

Greater China Smartphone Sector

Embracing spec upgrade trends for the next iPhones

- New iPhones to drive volume growth in 2017; we expect iPhone production of 225m, up 5% YoY vs. an 8% YoY decline in 2016
- Major upgrades likely to include new form factor, new display, more cameras, better sound quality, and adoption of wireless charging
- Recommend focusing on component leaders that dovetail with spec upgrade trends; Largan, AAC and Sunny Optical remain our top picks

Negative

Neutral

Positive


Positive
 (unchanged)

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What's new: We outline our expectations for Apple mobile-device releases in 2017, emerging trends in the smartphone space, and the implications for the Greater China supply chain based on our research in the market.

What's the impact: iPhones – likely to feature new form factor, new display, more cameras and wireless charging. Our market research suggests Apple is likely to release 3 iPhone models in September – the iPhone 7S (“i7S”), iPhone 7S Plus (“i7S+”) and iPhone 8 (“i8”). We believe the new models are likely to include a new case design – a metal frame with a 2.5D glass cover and a new colour — adopt wireless charging, and feature cameras with enhanced image quality (dual-cam for i8 and i7S+; single cam for i7S), better water-proofing, faster CPUs, improved sound quality, new 3D touch design (i8 only), iris scanning (i8 only), a borderless display design (i8 only), and removal of the home button (i8 only).

We consider these upgrades to be compelling enough to drive consumer interest, and hence estimate iPhone volume of 225m units in 2017, up 5% YoY, vs. an 8% YoY decline in 2016. We view the iPhone 8 as a genuine flagship model with major design changes, and forecast it to account for 50-55% of new iPhones in 2H17 despite its likely higher price tag. We expect the i8 to be priced at USD799-849, compared with likely price points of USD649 for the i7S and USD769 for the i7S+.

iPads, Apple Watch. We expect new iPads (10.5” and 12.9”) in early 2Q17 and a new Apple Watch in 2H17. We don't expect many “wow” factors, and look for iPad volume of 40m and Apple Watch volume of 10-11m in 2017.

What we recommend: Focus on market leaders amid favourable industry trends. We reaffirm our Positive stance on the Greater China Smartphone Sector and view 1H17 as an opportunity to accumulate our top picks: **Largan Precision (3008 TT, TWD4,550, Buy [1])** on lens spec upgrades and the multi-cam trend (see [The more the merrier: multi-cameras are the next mega trend](#), 2 August 2016), **AAC (2018 HK, HKD79.00, Buy [1])** on acoustics spec upgrades (water-proofing/better sound) and a ramp-up in the contribution from non-acoustics, and **Sunny Optical (2382 HK, HKD44.60, Buy [1])** as a beneficiary of the rise of multi-cams for smart cars and smartphones. We also like **General Interface Solution (GIS; 6456 TT, TWD101.00, Outperform [2])** for its ASP upside from 3D-touch spec upgrades and long-term potential from emerging opportunities in OLED adoption.

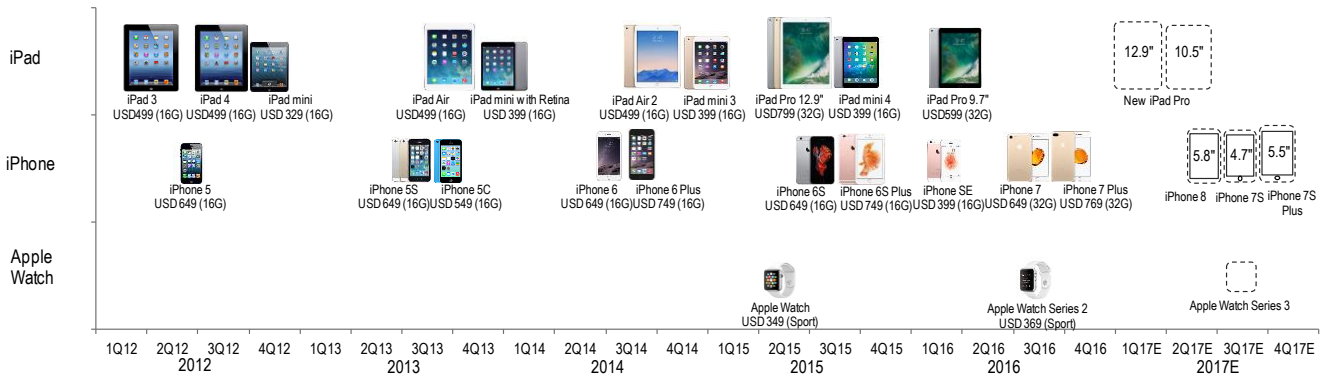
How we differ: We are more upbeat than the market on the benefits from spec upgrades that we expect to accrue to our preferred names.

