LGD from 2019.

LGI: earnings outlook by division

(KRWbn)	1Q17	2Q17	3Q17E	4Q17E	2016	2017E	2018E	2019E
Consolidated revenue	1,644.7	1,339.6	1,821.1	2,788.8	5,754.6	7,594.2	9,368.0	10,600.0
Optics Solution	924.2	634.9	1,037.4	1,996.4	2,870.8	4,593.0	5,779.4	6,111.3
Substrate & Material	264.1	271.3	298.2	303.4	1,152.4	1,137.0	1,275.2	1,332.4
Automotive & Electronics	307.2	271.5	338.8	367.0	1,132.9	1,284.4	1,805.5	2,684.9
LED	167.6	176.8	164.5	139.8	694.8	648.6	579.6	543.2
Consolidated operating profit	66.8	32.5	82.7	219.6	104.8	401.6	530.3	581.0
Optics Solution	72.7	11.7	53.8	189.9	112.7	328.1	424.7	466.8
Substrate & Material	8.5	24.4	25.3	24.3	48.9	82.5	82.2	63.1
Automotive & Electronics	-0.4	-1.0	10.2	11.0	14.7	19.8	27.9	45.7
LED	-14.0	-2.6	-6.6	-5.6	-71.4	-28.7	-4.6	5.4
Consolidated OP margin	4.1%	2.4%	4.5%	7.9%	1.8%	5.3%	5.7%	5.5%
Optics Solution	7.9%	1.8%	5.2%	9.5%	3.9%	7.1%	7.3%	7.6%
Substrate & Material	3.2%	9.0%	8.5%	8.0%	4.2%	7.3%	6.4%	4.7%
Automotive & Electronics	-0.1%	-0.4%	3.0%	3.0%	1.3%	1.5%	1.5%	1.7%
LED	-8.3%	-1.5%	-4.0%	-4.0%	-10.3%	-4.4%	-0.8%	1.0%

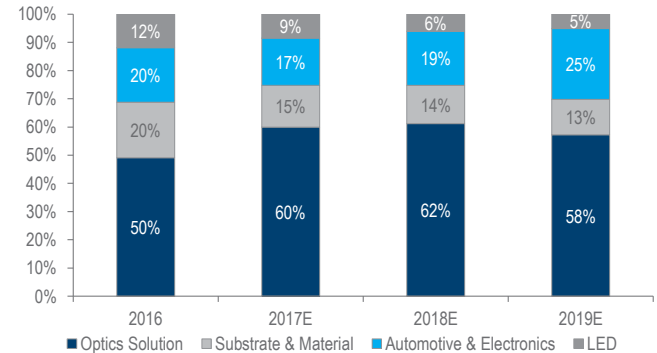
Source: Company, Daiwa forecasts

LGI: revenue forecasts by division



Source: Company, Daiwa forecasts

LGI: revenue mix forecasts by division



Source: Company, Daiwa forecasts

Capital expenditure

Ongoing active investment

In dual-cams, 3D-sensing modules and photomasks

We expect capex to increase meaningfully in 2017

We forecast the company's capex to increase by over 100% YoY to cKRW700bn for 2017E as it actively invests in new businesses, such as dual camera modules and 3D-sensing modules. LGI's yearly capex has been around KRW250-400bn per year for the past 5 years (2012-16), after it spent around KRW2tn during 2010-11 (KRW1.1tn in 2010/ KRW0.7tn in 2011), with most of the capex used to expand LED production capacity.

We believe the bold investment decision to increase its 2017 capex by so much was made at the right time and sends a positive signal to the market. Looking back at historical capex levels, we see that capex has been highly correlated with top-line growth (see chart below), which may seem straightforward and obvious. However, the large-scale investment decisions in 2017 are somewhat different from the past as the company has already secured customers, which is key to monetising the investment as soon as the facilities are completed.

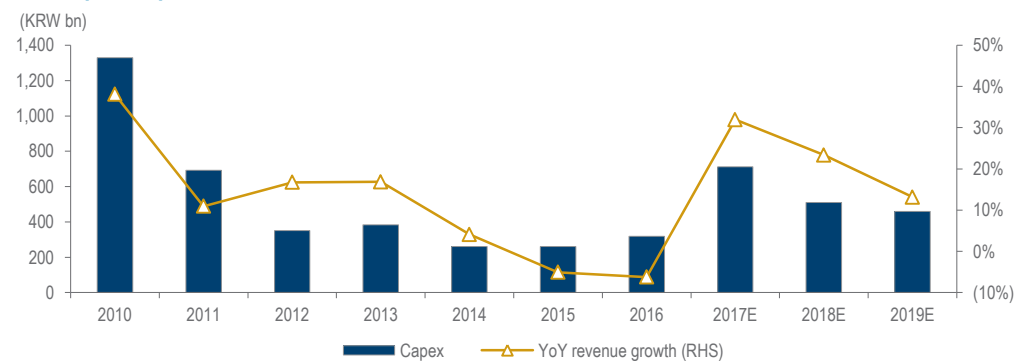
Although the company does not specify how much capex is related to Apple or how much is related to China-based and other customers, we assume the new facilities will reach their appropriate utilisation rates on time.

Details of recent investment announcements

Investment horizon		Objective	Amount KRW bn	Details
Start	End			
2017-03-17	2018-04-30	Camera module	264.4	The company increased production capacity at its Gumi fab by 50% to keep up with dual-cam demand from Apple. A new production line is expected to run from early-3Q17 and commence mass production within 2H17.
2017-04-26	2018-03-31	3D camera module sensor	269.7	The company appears to be preparing for mass production of 3D-sensing modules from 3Q17. Management is cautious about mentioning specifics regarding its customers and said only that it is still in discussions with customers regarding 3D sensors.
2017-07-26	2018-12-31	Photomask	106.0	LG Innotek invests in Photomask as preparation for demand from a customer, that produces large-size LCD and OLED panels. It plans to invest KRW3bn by 2017 and spend KRW103bn in 2018. The company may be able to build an entry barrier in the early stages as there are few companies who can produce a photomask for >Gen-7 size panels. The company aims to widen the gap between Innotek and other photomask suppliers to attract potential overseas customers.

Source: Company, Dart, Media (Infomax, ETnews, ZDnet, etc.)

LGI: capital expenditure



Source: Company, Daiwa forecasts

Valuation and risks

Good times returning after 7 years

Target price of KRW240,000, backed by historical PER comparison

Initiating coverage with a Buy (1) rating and TP of KRW240,000

LGI's share price peaked in 2010 at KRW193,000, and the stock has traded mostly in the range of KRW50,000-150,000 over the past 6 years. However, the share price began to rebound in 4Q16 and has more than doubled within the past 6 months. LGI's share price is now heading towards KRW240,000, which we believe is an achievable level over the next 12 months.

We forecast LGI to record EPS of KRW10,473 for 2017, which would mark the first time it has breached the record EPS of KRW10,325 registered in 2010. The year 2010 was also the year LGI's ROE was at its highest, following the merger of LGI and LG Micron in 2009. We believe share-price momentum over the next 12 months will be similar to that in 2010, as we forecast LGI to record a 13% ROE and KRW10,473 EPS for 2017. The ROE and EPS figures are not the only similarities between the current situation and 2010. Below we detail other similarities we have found between 2010 and 2017-18.

