

# CrucialTec (114120 KS)

 Target price: **KRW24,000**

 Share price (15 Feb): **KRW12,250** | Up/downside: **+95.9%**

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**Buy**  
 (initiation)

## Initiation: a turnaround at its fingertips

- Benefiting from strong demand/tight supply for fingerprint sensors
- Entry of new competitors should be limited, at least in 2016
- Initiating with a Buy (1) rating and TP of KRW24,000; rerating likely

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**Investment case:** We see CrucialTec as an earnings recovery play for 2016, following a switch in its business model at end-2013 which saw it move from being solely an optical trackpad (OTP) supplier for BlackBerry to becoming a fingerprint sensor (FPS) module supplier for some of China's leading smartphone makers (eg, Huawei, Meizu and OPPO Electronics). Given the rising demand for FPS modules globally, we forecast the FPS penetration rate among the top-10 China smartphone brands to rise from 14-15% for 2015 to 30-35% for 2016, which would lead to tight supply and strong demand for FPS modules in 2H16, pushing CrucialTec's utilisation rate to close to 100% by the end of 2016, on our estimates. It should also result in a 4,591% rise in CrucialTec's net profit, as the company is one of 2 global leaders in this hard-to-enter segment of the smartphone value chain.

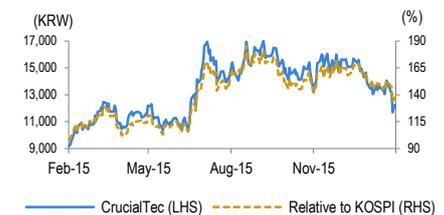
The strong demand growth for FPS led to a turnaround in CrucialTec's profitability in 3Q15 (having been in the red for 2012-14 due to its exposure to BlackBerry), also boosting its main FPS chip supplier, the Sweden-based Fingerprint Cards (FPC), which has evolved into a company with a market cap of USD4.5bn, and whose share price rose by more than 20x in 2015. FPC is not the only company to see such a positive trend; other pure FPS players such as IDEX, Precise Biometrics and Next Biometrics (all not rated) saw their share prices rise by 4x, 5x and 10x, respectively, in 2015 implying to us that investors are keen on this sub-segment.

**Catalysts:** The main share-price catalyst would be strong FPS module sales volume in 1Q16. But this still depends on its customers launching fingerprint-enabled smartphones (Huawei's P9 and LGE's G5 are the major models expected to come to market in 1Q16). CrucialTec's other customers will start launching FP-enabled smartphones in earnest from 2Q16.

**Valuation:** We initiate coverage with a Buy (1) rating and 12-month target price of KRW24,000, based on an 18.2x 2016E PER (in line with the average 2016E PER of its global FPS module manufacturer peers). Compared with peers, CrucialTec's 2016-17E PERs look undervalued to us, given its EPS growth potential over our forecast period, and as such, we believe the discount is unjustified. The valuation gap should narrow once the company starts seeing stronger earnings growth YoY, likely from 1Q16. While our 2016 and 2017 EPS forecasts are respectively 18.4% and 17.1% below the Fnguide consensus, the consensus figures incorporate only 3 forecasts and hence are not meaningful, in our view.

**Risks:** Weaker-than-expected FP-enabled smartphone sales by its customers, strong competitors entering the FPS space, and FPS being replaced by new technologies are the main risks to our Buy call.

## Share price performance



12-month range	9,190-17,000
Market cap (USDbn)	0.28
3m avg daily turnover (USDm)	5.50
Shares outstanding (m)	28
Major shareholder	Geonjun, Ahn (19.0%)

## Financial summary (KRW)

Year to 31 Dec	15E	16E	17E
Revenue (bn)	396	568	728
Operating profit (bn)	14	59	81
Net profit (bn)	1	41	60
Core EPS (fully-diluted)	28	1,322	1,912
EPS change (%)	n.a.	n.a.	44.6
Daiwa vs Cons. EPS (%)	(90.2)	(18.4)	(17.1)
PER (x)	n.a.	9.3	6.4
Dividend yield (%)	0.0	0.0	0.0
DPS	0	0	0
PBR (x)	6.0	3.5	2.2
EV/EBITDA (x)	19.2	6.3	4.1
ROE (%)	1.5	52.9	46.4

Source: FactSet, Daiwa forecasts

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# How do we justify our view?