Greater China Smartphone Sector: Daiwa's top picks

Company	Ticker	Daiwa rating	Mkt cap (USDbn)
Largan	3008 TT	Buy (1)	19.7
AAC	2018 HK	Buy (1)	12.5
Sunny	2382 HK	Buy (1)	6.3

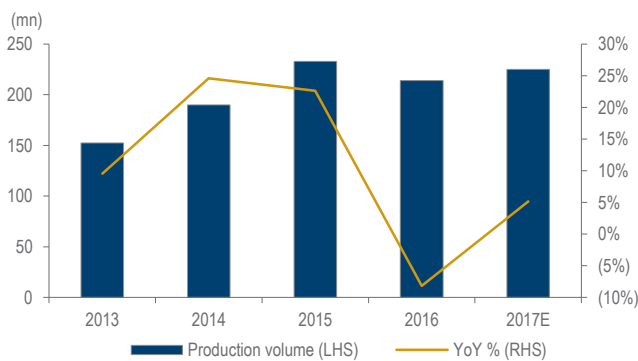
Source: Daiwa forecasts

i-devices: product roadmap (2012-2017E)



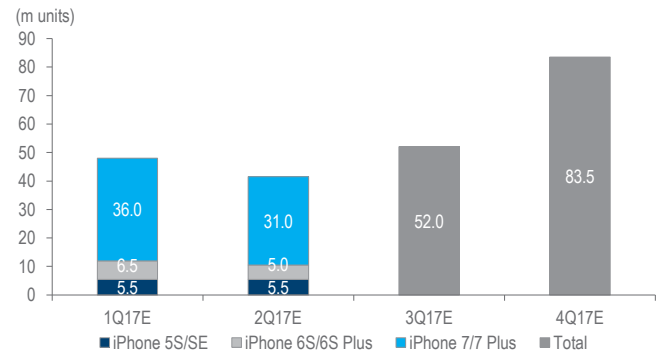
Source: Apple, Daiwa forecasts

iPhone: production volume and growth



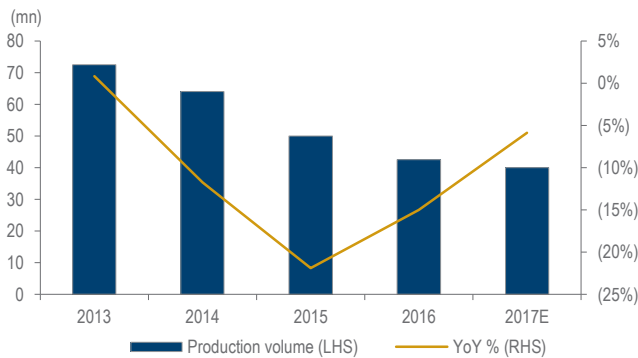
Source: Daiwa estimates and forecasts
Note: This chart represents Daiwa's iPhone production estimates and forecasts, which differ slightly from the iPhone sales figures reported by Apple

iPhone: production volume forecast by model



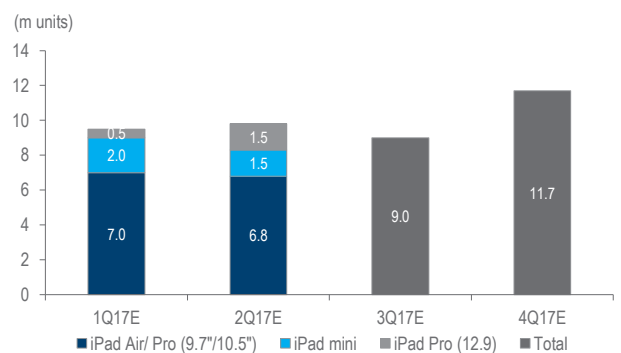
Source: Daiwa estimates and forecasts
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iPad: production volume and growth