- **High top-line growth.** Top-line growth was high at 38% YoY in 2010 and we expect comparable revenue growth of 32% for 2017 and 23% YoY for 2018E.
- **Bold investments in new businesses/facilities,** a key factor for attracting new investors. As mentioned, the company plans to more than double its capex to around KRW0.7tn in 2017, compared with average capex of KRW0.3tn over the past 5 years. Indeed, the last time the company's capex exceeded the 2017 level was in 2010-11. In our view, bold investment in the growing market for dual-cam and 3D-sensing modules, at the right time, is likely to boost market expectations of the company's growth.
- **A big leap in the camera module business.** In 2010, LGI's camera module revenue rose by 133% YoY thanks to camera spec upgrades from Apple. We forecast LGI's OS division's revenue to increase by 60% YoY for 2017E, albeit lower than that for 2010, but given that the division's revenue is already significant, 60% yearly growth would be remarkable.

LGI: earnings and PER level since 2010

(KRW)	2010	2011	2012	2013	2014	2015	2016	2017E	2018E
EPS	10,325	-7,211	-1,237	771	4,761	4,018	209	10,473	15,645
EPS growth	165%	n.m.	n.m.	n.m.	518%	-16%	-95%	4911%	49%
P/E highest	18.4x	n.m.	n.m.	136.8x	31.1x	28.5x	471.3x	16.9x	
P/E average	13.0x	n.m.	n.m.	109.8x	23.6x	24.5x	394.8x	12.9x	
Return-on-Equity	11%	-10%	-2%	2%	8%	5%	0%	13%	16%

Source: Company, Bloomberg, Daiwa forecasts

Note: P/E highest = highest price of the year / EPS of the year, P/E average = average price of the year / EPS of the year

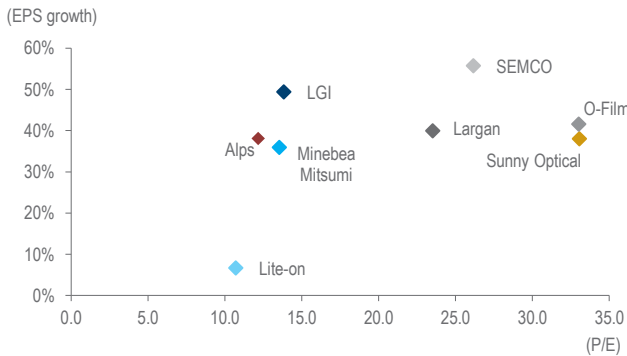
Given the above-mentioned reasons, we believe that LGI's PER could reach its high of 18.4x seen in 2010. By applying 18.4x to the average of our 2017-18E EPS forecasts, we derive our target price of KRW240,000.

Our target PER looks low given likely fast earnings growth

We justify our target PER by comparing it to the peer PEG ratio

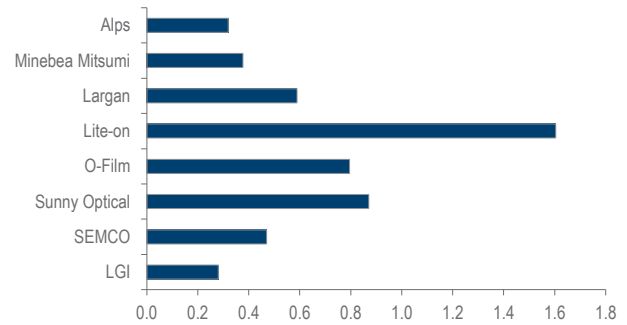
We justify our target PER by comparing LGI's PER to its EPS growth. Our target PER of 18.4x implies a PEG (PER divided by EPS growth) ratio of 0.37x, which is much lower than the peer average of 0.72x. After filtering its camera-related peers with a market cap of >USD3,000m and positive EPS growth for 2017-18E, we note that LGI has the lowest PEG of 0.28x, followed by Alps (0.32x). While many camera players are likely to record high EPS growth in 2017-18E, LGI's share price is still undervalued in our view, when compared with its expected earnings growth.

LGI: peer EPS growth vs. PER



Source: Company, Bloomberg, Daiwa forecasts
Note: EPS growth = 17-18E growth, PER = 17-18 average PER

LGI: peer PEG comparison



Source: Company, Bloomberg, Daiwa forecasts
Note: PEG = 17-18E average PER / 17-18E EPS growth