**Buy**  
(initiation)

Growth outlook



Valuation



Earnings revisions

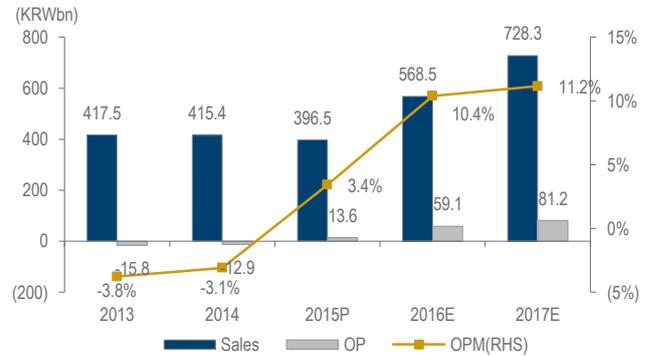


## Growth outlook



We estimate that 636.5m smartphones (+50.3% YoY) will be FP-enabled in 2016, with a 42% penetration ratio (from 35.3% for 2015), of which 280m (+190.1% YoY) will be non-Apple/non-Samsung smartphones. As such, we forecast CrucialTec to record revenue of KRW568.5bn (+43.4% YoY) for 2016, given our FPS shipment assumption of 78m (+157.9% YoY), and a 65.3% utilisation rate. Also, we forecast the company's operating profit to increase by 335.2% YoY to KRW59.1bn (operating profit margin of 10.4%), stemming from revenue volume growth and a recovery in the production yield.

## CrucialTec: earnings forecasts



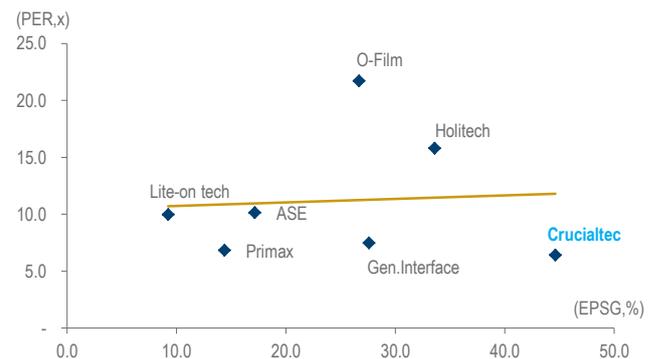
Source: Company, Daiwa forecasts

## Valuation



Compared with its peers, CrucialTec's shares are undervalued, in our view, given the earnings growth and profitability we see for 2016. We expect the stock to be rerated and the valuation gap with its peers to narrow, when investors see the penetration ratio of FPS in the smartphone space rising further and CrucialTec benefiting from it. The stock is trading currently at a diluted 2016E PER of 9.3x, which we see as undemanding.

## CrucialTec: peers PER vs. EPS growth (2017E)



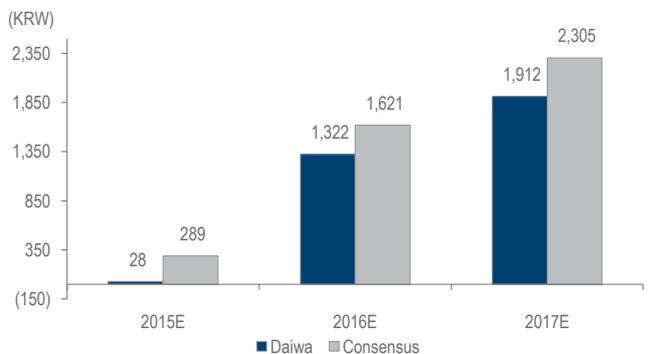
Source: Daiwa forecasts, Bloomberg

## Earnings revisions



Our EPS forecasts for 2016 and 2017 are 18.4% and 17.1% below the Fnguide consensus, but as there are only 3 estimates and these numbers are scattered, we do not think the consensus numbers are meaningful.