Source: Daiwa estimates and forecasts
Note: This chart represents Daiwa's iPad production estimates and forecasts, which differ slightly from the iPad sales figures reported by Apple

iPad: production volume forecast by model



Source: Daiwa estimates and forecasts
Note: This chart represents Daiwa's iPad production estimates and forecasts, which differ slightly from the iPad sales figures reported by Apple

Valuation summary

Company	Ticker	Price (local curr.)	Daiwa Rating	Mkt cap (USD bn)	EPS (rpt)			PER (x)			EPS growth (%)			ROE (%)			PBR (x)		
					2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E
HON HAI PRECISION	2317 TT	84.1	Hold	47.0	7.7	8.1	8.5	11.0	10.3	9.8	-10.8	6.3	5.0	12.6	12.5	12.3	1.3	1.3	1.2
LARGAN PRECISION	3008 TT	4550.0	Buy	19.7	169.4	260.6	318.2	26.9	17.5	14.3	-5.9	53.8	22.1	32.2	38.3	35.6	7.9	5.8	4.5
AAC TECHNOLOGIES HOLDINGS IN 2018 HK	79.00	Buy	12.5	3.2	4.1	4.6	20.8	16.2	14.2	24.9	28.2	14.6	30.0	30.9	29.0	5.6	4.5	3.8	
SUNNY OPTICAL TECH	2382 HK	44.6	Buy	6.3	1.1	1.5	2.0	33.9	25.1	19.0	54.8	35.1	31.8	27.3	29.4	30.7	8.3	6.6	5.2
CATCHER	2474 TT	250.5	Hold	6.2	25.7	26.8	25.9	9.7	9.3	9.7	-21.2	4.4	-3.3	16.3	15.4	13.6	1.5	1.4	1.3
FIH MOBILE LTD	2038 HK	2.59	Hold	2.7	0.012	0.016	0.019	26.9	20.3	17.7	-57.8	32.6	14.5	2.6	3.5	3.9	0.7	0.7	0.7
HTC CORP	2498 TT	78.3	Sell	2.1	-10.0	-6.8	-6.1	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	1.1	1.3	1.4
GIS	6456 TT	101.0	Outperform	1.0	8.0	9.0	10.0	12.6	11.2	10.1	9.1	12.3	11.2	20.3	20.0	19.6	2.4	2.1	1.9
CASETEK	5264 TT	104.0	Hold	1.1	8.2	10.1	10.2	12.6	10.3	10.2	-50.3	22.4	0.6	9.0	10.7	10.2	1.1	1.1	1.0
TPK	3673 TT	58.4	Hold	0.7	-2.6	6.6	7.8	n.m.	8.9	7.4	n.m.	n.m.	19.4	n.m.	7.3	8.1	0.7	0.6	0.6
TXC	3042 TT	43.4	Outperform	0.4	3.3	3.6	3.9	13.3	11.9	11.0	8.0	11.1	8.4	9.3	10.1	10.6	1.2	1.2	1.2

Source: Bloomberg, Daiwa; *based on 02 February 2017 closing prices

Focusing on spec upgrade trends


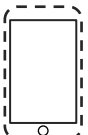
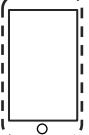


iPhones: a new form factor, new display, more cameras, and the adoption wireless charging

We believe that major upgrades for the next iPhones are likely to include a new form factor, new display, more cameras, better sound quality, and the adoption of wireless charging

Our research in the market suggests Apple is likely to release 3 iPhone models this September: the iPhone 7S (“i7S”), iPhone 7S Plus (“i7S+”) and iPhone 8 (“i8”). We view the i7S and i7S+ as the successors to the iPhone 7 (“i7”) and iPhone 7 Plus (“i7+”). The iPhone 8 is likely to be a genuine flagship model with a whole new design, in our view.