LGI: peer valuation comparison

Company	Ticker (Bloomberg)	Price (Local curr)	Mkt cap (USD \$m)	P/E (x)		P/BV (x)		ROE (%)		EPS growth		Div yield (%)	
				FY17E	FY18E	FY17E	FY18E	FY17E	FY18E	FY17E	FY18E	FY17E	FY18E
Coverage													
LG Innotek	011070 KS	173,500	3,637	16.6	11.1	2.0	1.7	13.0%	16.4%	n.m.	49.4%	0.2%	0.2%
Camera module													
LG Innotek	011070 KS	173,500	3,637	16.6	11.1	2.0	1.7	13.0%	16.4%	n.m.	49.4%	0.2%	0.2%
SEMCO	009150 KS	101,000	6,611	31.9	20.4	1.7	1.5	0.1%	0.1%	n.m.	99.4%	0.6%	0.7%
Sharp*	6753 JP	331	14,831	33.3	31.2	6.1	5.1	15.3%	13.4%	n.m.	6.6%	0.0%	0.0%
Sunny Optical	2382 HK	111.0	15,390	38.3	27.8	13.9	10.0	41.9%	41.9%	n.m.	38.0%	0.6%	1.0%
O-Film	002456 CH	21.15	8,826	38.7	27.4	5.9	5.0	16.3%	18.7%	71.5%	41.5%	0.4%	0.6%
Lite-on	2301 TT	43.30	3,442	11.1	10.4	1.3	1.2	11.7%	12.0%	-1.9%	6.7%	6.5%	6.9%
Ibiden*	4062 JP	1,762	2,285	22.6	19.9	0.9	0.9	4.1%	4.7%	n.m.	14.1%	2.0%	2.0%
Partron	091700 KS	9,130	438	44.4	11.8	1.4	1.3	3.4%	11.9%	-55.8%	n.m.	2.2%	2.5%
Average**				31.5	21.3	4.5	3.6	13.2%	14.7%	4.6%	34.4%	1.8%	1.9%
Actuator													
LG Innotek	011070 KS	173,500	3,637	16.6	11.1	2.0	1.7	13.0%	16.4%	n.m.	49.4%	0.2%	0.2%
Minebea Mitsumi*	6479 JP	1,752	6,924	13.8	13.3	2.0	1.8	15.6%	14.4%	35.9%	3.6%	1.2%	1.3%
Alps*	6770 JP	2,898	5,229	12.8	11.5	1.9	1.6	16.8%	16.0%	38.1%	11.4%	1.2%	1.5%
Nanya PCB	8046 TT	25.1	542	n.m.	24.6	0.5	0.5	n.m.	n.m.	-61.0%	n.m.	n.m.	n.m.
Jahwa Electronics	033240 KS	18,750	296	13.9	8.8	1.1	1.0	8.4%	12.3%	57.6%	58.1%	2.2%	2.2%
Average**				13.5	14.6	1.4	1.2	13.6%	14.2%	17.6%	24.3%	1.5%	1.6%
Lens													
LG Innotek	011070 KS	173,500	3,637	16.6	11.1	2.0	1.7	13.0%	16.4%	n.m.	49.4%	0.2%	0.2%
Largan	3008 TT	5,945.0	26,773	27.4	19.6	8.4	6.4	33.6%	36.6%	27.3%	39.9%	1.2%	1.8%
Sunny Optical	2382 HK	111.0	15,390	38.3	27.8	13.9	10.0	41.9%	41.9%	n.m.	38.0%	0.6%	1.0%
Nanya PCB	8046 TT	25.1	542	n.m.	24.6	0.5	0.5	n.m.	n.m.	-61.0%	n.m.	n.m.	n.m.
Sekonix	053450 KS	15,750	154	14.4	5.6	1.2	1.0	8.6%	19.7%	-38.3%	n.m.	1.3%	1.3%
Haesung Optics	076610 KS	6,390	96	n.m.	5.1	1.6	1.2	-9.2%	27.3%	n.m.	n.m.	n.m.	n.m.
Average**				26.7	16.5	5.1	3.8	18.7%	31.4%	-24.0%	38.9%	1.0%	1.3%
Equipment													
LG Innotek	011070 KS	173,500	3,637	16.6	11.1	2.0	1.7	13.0%	16.4%	n.m.	49.4%	0.2%	0.2%
AMS	AMS SW	77.0	6,868	55.4	21.1	6.1	5.0	8.8%	23.7%	-2.2%	n.m.	0.4%	0.8%
ASMP	522 HK	108.5	5,581	17.6	17.2	4.1	3.7	25.9%	22.6%	78.7%	2.2%	2.5%	2.6%
Chroma ATE	2360 TT	99.6	1,367	20.1	17.3	3.4	3.1	17.9%	19.4%	17.3%	15.8%	3.5%	4.0%
Genius	3406 TT	510.0	1,853	n.m.	n.m.	n.m.	n.m.	-4.5%	n.m.	-8.0%	n.m.	n.m.	n.m.
Inari Amertron	INRI MK	2.5	1,213	25.3	19.5	6.2	5.3	27.0%	29.3%	20.5%	30.0%	2.6%	3.4%
Interflex	051370 KS	47,550	926	26.4	11.7	4.1	3.1	16.2%	29.1%	n.m.	n.m.	n.m.	n.m.
Nanya PCB	8046 TT	25.1	542	n.m.	24.6	0.5	0.5	n.m.	n.m.	-61.0%	n.m.	n.m.	n.m.
Daeduck electronics	008060 KS	11,800	516	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	2.5%	2.5%
Daeduck GDS	004130 KS	18,150	327	11.0	8.3	0.8	0.8	7.3%	8.9%	10.5%	32.2%	1.7%	1.7%
All Ring tech	6187 TT	54.3	154	8.4	n.m.	n.m.	n.m.	44.9%	n.m.	55.1%	n.m.	n.m.	n.m.
Average**				23.4	17.1	3.6	3.0	17.9%	22.2%	13.8%	20.0%	2.2%	2.5%

Source: Bloomberg, Daiwa forecasts for LGI and SEMCO
Note: prices as of 7 September 2017; *FY18 figures for FY17, FY19 figures for FY18;**Average excluding LG Innotek

We expect DPS to increase only gradually**Dividends forecast to increase gradually**

As we forecast LGI's EPS to rise considerably to KRW10,473 in 2017E from KRW209 in 2016, we forecast its DPS to also increase to KRW350 in 2017E from KRW250 in 2016. Despite a higher DPS in 2017E, LGI's dividend payout ratio is likely to remain at 3.3% for 2017E.

In 2018-19E, we expect dividends to increase, but not at the same pace as EPS growth. We forecast DPS of KRW400 for 2018 and KRW500 for 2019, a gradual improvement as long as the company achieves stable EPS growth. However, there is unlikely to be a rapid increase in DPS over a short period as LGI does not plan to increase dividends substantially in the near future, according to the company. Given that its net profit has been volatile over the past 10 years, LGI is hesitant to raise its dividend too quickly for fear of inducing a deterioration in its financial structure (eg, net debt/equity).

Key risks

Despite a rosy business outlook, we outline possible concerns on LGI below:

- **Lower-than-expected production yield.** The company is actively investing in new facilities and expanding in several new businesses at the same time. If LGI were to fail to achieve its target yield on time, this could also impact its operating margin, thereby pressuring investment sentiment. This is the primary risk to our call.
- **LGI's high dependency on Apple.** More than 50% of LGI's revenue is derived from Apple. If LGI were to begin supplying RF-PCBs to Apple, the exposure to Apple would be even greater. Too much dependency on one customer represents a concentration risk. If Apple were to further diversify its vendors for dual cams or 3D-sensing modules, LGI's revenue and operating margin could decline. This is a secondary risk to our call.

Daiwa's Asia Pacific Research Directory

HONG KONG		
Takashi FUJIKURA	(852) 2848 4051	takashi.fujikura@hk.daiwacm.com
<i>Regional Research Head</i>		
Jiro IOKIBE	(852) 2773 8702	jiro.iokibe@hk.daiwacm.com
<i>Co-head of Asia Pacific Research</i>		
John HETHERINGTON	(852) 2773 8787	john.hetherington@hk.daiwacm.com
<i>Co-head of Asia Pacific Research</i>		
Craig CORK	(852) 2848 4463	craig.cork@hk.daiwacm.com
<i>Regional Head of Asia Pacific Product Management</i>		
Kevin LAI	(852) 2848 4926	kevin.lai@hk.daiwacm.com
<i>Chief Economist for Asia ex-Japan; Macro Economics (Regional)</i>		
Olivia XIA	(852) 2773 8736	olivia.xia@hk.daiwacm.com
<i>Macro Economics (Hong Kong/China)</i>		
Kelvin LAU	(852) 2848 4467	kelvin.lau@hk.daiwacm.com
<i>Head of Automobiles; Transportation and Industrial (Hong Kong/China)</i>		
Leon QI	(852) 2532 4381	leon.qi@hk.daiwacm.com
<i>Regional Head of Financials; Banking; Diversified financials; Insurance (Hong Kong/China)</i>		
Yan LI	(852) 2773 8822	yan.li@hk.daiwacm.com
<i>Banking (China)</i>		
Anson CHAN	(852) 2532 4350	anson.chan@hk.daiwacm.com
<i>Consumer (Hong Kong/China)</i>		
Adrian CHAN	(852) 2848 4427	adrian.chan@hk.daiwacm.com
<i>Consumer (Hong Kong/China)</i>		
Jamie SOO	(852) 2773 8529	jamie.soo@hk.daiwacm.com
<i>Gaming and Leisure (Hong Kong/China)</i>		
John CHOI	(852) 2773 8730	john.choi@hk.daiwacm.com
<i>Head of Hong Kong and China Internet; Regional Head of Small/Mid Cap</i>		
Alex LIU	(852) 2848 4976	alex.liu@hk.daiwacm.com
<i>Internet (Hong Kong/China)</i>		
Carlton LAI	(852) 2532 4349	carlton.lai@hk.daiwacm.com
<i>Small/Mid Cap (Hong Kong/China)</i>		
Dennis IP	(852) 2848 4068	dennis.ip@hk.daiwacm.com
<i>Regional Head of Power, Utilities, Renewable and Environment (PURE); PURE (Hong Kong/China)</i>		
Jonas KAN	(852) 2848 4439	jonas.kan@hk.daiwacm.com
<i>Head of Hong Kong and China Property</i>		
Cynthia CHAN	(852) 2773 8243	cynthia.chan@hk.daiwacm.com
<i>Property (China)</i>		
Thomas HO	(852) 2773 8716	thomas.ho@hk.daiwacm.com
<i>Custom Products Group</i>		
PHILIPPINES		
Micaela ABAQUITA	(63) 2 737 3021	micaela.abaquita@dbpdaiwacm.com.ph
<i>Property</i>		
Gregg Ilag	(63) 2 737 3023	gregg.ilag@dbpdaiwacm.com.ph
<i>Utilities; Energy</i>		