## CrucialTec: Fnguide-consensus EPS comparison



Source: Fnguide, Daiwa forecasts

## Financial summary

### Key assumptions

Year to 31 Dec	2010	2011	2012	2013	2014	2015E	2016E	2017E
Fingerprint Sensor Shipment(mn)	0	0	0	0	5	30	78	120
FPS ASP(US\$)	0.0	0.0	0.0	0.0	5.5	6.8	5.8	4.7
exSEC/App FP Shipment(mn)	0	0	0	0	38	102	273	479

### Profit and loss (KRWbn)

Year to 31 Dec	2010	2011	2012	2013	2014	2015E	2016E	2017E
Fingerprint Sensor Module	0	0	0	11	29	227	542	703
Optical Trackpad	190	202	75	18	5	2	0	0
Other Revenue	18	50	205	389	381	167	26	25
<b>Total Revenue</b>	<b>208</b>	<b>252</b>	<b>280</b>	<b>417</b>	<b>415</b>	<b>396</b>	<b>568</b>	<b>728</b>
Other income	0	0	0	0	0	0	0	0
COGS	(171)	(219)	(259)	(388)	(385)	(337)	(457)	(584)
SG&A	(12)	(20)	(29)	(45)	(43)	(46)	(53)	(63)
Other op.expenses	0	0	0	0	0	0	0	0
<b>Operating profit</b>	<b>24</b>	<b>13</b>	<b>(8)</b>	<b>(16)</b>	<b>(13)</b>	<b>14</b>	<b>59</b>	<b>81</b>
Net-interest inc./(exp.)	(0)	(0)	(3)	(5)	(8)	(6)	(5)	(3)
Assoc/forex/extraord./others	1	3	(3)	(6)	(16)	(4)	(2)	(1)
<b>Pre-tax profit</b>	<b>25</b>	<b>16</b>	<b>(14)</b>	<b>(27)</b>	<b>(37)</b>	<b>4</b>	<b>53</b>	<b>77</b>
Tax	(4)	(3)	3	9	9	(3)	(11)	(17)
Min. int./pref. div./others	0	0	0	0	0	0	0	0
<b>Net profit (reported)</b>	<b>21</b>	<b>15</b>	<b>(12)</b>	<b>(23)</b>	<b>(37)</b>	<b>1</b>	<b>41</b>	<b>60</b>
<b>Net profit (adjusted)</b>	<b>21</b>	<b>15</b>	<b>(12)</b>	<b>(23)</b>	<b>(37)</b>	<b>1</b>	<b>41</b>	<b>60</b>
<b>EPS (reported)(KRW)</b>	<b>2,383</b>	<b>625</b>	<b>(493)</b>	<b>(966)</b>	<b>(1,492)</b>	<b>31</b>	<b>1,452</b>	<b>2,099</b>
<b>EPS (adjusted)(KRW)</b>	<b>2,383</b>	<b>625</b>	<b>(493)</b>	<b>(966)</b>	<b>(1,492)</b>	<b>31</b>	<b>1,452</b>	<b>2,099</b>
<b>EPS (adjusted fully-diluted)(KRW)</b>	<b>2,383</b>	<b>621</b>	<b>(493)</b>	<b>(915)</b>	<b>(1,311)</b>	<b>28</b>	<b>1,322</b>	<b>1,912</b>
<b>DPS (KRW)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>EBIT</b>	<b>24</b>	<b>13</b>	<b>(8)</b>	<b>(16)</b>	<b>(13)</b>	<b>14</b>	<b>59</b>	<b>81</b>
<b>EBITDA</b>	<b>27</b>	<b>19</b>	<b>1</b>	<b>(3)</b>	<b>2</b>	<b>23</b>	<b>64</b>	<b>88</b>