Although the specs have not yet been finalised, we expect major upgrades for these new iPhones to include a new casing design – a metal frame with a 2.5D glass cover (aluminium metal frame for i7S/i7S+ and a stainless steel metal frame for i8), and a new colour — adopt wireless charging, and feature better cameras with enhanced image quality (dual-cam for i8 and i7S+; single cam for i7S), better water-proofing, faster CPUs, improved sound quality, new 3D touch design (i8 only), iris scanning (i8 only), a borderless display design (i8 only), and removal of the home button (i8 only).

New iPhones: likely major spec upgrades over iPhone 7/7Plus

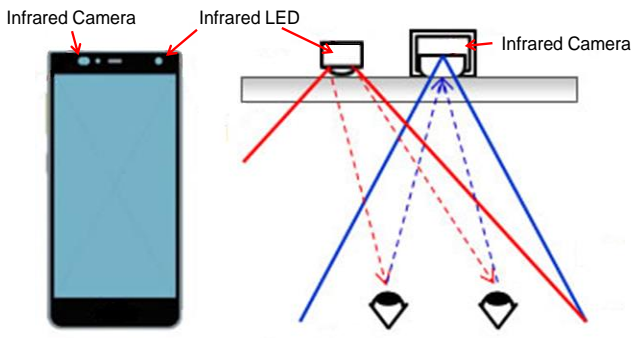
Model name	iPhone 8*	iPhone 7S*	iPhone 7S Plus*	iPhone 7	iPhone 7 Plus
Model picture					
Display diagonal:	5.8"	4.7"	5.5"	4.7"	5.5"
Display type	Flexible AMOLED	TFT-LCD	TFT-LCD	TFT-LCD	TFT-LCD
Borderless display design	v	x	x	x	x
CPU	A11	A11	A11	A10	A10
Cameras	Dual-cam with dual- OIS	Single Cam	Dual-cam with dual- OIS	Single Cam	Dual-cam with single OIS
IRIS scanner	v	x	x	x	x
Casing design	Stainless steel frame + 2.5D glass cover	Aluminium frame + 2.5D glass cover	Aluminium frame + 2.5D glass cover	AL unibody	AL unibody
New colour	v	v	v	n/a	n/a
Warless charging	v	v	v	x	x
3D Touch /haptics	Major upgrades in force touch and haptics	Mild upgrade	Mild upgrade	n/a	n/a
Sound quality	Major upgrades in receiver module	Mild upgrade	Mild upgrade	Stereo sound	Stereo sound
Water-proofing	IP 68	IP 68	IP 68	IP67	IP67
Home button	x	v	v	v	v
Storage	32 GB, 128 GB, 256 GB	32 GB, 128 GB, 256 GB	32 GB, 128 GB, 256 GB	32 GB, 128 GB, 256 GB	32 GB, 128 GB, 256 GB
Pricing	USD799-USD849 (32G)	USD649 (32G)	USD769 (32G)	USD649 (32G)	USD769 (32G)

Source: Daiwa forecasts

Note: *all new iPhones specs, names, release time & pricing are not yet confirmed and are based our estimates and research in the market

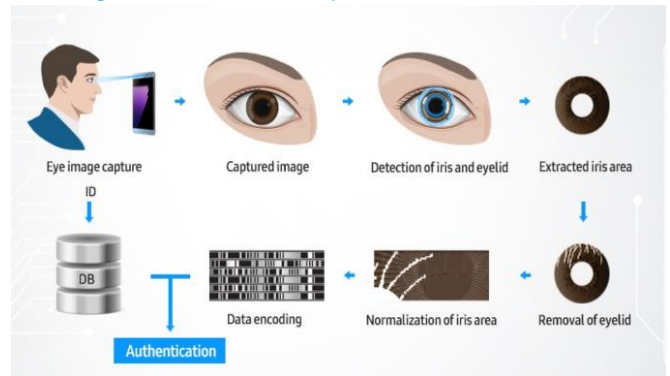
In particular, we believe the likely rising adoption of dual cams in the next iPhones echoes our positive thesis for the smartphone camera supply chain (see [The more the merrier: multi-cameras are the next mega trend](#), 2 August 2016). We expect Apple’s aggressive push in dual-cams to drive dual-cam adoption in Android smartphones in the coming years. In addition, we expect the likely adoption of iris recognition technology (IRIS) in the iPhone 8 to further broaden the addressable market for camera components in the long term, given the currently limited penetration in smartphones. We view Largan and Sunny Optical as well-positioned to benefit from this trend but have not factored upside from IRIS into our earnings estimates.