SOUTH KOREA		
Sung Yop CHUNG	(82) 2 787 9157	sychung@kr.daiwacm.com
<i>Pan-Asia Co-head/Regional Head of Automobiles and Components; Automobiles; Shipbuilding; Steel</i>		
Mike OH	(82) 2 787 9179	mike.oh@kr.daiwacm.com
<i>Banking; Capital Goods (Construction and Machinery)</i>		
Iris PARK	(82) 2 787 9165	iris.park@kr.daiwacm.com
<i>Consumer/Retail</i>		
SK KIM	(82) 2 787 9173	sk.kim@kr.daiwacm.com
<i>IT/Electronics – Semiconductor/Display and Tech Hardware</i>		
Thomas Y KWON	(82) 2 787 9181	yskwon@kr.daiwacm.com
<i>Pan-Asia Head of Internet & Telecommunications; Software – Internet/On-line Games</i>		

TAIWAN		
Rick HSU	(886) 2 8758 6261	rick.hsu@daiwacm-cathay.com.tw
<i>Head of Regional Technology; Head of Taiwan Research; Semiconductor/IC Design (Regional)</i>		
Nora HOU	(886) 2 8758 6249	nora.hou@daiwacm-cathay.com.tw
<i>Banking; Diversified financials; Insurance</i>		
Steven TSENG	(886) 2 8758 6252	steven.tseng@daiwacm-cathay.com.tw
<i>IT/Technology Hardware (PC Hardware)</i>		
Kylie HUANG	(886) 2 8758 6248	kylie.huang@daiwacm-cathay.com.tw
<i>IT/Technology Hardware (Handsets and Components)</i>		
Helen CHIEN	(886) 2 8758 6254	helen.chien@daiwacm-cathay.com.tw
<i>Small/Mid Cap</i>		

INDIA		
Punit SRIVASTAVA	(91) 22 6622 1013	punit.srivastava@in.daiwacm.com
<i>Head of India Research; Strategy; Banking/Finance</i>		
Saurabh MEHTA	(91) 22 6622 1009	saurabh.mehta@in.daiwacm.com
<i>Capital Goods; Utilities</i>		

SINGAPORE		
Ramakrishna MARUVADA	(65) 6499 6543	ramakrishna.maruvada@sg.daiwacm.com
<i>Head of Singapore Research; Telecommunications (China/ASEAN/India)</i>		
David LUM	(65) 6329 2102	david.lum@sg.daiwacm.com
<i>Banking; Property and REITs</i>		
Royston TAN	(65) 6321 3086	royston.tan@sg.daiwacm.com
<i>Oil and Gas; Capital Goods</i>		
Jame OSMAN	(65) 6321 3092	jame.osman@sg.daiwacm.com
<i>Transportation – Road and Rail; Pharmaceuticals and Healthcare; Consumer (Singapore)</i>		

Daiwa's Offices

Office / Branch / Affiliate	Address	Tel	Fax
DAIWA SECURITIES GROUP INC			
HEAD OFFICE			
	Gran Tokyo North Tower, 1-9-1, Marunouchi, Chiyoda-ku, Tokyo, 100-6753	(81) 3 5555 3111	(81) 3 5555 0661
Daiwa Securities Trust Company	One Evertrust Plaza, Jersey City, NJ 07302, U.S.A.	(1) 201 333 7300	(1) 201 333 7726
Daiwa Securities Trust and Banking (Europe) PLC (Head Office)	5 King William Street, London EC4N 7JB, United Kingdom	(44) 207 320 8000	(44) 207 410 0129
Daiwa Europe Trustees (Ireland) Ltd	Level 3, Block 5, Harcourt Centre, Harcourt Road, Dublin 2, Ireland	(353) 1 603 9900	(353) 1 478 3469
DAIWA CAPITAL MARKETS			
Daiwa Capital Markets America Inc. New York Head Office	Financial Square, 32 Old Slip, New York, NY10005, U.S.A.	(1) 212 612 7000	(1) 212 612 7100
Daiwa Capital Markets America Inc. San Francisco Branch	555 California Street, Suite 3360, San Francisco, CA 94104, U.S.A.	(1) 415 955 8100	(1) 415 956 1935
Daiwa Capital Markets Europe Limited, London Head Office	5 King William Street, London EC4N 7AX, United Kingdom	(44) 20 7597 8000	(44) 20 7597 8600
Daiwa Capital Markets Europe Limited, Frankfurt Branch	Neue Mainzer Str. 1, 60311 Frankfurt/Main, Germany	(49) 69 717 080	(49) 69 723 340
Daiwa Capital Markets Europe Limited, Paris Representative Office	17, rue de Surène 75008 Paris, France	(33) 1 56 262 200	(33) 1 47 550 808
Daiwa Capital Markets Europe Limited, Geneva Branch	50 rue du Rhône, P.O.Box 3198, 1211 Geneva 3, Switzerland	(41) 22 818 7400	(41) 22 818 7441
Daiwa Capital Markets Europe Limited, Moscow Representative Office	Midland Plaza 7th Floor, 10 Arbat Street, Moscow 119002, Russian Federation	(7) 495 641 3416	(7) 495 775 6238
Daiwa Capital Markets Europe Limited, Bahrain Branch	7th Floor, The Tower, Bahrain Commercial Complex, P.O. Box 30069, Manama, Bahrain	(973) 17 534 452	(973) 17 535 113
Daiwa Capital Markets Hong Kong Limited	Level 28, One Pacific Place, 88 Queensway, Hong Kong	(852) 2525 0121	(852) 2845 1621
Daiwa Capital Markets Singapore Limited	6 Shenton Way #26-08, OUE Downtown 2, Singapore 068809, Republic of Singapore	(65) 6220 3666	(65) 6223 6198
Daiwa Capital Markets Australia Limited	Level 34, Rialto North Tower, 525 Collins Street, Melbourne, Victoria 3000, Australia	(61) 3 9916 1300	(61) 3 9916 1330
DBP-Daiwa Capital Markets Philippines, Inc	18th Floor, Citibank Tower, 8741 Paseo de Roxas, Salcedo Village, Makati City, Republic of the Philippines	(632) 813 7344	(632) 848 0105
Daiwa-Cathay Capital Markets Co Ltd	14/F, 200, Keelung Road, Sec 1, Taipei, Taiwan, R.O.C.	(886) 2 2723 9698	(886) 2 2345 3638
Daiwa Securities Capital Markets Korea Co., Ltd.	20 Fl.& 21Fl. One IFC, 10 Gukjegeumyung-Ro, Yeongdeungpo-gu, Seoul, Korea	(82) 2 787 9100	(82) 2 787 9191
Daiwa Securities Co. Ltd., Beijing Representative Office	Room 301/302, Kerry Center, 1 Guanghua Road, Chaoyang District, Beijing 100020, People's Republic of China	(86) 10 6500 6688	(86) 10 6500 3594
Daiwa (Shanghai) Corporate Strategic Advisory Co. Ltd.	44/F, Hang Seng Bank Tower, 1000 Lujiazui Ring Road, Pudong, Shanghai China 200120, People's Republic of China	(86) 21 3858 2000	(86) 21 3858 2111
Daiwa Securities Co. Ltd., Bangkok Representative Office	18 th Floor, M Thai Tower, All Seasons Place, 87 Wireless Road, Lumpini, Pathumwan, Bangkok 10330, Thailand	(66) 2 252 5650	(66) 2 252 5665
Daiwa Capital Markets India Private Ltd	10th Floor, 3 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra East, Mumbai – 400051, India	(91) 22 6622 1000	(91) 22 6622 1019
Daiwa Securities Co. Ltd., Hanoi Representative Office	Suite 405, Pacific Palace Building, 83B, Ly Thuong Kiet Street, Hoan Kiem Dist. Hanoi, Vietnam	(84) 4 3946 0460	(84) 4 3946 0461
DAIWA INSTITUTE OF RESEARCH LTD			
HEAD OFFICE			
	15-6, Fuyuki, Koto-ku, Tokyo, 135-8460, Japan	(81) 3 5620 5100	(81) 3 5620 5603
MARUNOUCHI OFFICE			
	Gran Tokyo North Tower, 1-9-1, Marunouchi, Chiyoda-ku, Tokyo, 100-6756	(81) 3 5555 7011	(81) 3 5202 2021
New York Research Center	11th Floor, Financial Square, 32 Old Slip, NY, NY 10005-3504, U.S.A.	(1) 212 612 6100	(1) 212 612 8417
London Research Centre	3/F, 5 King William Street, London, EC4N 7AX, United Kingdom	(44) 207 597 8000	(44) 207 597 8550