### Cash flow (KRWbn)

Year to 31 Dec	2010	2011	2012	2013	2014	2015E	2016E	2017E
Profit before tax	25	16	(14)	(27)	(37)	4	53	77
Depreciation and amortisation	3	6	9	12	14	12	8	9
Tax paid	(4)	(3)	3	9	9	(3)	(11)	(17)
Change in working capital	(6)	10	2	13	4	0	2	(6)
Other operational CF items	(15)	(44)	(3)	(21)	7	(23)	(10)	(5)
<b>Cash flow from operations</b>	<b>3</b>	<b>(17)</b>	<b>(3)</b>	<b>(14)</b>	<b>(1)</b>	<b>(10)</b>	<b>41</b>	<b>58</b>
Capex	(11)	(29)	(30)	(41)	(14)	(8)	(5)	(12)
Net (acquisitions)/disposals	(26)	(7)	2	4	(3)	(5)	(3)	1
Other investing CF items	(0)	0	0	0	0	0	0	0
<b>Cash flow from investing</b>	<b>(37)</b>	<b>(36)</b>	<b>(28)</b>	<b>(37)</b>	<b>(18)</b>	<b>(13)</b>	<b>(8)</b>	<b>(11)</b>
Change in debt	17	28	31	29	12	31	(7)	(1)
Net share issues/(repurchases)	27	32	2	9	13	0	0	0
Dividends paid	0	0	0	0	0	0	0	0
Other financing CF items	0	(6)	4	(0)	(2)	0	0	0
<b>Cash flow from financing</b>	<b>45</b>	<b>55</b>	<b>37</b>	<b>38</b>	<b>22</b>	<b>31</b>	<b>(7)</b>	<b>(1)</b>
Forex effect/others	0	(0)	0	(0)	(0)	(0)	(0)	(0)
<b>Change in cash</b>	<b>11</b>	<b>2</b>	<b>7</b>	<b>(14)</b>	<b>3</b>	<b>8</b>	<b>27</b>	<b>46</b>
Free cash flow	(9)	(45)	(33)	(55)	(16)	(18)	36	46

Source: FactSet, Daiwa forecasts

Note: Samwoo Ems (MCM division) is deconsolidated from August 2015

## Financial summary continued ...

### Balance sheet (KRWbn)

As at 31 Dec	2010	2011	2012	2013	2014	2015E	2016E	2017E
Cash & short-term investment	31	26	34	20	25	35	63	109
Inventory	20	11	12	12	14	5	6	8
Accounts receivable	39	48	42	55	43	52	62	66
Other current assets	9	70	66	93	75	62	65	61
<b>Total current assets</b>	<b>100</b>	<b>156</b>	<b>155</b>	<b>180</b>	<b>158</b>	<b>154</b>	<b>196</b>	<b>243</b>
Fixed assets	14	81	99	129	139	71	79	95
Goodwill & intangibles	1	5	11	20	11	11	11	11
Other non-current assets	11	25	26	27	37	34	33	36
<b>Total assets</b>	<b>126</b>	<b>267</b>	<b>289</b>	<b>356</b>	<b>345</b>	<b>269</b>	<b>319</b>	<b>386</b>
Short-term debt	20	77	89	131	107	46	43	42
Accounts payable	25	49	41	69	65	75	87	94
Other current liabilities	3	4	3	8	3	3	4	4
<b>Total current liabilities</b>	<b>48</b>	<b>130</b>	<b>133</b>	<b>208</b>	<b>175</b>	<b>124</b>	<b>134</b>	<b>139</b>
Long-term debt	10	12	38	36	74	48	44	45
Other non-current liabilities	1	3	2	3	4	4	4	4
<b>Total liabilities</b>	<b>59</b>	<b>144</b>	<b>173</b>	<b>246</b>	<b>253</b>	<b>176</b>	<b>182</b>	<b>188</b>
Share capital	4	12	12	12	12	12	12	12
Reserves/R.E./others	63	97	87	69	44	45	87	146
<b>Shareholders' equity</b>	<b>67</b>	<b>109</b>	<b>98</b>	<b>81</b>	<b>57</b>	<b>58</b>	<b>99</b>	<b>159</b>
Minority interests	0	14	18	28	35	35	37	39
<b>Total equity &amp; liabilities</b>	<b>126</b>	<b>267</b>	<b>289</b>	<b>356</b>	<b>345</b>	<b>269</b>	<b>319</b>	<b>386</b>
EV	345	423	457	521	537	441	409	362
<b>Net debt/(cash)</b>	<b>(1)</b>	<b>63</b>	<b>93</b>	<b>147</b>	<b>155</b>	<b>59</b>	<b>25</b>	<b>(23)</b>
<b>BVPS (KRW)</b>	<b>7,659</b>	<b>4,653</b>	<b>4,178</b>	<b>3,436</b>	<b>2,282</b>	<b>2,037</b>	<b>3,471</b>	<b>5,569</b>