Iris recognition: iris scanner design



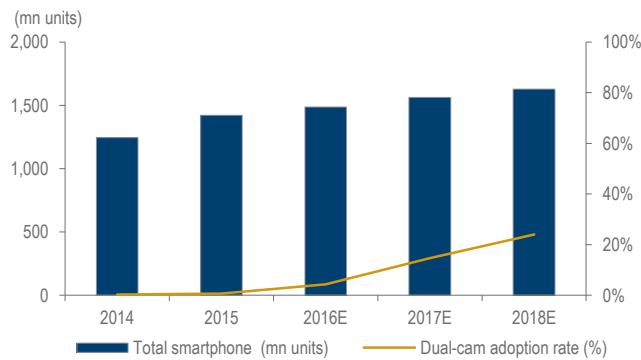
Source: Daiwa

Iris recognition: authentication process



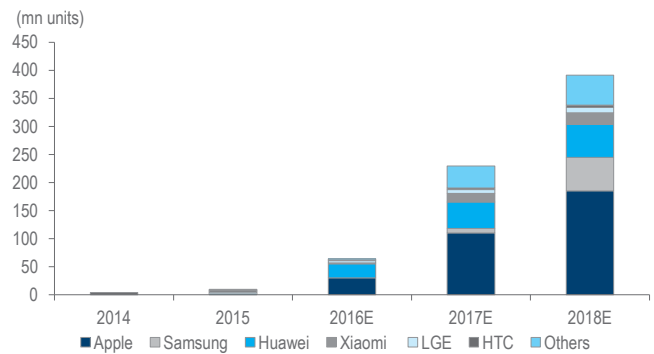
Source: Company

Dual-cam penetration in smartphones



Source: Daiwa estimates and forecasts

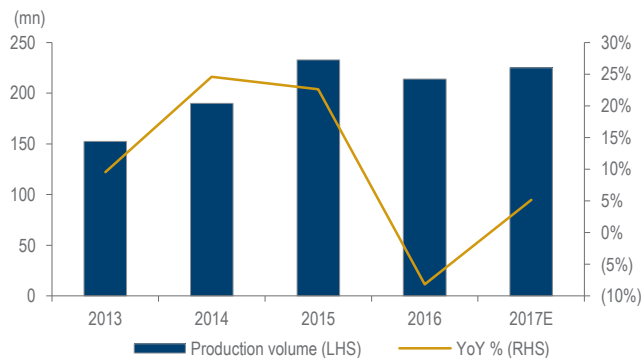
Dual cams adopted in smartphones by brand



Source: Daiwa estimates and forecasts

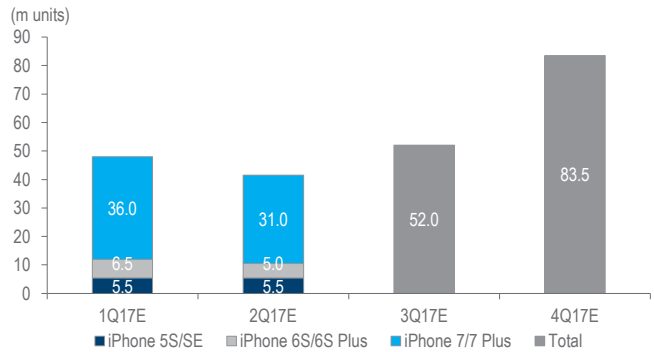
We believe these likely upgrades for the next iPhones (2H17) will be compelling enough to generate consumer interest. Hence, we forecast total iPhone production volume to grow by 5% YoY to 225m units in 2017, compared with an 8% YoY decline for 2016E. We expect new iPhone volume of 90-100m in 2H17, up from 83.5 m for the iPhone 7 series in 2H16. In terms of product segmentation, we view the iPhone 8 as a true flagship model that is likely to have the highest price tag (USD799 to USD849), with the iPhone 7S and 7S Plus likely to be priced at USD649 and USD769, respectively, in line with the prices of the iPhone 7 and 7 Plus when they were released in September 2016. In terms of the volume breakdown, despite a likely higher price due to the new design and numerous spec upgrades, we expect the iPhone 8 to account for 50-55% of new iPhone sales in 2H17 and the i7S/i7S+ combined to contribute 45-50%.