LG Display: share price and Daiwa recommendation trend

Date	Target Price	Rating	Date	Target price	Rating	Date	Target price	Rating
18/11/16	36,000	Buy	21/04/17	41,000	Buy	26/07/17	44,000	Buy
17/01/17	39,000	Buy	07/07/17	49,000	Buy			

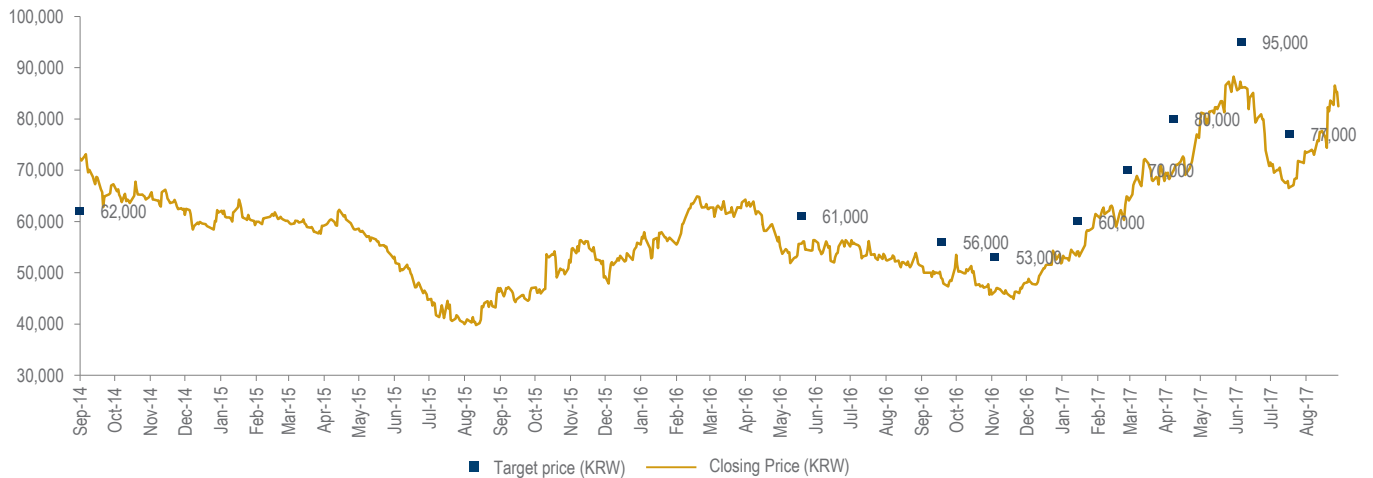


Source: Daiwa

Note: where appropriate, historical target prices have been adjusted to reflect the current share count

LG Electronics: share price and Daiwa recommendation trend

Date	Target Price	Rating	Date	Target price	Rating	Date	Target price	Rating
30/05/16	61,000	Outperform	25/01/17	60,000	Outperform	16/06/17	95,000	Outperform
29/09/16	56,000	Outperform	09/03/17	70,000	Outperform	28/07/17	77,000	Outperform
14/11/16	53,000	Outperform	18/04/17	80,000	Outperform			

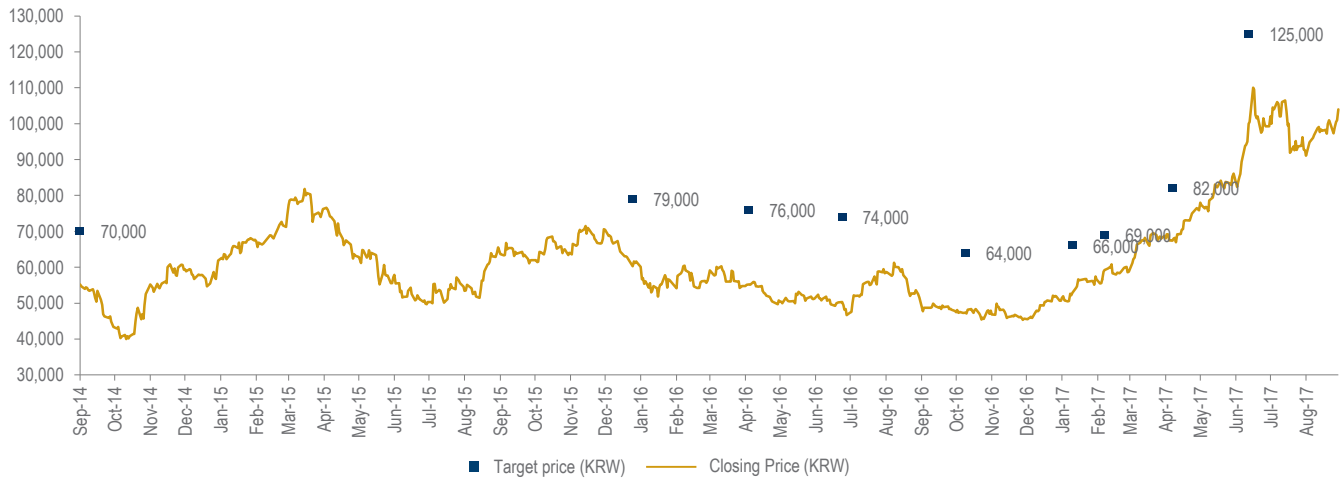


Source: Daiwa

Note: where appropriate, historical target prices have been adjusted to reflect the current share count

Samsung Electro-Mechanics: share price and Daiwa recommendation trend

Date	Target Price	Rating	Date	Target price	Rating	Date	Target price	Rating
04/01/16	79,000	Buy	19/10/16	64,000	Buy	17/04/17	82,000	Buy
14/04/16	76,000	Buy	20/01/17	66,000	Buy	22/06/17	125,000	Buy
04/07/16	74,000	Buy	17/02/17	69,000	Buy			



Source: Daiwa

Note: where appropriate, historical target prices have been adjusted to reflect the current share count

LG Innotek: share price and Daiwa recommendation trend

Date	Target Price	Rating
------	--------------	--------



Source: Daiwa

Note: where appropriate, historical target prices have been adjusted to reflect the current share count

Important Disclosures and Disclaimer

This publication is produced by Daiwa Securities Group Inc. and/or its non-U.S. affiliates, and distributed by Daiwa Securities Group Inc. and/or its non-U.S. affiliates, except to the extent expressly provided herein. This publication and the contents hereof are intended for information purposes only, and may be subject to change without further notice. Any use, disclosure, distribution, dissemination, copying, printing or reliance on this publication for any other purpose without our prior consent or approval is strictly prohibited. Neither Daiwa Securities Group Inc. nor any of its respective parent, holding, subsidiaries or affiliates, nor any of its respective directors, officers, servants and employees, represent nor warrant the accuracy or completeness of the information contained herein or as to the existence of other facts which might be significant, and will not accept any responsibility or liability whatsoever for any use of or reliance upon this publication or any of the contents hereof. Neither this publication, nor any content hereof, constitute, or are to be construed as, an offer or solicitation of an offer to buy or sell any of the securities or investments mentioned herein in any country or jurisdiction nor, unless expressly provided, any recommendation or investment opinion or advice. Any view, recommendation, opinion or advice expressed in this publication may not necessarily reflect those of Daiwa Securities Group Inc., and/or its affiliates nor any of its respective directors, officers, servants and employees except where the publication states otherwise. This research report is not to be relied upon by any person in making any investment decision or otherwise advising with respect to, or dealing in, the securities mentioned, as it does not take into account the specific investment objectives, financial situation and particular needs of any person.

Daiwa Securities Group Inc., its subsidiaries or affiliates, or its or their respective directors, officers and employees from time to time have trades as principals, or have positions in, or have other interests in the securities of the company under research including market making activities, derivatives in respect of such securities or may have also performed investment banking and other services for the issuer of such securities. Daiwa Securities Group Inc., its subsidiaries or affiliates do and seek to do business with the company(s) covered in this research report. Therefore, investors should be aware that a conflict of interest may exist. The following are additional disclosures.

Ownership of Securities

For "Ownership of Securities" information, please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.
Investment Banking Relationship

For "Investment Banking Relationship", please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.

Japan

Daiwa Securities Co. Ltd. and Daiwa Securities Group Inc.

Daiwa Securities Co. Ltd. is a subsidiary of Daiwa Securities Group Inc.
Investment Banking Relationship

Within the preceding 12 months, the subsidiaries and/or affiliates of Daiwa Securities Group Inc. * has lead-managed public offerings and/or secondary offerings (excluding straight bonds) of the securities of the following companies: Neo Solar Power Corp (3576 TT), Acushnet Holdings Corp (GOLF US), No Va Land Investment Group Corporation (NVL VN), PT Totalindo Eka Persada Tbk (TOPS IJ), PT Integra Indocabinet Tbk (WOOD IJ) and PT Buyung Putera Sembada (HOKI IJ).

*Subsidiaries of Daiwa Securities Group Inc. for the purposes of this section shall mean any one or more of: Daiwa Capital Markets Hong Kong Limited (大和資本市場香港有限公司), Daiwa Capital Markets Singapore Limited, Daiwa Capital Markets Australia Limited, Daiwa Capital Markets India Private Limited, Daiwa-Cathay Capital Markets Co., Ltd., Daiwa Securities Capital Markets Korea Co., Ltd.

Hong Kong

This research is distributed in Hong Kong by Daiwa Capital Markets Hong Kong Limited (大和資本市場香港有限公司) ("DHK") which is regulated by the Hong Kong Securities and Futures Commission. Recipients of this research in Hong Kong may contact DHK in respect of any matter arising from or in connection with this research.

Relevant Relationship (DHK)

DHK may from time to time have an individual employed by or associated with it serves as an officer of any of the companies under its research coverage.

Korea

The developing analyst of this research and analysis material hereby states and confirms that the contents of this material correctly reflect the analyst's views and opinions and that the analyst has not been placed under inappropriate pressure or interruption by an external party.

Name of Analyst : SK Kim / Henry Jung

Disclosure of Analysts' Interests

If an analyst engaging in or a person who exercises influences on the preparation or publication of a Research Report containing recommendations for general investors to trade financial investment instruments with regard to which the analyst or the influential person has personal interests and if the recommendations contained in the Report may have impacts on the personal interests, Daiwa Securities Capital Markets Korea Co., Ltd. ("Daiwa Securities Korea") shall ensure that the Analyst or the influential person notifies that he/she has personal interests with regard to:

1. The equity, the equity-linked bonds and the instruments with the subscription right to the equity issued by the legal entity covered in the Research Report (or the legal entity subject to the investment recommendations);
2. The stock option granted by the legal entity covered in the Research Report (or the legal entity subject to the investment recommendations); or
3. The equity futures, the equity options and the equity-linked warrants backed by the equity prescribed in the preceding Paragraph 1 as the underlying assets.

Legal Entities subject to Research Report Coverage Restrictions

Daiwa Securities Korea hereby states and confirms that Daiwa Securities Korea has no conflicts of interests with the legal entity covered in this Research Report:

1. In that Daiwa Securities Korea does NOT offer direct or indirect payment guarantee for the legal entity by means of, for instance, guarantee, endorsement, provision of collaterals or the acquisition of debts;
2. In that Daiwa Securities Korea does NOT own one-hundredth (or 1/100) or more of the total number of outstanding equities issued by the legal entity;
3. In that The legal entity is NOT an affiliated company of Daiwa Securities Korea pursuant to Sub-paragraph 3, Article 2 of the Monopoly Regulation and Fair Trade Act of Korea;
4. In that, although Daiwa Securities Korea offers advisory services for the legal entity with regard to an M&A deal, the size of the M&A deal does NOT exceed five-hundredths (or 5/100) of the total asset size or the total number of equities issued and outstanding of the legal entity;
5. In that, although Daiwa Securities Korea acted in the capacity of a Lead Underwriter for the initial public offering of the legal entity, more than one-year has passed since the IPO date;
6. In that Daiwa Securities Korea is NOT designated by the legal entity as the "tender offer agent" pursuant to the Paragraph 2, Article 133 of the Financial Services and Capital Market Act or the legal entity is NOT the issuer of the equity subject to the proposed tender offer; this requirement, however applies until the maturity of the tender offer period; or
7. In that Daiwa Securities Korea does NOT have significant or material interests with regard to the legal entity.