iPhone: production volume and growth



Source: Daiwa estimates and forecasts
Note: This chart represents Daiwa's iPhone production estimates and forecasts, which differ slightly from the iPhone sales figures reported by Apple

iPhone: production volume forecast by model



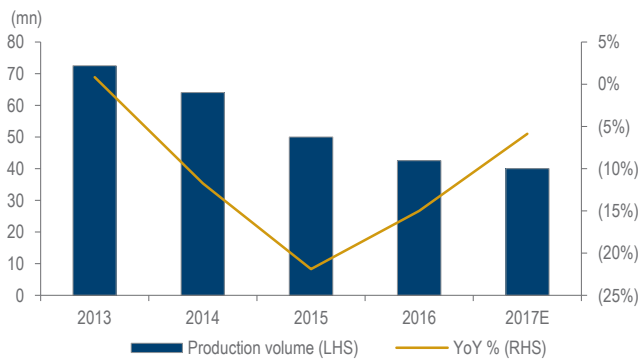
Source: Daiwa estimates and forecasts
Note: This chart represents Daiwa's iPhone production estimates and forecasts, which differ slightly from the iPhone sales figures reported by Apple

iPads and Apple Watch

We expect Apple to release 10.5” and 12.9” iPads and a new Apple Watch with LTE support

As for the iPad line, we expect Apple to release a new 10.5” iPad Pro and a refreshed iPad Pro with a 12.9” screen in early 2Q17. For the Apple Watch, we expect Apple to release a new version with LTE functionality in 2H17. Due to the likelihood of limited upgrades and the lack of a strong ecosystem, we expect volume growth for the iPad and Apple Watch to remain muted in 2017. We forecast iPad sales of 40m units in 2017 (vs. 42.5m in 2016E) and Apple Watch sales of 10-11m units in 2017 (vs. 9.5m in 2016E).

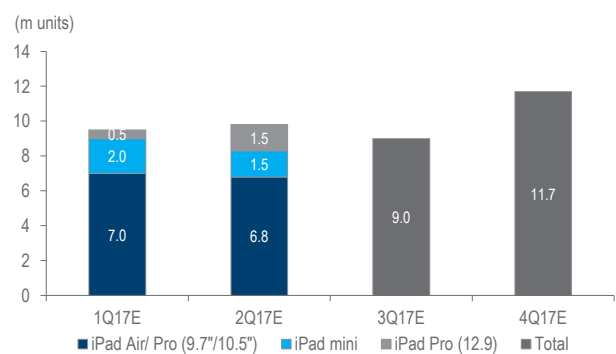
iPad: production volume and growth (2013-2017E)



Source: Daiwa estimates and forecasts

Note: This chart represents Daiwa's iPhone production estimates and forecasts, which differ slightly from the iPhone sales figures reported by Apple

iPad: production volume forecast by model (1Q17E-4Q17E)



Source: Daiwa estimates and forecasts

Note: This chart represents Daiwa's iPhone production estimates and forecasts, which differ slightly from the iPhone sales figures reported by Apple

Largan, AAC and Sunny Optical remain our top picks on the spec upgrade trends in the Greater China Smartphone Sector

We continue to have a Positive view on the Greater China Smartphone Sector. Within the Apple supply chain, we highlight Largan, AAC and Sunny Optical as our top picks:

We like **Largan (3008 TT, TWD4,550, Buy [1])** for its market-leading position in the high-end lens segment, given ongoing spec upgrades and an expanding addressable market arising from multi-camera adoption (see [The more the merrier: multi-cameras are the next mega trend](#), 2 August 2016). The key risk to our Buy (1) call on Largan: weaker-than-expected dual-cam adoption.