Disclosure of Prior Distribution to Third Party

This report has not been distributed to the third party in advance prior to public release.

The following explains the rating system in the report as compared to KOSPI, based on the beliefs of the author(s) of this report.

- "1": the security could outperform the KOSPI by more than 15% over the next 12 months, unless otherwise stated.
- "2": the security is expected to outperform the KOSPI by 5-15% over the next 12 months, unless otherwise stated.
- "3": the security is expected to perform within 5% of the KOSPI (better or worse) over the next 12 months, unless otherwise stated.
- "4": the security is expected to underperform the KOSPI by 5-15% over the next 12 months, unless otherwise stated.
- "5": the security could underperform the KOSPI by more than 15% over the next 12 months, unless otherwise stated.

"Positive" means that the analyst expects the sector to outperform the KOSPI over the next 12 months, unless otherwise stated.

"Neutral" means that the analyst expects the sector to be in-line with the KOSPI over the next 12 months, unless otherwise stated.

"Negative" means that the analyst expects the sector to underperform the KOSPI over the next 12 months, unless otherwise stated.

Additional information may be available upon request.

Singapore

This research is distributed in Singapore by Daiwa Capital Markets Singapore Limited and it may only be distributed in Singapore to accredited investors, expert investors and institutional investors as defined in the Financial Advisers Regulations and the Securities and Futures Act (Chapter 289), as amended from time to time. By virtue of distribution to these category of investors, Daiwa Capital Markets Singapore Limited and its representatives are not required to comply with Section 36 of the Financial Advisers Act (Chapter 110) (Section 36 relates to disclosure of Daiwa Capital Markets Singapore Limited's interest and/or its representative's interest in securities). Recipients of this research in Singapore may contact Daiwa Capital Markets Singapore Limited in respect of any matter arising from or in connection with the research.

Australia

This research is distributed in Australia by Daiwa Capital Markets Australia Limited and it may only be distributed in Australia to wholesale investors within the meaning of the Corporations Act.

Recipients of this research in Australia may contact Daiwa Capital Markets Stockbroking Limited in respect of any matter arising from or in connection with the research.

India

This research is distributed in India to Institutional Clients only by Daiwa Capital Markets India Private Limited (Daiwa India) which is an intermediary registered with Securities & Exchange Board of India as a Stock Broker, Merchant Bank and Research Analyst. Daiwa India, its Research Analyst and their family members and its associates do not have any financial interest save as disclosed or other undisclosed material conflict of interest in the securities or derivatives of any companies under coverage. Daiwa India and its associates, may have received compensation for any products other than Investment Banking (as disclosed) or brokerage services from the subject company in this report or from any third party during the past 12 months. Daiwa India and its associates may have debt holdings in the subject company. For information on ownership of equity, please visit BlueMatrix disclosure Link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.

There is no material disciplinary action against Daiwa India by any regulatory authority impacting equity research analysis activities as of the date of this report.

Associates of Daiwa India, registered with Indian regulators, include Daiwa Capital Markets Singapore Limited and Daiwa Portfolio Advisory (India) Private Limited.

Taiwan

This research is solely for reference and not intended to provide tailored investment recommendations. This research is distributed in Taiwan by Daiwa-Cathay Capital Markets Co., Ltd. and it may only be distributed in Taiwan to specific customers who have signed recommendation contracts with Daiwa-Cathay Capital Markets Co., Ltd. and non-customers including (i) professional institutional investors, (ii) TWSE or TPEX listed companies, upstream and downstream vendors, and specialists that offer or seek advice, and (iii) potential customers with an actual need for business development in accordance with the Operational Regulations Governing Securities Firms Recommending Trades in Securities to Customers. Recipients of this research including non-customer recipients of this research shall not provide it to others or engage in any activities in connection with this research which may involve conflicts of interests. Neither Daiwa-Cathay Capital Markets Co., Ltd. nor its personnel who writes or reviews the research report has any conflict of interest in this research. Since Daiwa-Cathay Capital Markets Co., Ltd. does not operate brokerage trading business in foreign markets, **this research is prepared on a "without recommendation" to any foreign securities basis** and Daiwa-Cathay Capital Markets Co., Ltd. does not accept orders from customers to trade in such foreign securities that are without recommendation. Recipients of this research in Taiwan may contact Daiwa-Cathay Capital Markets Co., Ltd. in respect of any matter arising from or in connection with the research.

Philippines

This research is distributed in the Philippines by DBP-Daiwa Capital Markets Philippines, Inc. which is regulated by the Philippines Securities and Exchange Commission and the Philippines Stock Exchange, Inc. Recipients of this research in the Philippines may contact DBP-Daiwa Capital Markets Philippines, Inc. in respect of any matter arising from or in connection with the research. DBP-Daiwa Capital Markets Philippines, Inc. recommends that investors independently assess, with a professional advisor, the specific financial risks as well as the legal, regulatory, tax, accounting, and other consequences of a proposed transaction. DBP-Daiwa Capital Markets Philippines, Inc. may have positions or may be materially interested in the securities in any of the markets mentioned in the publication or may have performed other services for the issuers of such securities.

For relevant securities and trading rules please visit SEC and PSE links at <http://www.sec.gov.ph> and <http://www.pse.com.ph/> respectively.

Thailand

This research is distributed to only institutional investors in Thailand primarily by Thanachart Securities Public Company Limited ("TNS").

This report is prepared by analysts who are employed by Daiwa Securities Group Inc. and/or its non-U.S. affiliates. This report is provided to you for informational purposes only and it is not, and is not to be construed as, an offer or an invitation to make an offer to sell or buy any securities. Neither TNS, Daiwa Securities Group Inc. nor any of their respective parent, holding, subsidiaries or affiliates, nor any of their respective directors, officers, servants and employees accept any liability whatsoever for any direct or consequential loss arising from any use of this research or its contents.

The information and opinions contained herein have been compiled or arrived at from sources believed to be reliable. However, TNS, Daiwa Securities Group Inc. nor any of their respective parent, holding, subsidiaries or affiliates, nor any of their respective directors, officers, servants and employees make no representation or warranty, express or implied, as to their accuracy or completeness. Expressions of opinion herein are subject to change without notice. The use of any information, forecasts and opinions contained in this report shall be at the sole discretion and risk of the user.

TNS, Daiwa Securities Group Inc., their respective parent, holding, subsidiaries or affiliates, their respective directors, officers, servants and employees may have positions and financial interest in securities mentioned in this research. Thanachart Securities Public Company Limited, Daiwa Securities Group Inc., their respective parent, holding, subsidiaries or affiliates may from time to time perform investment banking or other services for, or solicit investment banking or other business from, any entity mentioned in this research. Therefore, investors should be aware of conflict of interest that may affect the objectivity of this research.

United Kingdom

This research report is produced by Daiwa Securities Co. Ltd. and/or its affiliates and is distributed in the European Union, Iceland, Liechtenstein, Norway and Switzerland. Daiwa Capital Markets Europe Limited is authorised and regulated by The Financial Conduct Authority ("FCA") and is a member of the London Stock Exchange and Eurex. This publication is intended for investors who are not Retail Clients in the United Kingdom within the meaning of the Rules of the FCA and should not therefore be distributed to such Retail Clients in the United Kingdom. Should you enter into investment business with Daiwa Capital Markets Europe's affiliates outside the United Kingdom, we are obliged to advise that the protection afforded by the United Kingdom regulatory system may not apply; in particular, the benefits of the Financial Services Compensation Scheme may not be available.

Daiwa Capital Markets Europe Limited has in place organisational arrangements for the prevention and avoidance of conflicts of interest. Our conflict management policy is available at <http://www.uk.daiwacm.com/about-us/corporate-governance-regulatory>.

Germany

This document is distributed in Germany by Daiwa Capital Markets Europe Limited, Niederlassung Frankfurt which is regulated by BaFin (Bundesanstalt fuer Finanzdienstleistungsaufsicht) for the conduct of business in Germany.

Bahrain

This research material is distributed in Bahrain by Daiwa Capital Markets Europe Limited, Bahrain Branch, regulated by The Central Bank of Bahrain and holds Investment Business Firm – Category 2 license and having its official place of business at the Bahrain World Trade Centre, South Tower, 7th floor, P.O. Box 30069, Manama, Kingdom of Bahrain. Tel No. +973 17534452 Fax No. +973 535113

United States

This report is distributed in the U.S. by Daiwa Capital Markets America Inc. (DCMA). It may not be accurate or complete and should not be relied upon as such. It reflects the preparer's views at the time of its preparation, but may not reflect events occurring after its preparation; nor does it reflect DCMA's views at any time. Neither DCMA nor the preparer has any obligation to update this report or to continue to prepare research on this subject. This report is not an offer to sell or the solicitation of any offer to buy securities. Unless this report says otherwise, any recommendation it makes is risky and appropriate only for sophisticated speculative investors able to incur significant losses. Readers should consult their financial advisors to determine whether any such recommendation is consistent with their own investment objectives, financial situation and needs. This report does not recommend to U.S. recipients the use of any of DCMA's non-U.S. affiliates to effect trades in any security and is not supplied with any understanding that U.S. recipients of this report will direct commission business to such non-U.S. entities. Unless applicable law permits otherwise, non-U.S. customers wishing to effect a transaction in any securities referenced in this material should contact a Daiwa entity in their local jurisdiction. Most countries throughout the world have their own laws regulating the types of securities and other investment products which may be offered to their residents, as well as a process for doing so. As a result, the securities discussed in this report may not be eligible for sales in some jurisdictions. Customers wishing to obtain further information about this report should contact DCMA: Daiwa Capital Markets America Inc., Financial Square, 32 Old Slip, New York, New York 10005 (Tel no. 212-612-7000).

Ownership of Securities

For "Ownership of Securities" information please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.

Investment Banking Relationships

For "Investment Banking Relationships" please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.

DCMA Market Making

For "DCMA Market Making" please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>.

Research Analyst Conflicts

For updates on "Research Analyst Conflicts" please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>. The principal research analysts who prepared this report have no financial interest in securities of the issuers covered in the report, are not (nor are any members of their household) an officer, director or advisory board member of the issuer(s) covered in the report, and are not aware of any material relevant conflict of interest involving the analyst or DCMA, and did not receive any compensation from the issuer during the past 12 months except as noted: no exceptions.

Research Analyst Certification

For updates on "Research Analyst Certification" and "Rating System" please visit BlueMatrix disclosure link at <https://daiwa3.bluematrix.com/sellside/Disclosures.action>. The views about any and all of the subject securities and issuers expressed in this Research Report accurately reflect the personal views of the research analyst(s) primarily responsible for this report (or the views of the firm producing the report if no individual analyst is named on the report); and no part of the compensation of such analyst (or no part of the compensation of the firm if no individual analyst is named on the report) was, is, or will be directly or indirectly related to the specific recommendations or views contained in this Research Report.

The following explains the rating system in the report as compared to relevant local indices, unless otherwise stated, based on the beliefs of the author of the report.

- "1": the security could outperform the local index by more than 15% over the next 12 months.
- "2": the security is expected to outperform the local index by 5-15% over the next 12 months.
- "3": the security is expected to perform within 5% of the local index (better or worse) over the next 12 months.
- "4": the security is expected to underperform the local index by 5-15% over the next 12 months.
- "5": the security could underperform the local index by more than 15% over the next 12 months.

Disclosure of investment ratings

Rating	Percentage of total
Buy*	66.1%
Hold**	21.6%
Sell***	12.3%

Source: Daiwa

Notes: data is for single-branded Daiwa research in Asia (ex Japan) and correct as of 30 June 2017.

* comprised of Daiwa's Buy and Outperform ratings.

** comprised of Daiwa's Hold ratings.

*** comprised of Daiwa's Underperform and Sell ratings.

Additional information may be available upon request.

Japan - additional notification items pursuant to Article 37 of the Financial Instruments and Exchange Law
 (This Notification is only applicable where report is distributed by Daiwa Securities Co. Ltd.)

If you decide to enter into a business arrangement with us based on the information described in materials presented along with this document, we ask you to pay close attention to the following items.

- In addition to the purchase price of a financial instrument, we will collect a trading commission* for each transaction as agreed beforehand with you. Since commissions may be included in the purchase price or may not be charged for certain transactions, we recommend that you confirm the commission for each transaction.
 - In some cases, we may also charge a maximum of ¥ 2 million (including tax) per year as a standing proxy fee for our deposit of your securities, if you are a non-resident of Japan.
 - For derivative and margin transactions etc., we may require collateral or margin requirements in accordance with an agreement made beforehand with you. Ordinarily in such cases, the amount of the transaction will be in excess of the required collateral or margin requirements.
 - There is a risk that you will incur losses on your transactions due to changes in the market price of financial instruments based on fluctuations in interest rates, exchange rates, stock prices, real estate prices, commodity prices, and others. In addition, depending on the content of the transaction, the loss could exceed the amount of the collateral or margin requirements.
 - There may be a difference between bid price etc. and ask price etc. of OTC derivatives handled by us.
 - Before engaging in any trading, please thoroughly confirm accounting and tax treatments regarding your trading in financial instruments with such experts as certified public accountants.
- *The amount of the trading commission cannot be stated here in advance because it will be determined between our company and you based on current market conditions and the content of each transaction etc.

When making an actual transaction, please be sure to carefully read the materials presented to you prior to the execution of agreement, and to take responsibility for your own decisions regarding the signing of the agreement with us.

Corporate Name: Daiwa Securities Co. Ltd.
 Memberships: Financial instruments firm: chief of Kanto Local Finance Bureau (Kin-sho) No.108
 Japan Securities Dealers Association, The Financial Futures Association of Japan
 Japan Securities Investment Advisers Association
 Type II Financial Instruments Firms Association