For **AAC (2018 HK, HKD79, Buy [1])**, we expect ASP upside in acoustics due to the rising adoption of waterproofing and its receiver module (see [Benefits from spec upgrades to accelerate from 2H16](#), 18 July 2016), while upgrades to the haptics functionality of iPhones should provide solid earnings drivers in the coming years. In addition, the ramp-up in project/client wins from non-acoustic RF/mechanical products should be a positive driver, in our view. The key risk to our Buy (1) call on AAC: weaker-than-expected smartphone sell-through.

As discussed, strong demand for iPhone 7 Plus and the likely increasing adoption of dual-cams in the next iPhones should drive dual-cam adoption in the broader smartphone space and benefit **Sunny Optical (2382 HK, HKD44.6, Buy [1])**, another of our top picks in the sector (though it is not part of the Apple supply chain). We also view Sunny as well-positioned to benefit from the multi-cam trends in smart cars on rising adoption of ADAS. The key risk to our Buy (1) call on Sunny: worse-than-expected pricing competition in handset camera modules.

Separately, we like **GIS (6456 TT, TWD101, Outperform [2])** as we see upside for its ASP from 3D touch spec upgrades and long-term potential in emerging opportunities from rising OLED adoption. We are more cautious on the casing component players such as **Catcher (2474 TT, TWD250.5, Hold [3])**, due to rising ASP pressure resulting from design changes, and volume players like **Hon Hai Precision (2317 TT, TWD84.1, Hold [3])** and **FIH Mobile (2038 HK, HKD2.59, Hold [3])**, where we believe upside is capped by the limited volume

growth in the broader smartphone industry. We also recommend staying away from the tier-2 brands such as **HTC (2498 TT, TWD78.3, Sell [5])**, given stiff competition in that space.

The major risk to our Positive view on the Greater China Smartphone Sector would be weaker-than-expected iPhone sell-through.

Greater China Smartphone Sector: valuation summary

Company	Ticker	Price	Daiwa	Mkt cap	EPS (rpt)			PER (x)			EPS growth (%)			ROE (%)			PBR (x)		
		(local curr.) 02/02/17			Rating	(USD bn)	2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E	2016E	2017E	2018E	2016E
HON HAI PRECISION	2317 TT	84.1	Hold	47.0	7.7	8.1	8.5	11.0	10.3	9.8	-10.8	6.3	5.0	12.6	12.5	12.3	1.3	1.3	1.2
LARGAN PRECISION	3008 TT	4550.0	Buy	19.7	169.4	260.6	318.2	26.9	17.5	14.3	-5.9	53.8	22.1	32.2	38.3	35.6	7.9	5.8	4.5
AAC TECHNOLOGIES HOLDINGS IN 2018	2018 HK	79.00	Buy	12.5	3.2	4.1	4.6	20.8	16.2	14.2	24.9	28.2	14.6	30.0	30.9	29.0	5.6	4.5	3.8
SUNNY OPTICAL TECH	2382 HK	44.6	Buy	6.3	1.1	1.5	2.0	33.9	25.1	19.0	54.8	35.1	31.8	27.3	29.4	30.7	8.3	6.6	5.2
CATCHER	2474 TT	250.5	Hold	6.2	25.7	26.8	25.9	9.7	9.3	9.7	-21.2	4.4	-3.3	16.3	15.4	13.6	1.5	1.4	1.3
FIH MOBILE LTD	2038 HK	2.59	Hold	2.7	0.012	0.016	0.019	26.9	20.3	17.7	-57.8	32.6	14.5	2.6	3.5	3.9	0.7	0.7	0.7
HTC CORP	2498 TT	78.3	Sell	2.1	-10.0	-6.8	-6.1	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	n.m.	1.1	1.3	1.4
GIS	6456 TT	101.0	Outperform	1.0	8.0	9.0	10.0	12.6	11.2	10.1	9.1	12.3	11.2	20.3	20.0	19.6	2.4	2.1	1.9
CASETEK	5264 TT	104.0	Hold	1.1	8.2	10.1	10.2	12.6	10.3	10.2	-50.3	22.4	0.6	9.0	10.7	10.2	1.1	1.1	1.0
TPK	3673 TT	58.4	Hold	0.7	-2.6	6.6	7.8	n.m.	8.9	7.4	n.m.	n.m.	19.4	n.m.	7.3	8.1	0.7	0.6	0.6
TXC	3042 TT	43.4	Outperform	0.4	3.3	3.6	3.9	13.3	11.9	11.0	8.0	11.1	8.4	9.3	10.1	10.6	1.2	1.2	1.2

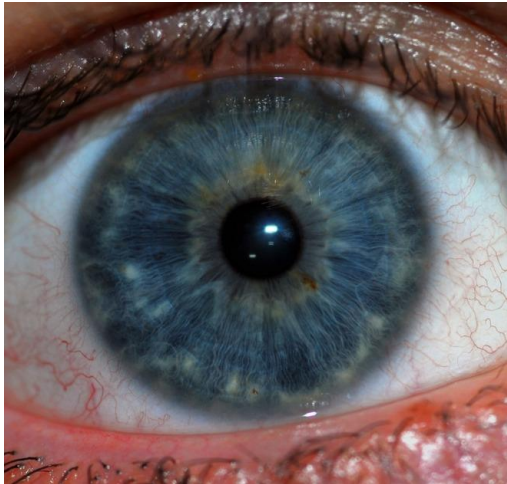
Source: Bloomberg, Daiwa; *based on 02 February 2017 closing prices

Appendix – Iris recognition technology

The iris defined

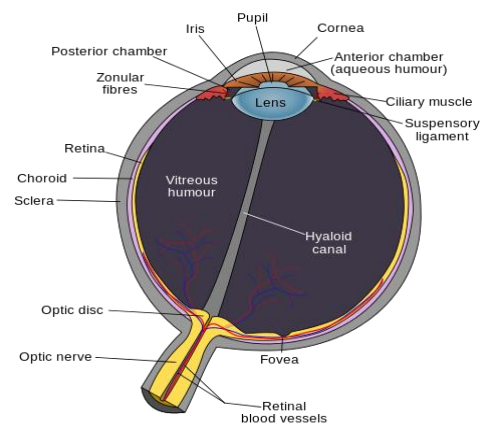
The iris is a thin, colourful circular diaphragm which lies between the cornea and the lens of the human eye. It is held close to its centre by a circular aperture known as the pupil. The function of the iris is to control the amount of light entering through the pupil. The iris is developed during the seventh month of gestation where it begins to hold its unique shape and form, and does not change with age.

Iris recognition: unique, complex, and stable pattern of iris



Source: Daiwa

Iris recognition: Hume eye diagram



Source: Daiwa

How iris recognition works

Iris recognition is a type of biometric identification that provides a secure method of authentication as the human iris holds a unique, complex and stable pattern, which can be recognised from a distance. An iris recognition system comprises an infrared light source, an infrared camera and a secondary camera which works in a variety of lighting conditions. An iris scanner utilises both visible and near-infrared light (NIR) to capture a clear, high-contrast image of a person's iris. This image is used to register and verify matches. The authentic process has three main stages involved which are discussed below:

- **Image acquisition**
Image acquisition deals with capturing a sequence of iris images from the subject using a high-resolution camera in good lighting conditions. Infrared light is applied to light up the iris in order to extract a sharp, noise-free image of the texture of the iris. The image of the iris needs to be rich in texture because the feature extraction stage depends on the image quality.
- **Segmentation**
Segmentation is utilised to locate the outer boundary of the iris where it meets the sclera of the eye, the pupillary boundary and the centre of the pupil. This generates the precise location of the circular iris. The recognition system then identifies the area of the iris that is suitable for feature extraction and analysis.
- **Algorithm utilisation**
As soon as the image is captured, the algorithm kicks in. The algorithm is used to normalise the image, generate identification code for the iris, and finally store the image. The record is then extracted from the database and a comparison of the record with the new image is undertaken. It should be noted that the comparison doesn't compare the image of the iris, but rather it compares the hexadecimal value produced after the algorithms have been applied.

Daiwa's Asia Pacific Research Directory

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