### Key ratios (%)

Year to 31 Dec	2010	2011	2012	2013	2014	2015E	2016E	2017E
Sales (YoY)	234.6	21.2	11.2	48.9	(0.5)	(4.5)	43.4	28.1
EBITDA (YoY)	250.1	(31.1)	(93.9)	n.a.	n.a.	1,327.3	179.6	37.0
Operating profit (YoY)	285.0	(46.6)	n.a.	n.a.	n.a.	n.a.	335.2	37.4
Net profit (YoY)	192.3	(29.6)	n.a.	n.a.	n.a.	n.a.	4,590.8	44.6
Core EPS (fully-diluted) (YoY)	145.1	(73.9)	n.a.	n.a.	n.a.	n.a.	4,590.8	44.6
Gross-profit margin	17.7	13.3	7.6	7.0	7.3	15.0	19.7	19.8
EBITDA margin	12.9	7.3	0.4	(0.8)	0.4	5.8	11.3	12.1
Operating-profit margin	11.7	5.2	(2.9)	(3.8)	(3.1)	3.4	10.4	11.2
Net profit margin	10.0	5.8	(4.1)	(5.4)	(8.9)	0.2	7.3	8.2
ROAE	n.a.	16.7	n.a.	n.a.	n.a.	1.5	52.9	46.4
ROAA	n.a.	7.4	n.a.	n.a.	n.a.	0.3	14.1	17.0
ROCE	n.a.	8.4	n.a.	n.a.	n.a.	5.9	28.8	32.0
ROIC	30.7	8.2	(3.2)	(4.5)	(3.8)	1.7	29.7	37.5
Net debt to equity	n.a.	58.0	94.7	181.3	273.8	102.9	25.0	n.a.
Effective tax rate	17.3	21.1	22.4	33.5	25.2	75.5	21.3	22.5
Accounts receivable (days)	n.a.	63.4	58.8	42.6	43.1	43.4	36.5	32.0
Current ratio (x)	2.1	1.2	1.2	0.9	0.9	1.2	1.5	1.7
Net interest cover (x)	50.7	27.1	n.a.	n.a.	n.a.	2.3	13.1	27.1
Net dividend payout	0.0	0.0	n.a.	n.a.	n.a.	0.0	0.0	0.0
Free cash flow yield	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10.5	13.2

Source: FactSet, Daiwa forecasts

Note: Samwoo Ems (MCM division) is deconsolidated from August 2015

## Company profile

CrucialTec manufactures fingerprint sensor (FPS) modules for smartphones. Its main customers are most of the global smartphone manufacturers, with the exception of Samsung and Apple. The company mainly uses fingerprint IC chips from Sweden-based Fingerprint Cards. In the future, we expect FPS modules to be used not only for smartphones, but in many other areas, including autos and credit cards.

## The world's largest FPS module manufacturer

### Dominating the China FPS market with O-Film

#### FPS business has led to an earnings rebound

CrucialTec used to focus on the development of OTP and was BlackBerry's sole supplier for years. However, when BlackBerry started losing market share to the other smartphone makers such as Apple in 2012, CrucialTec found itself in the red from 2012-14. It was only after it switched to developing new products in 2013, such as FPS, that it was able to turn its profitability around, from 3Q15.

#### With Shenzhen O-Film, CrucialTec has the largest FPS capacity in the world

Since June 2013, CrucialTec has been supplying FPS modules (also called biometric pads) to 14 smartphone manufacturers, totalling 43 models, with the exception of Samsung and Apple. Most of its customers are the China smartphone players that are keen to adopt FPS in their smartphones. Note that only around 15 FP-enabled China smartphone models were launched in 2014, but that number jumped to around 67 for 2015, according to our market research.

CrucialTec manufactures both area (touch) type and swipe type FPS modules, the ASP for which is currently about USD6-7. It is the global market leader, and together with Shenzhen O-Film (O-Film) (002456 CH, not rated), it dominates the FPS market (combined 100% for 2015E; 60% for CrucialTec and 40% for O-Film, according to CrucialTec) and has the largest capacity in the world. The rapidly expanding demand for FPS has benefited CrucialTec, enabling it to raise its monthly capacity from 7m FPS modules to 10m in October 2015. According Taiwan media reports, the China-based O-Film, CrucialTec's largest competitor, also recently raised its monthly capacity to 10m FPS modules, from 6.5m in December 2015.

#### Own algorithm, module packaging and IC-chip design functions are all in-house

Manufacturing FPS modules requires 3 types of technology for: 1) the IC chip design, 2) an algorithm, and 3) module packaging. FPS modules for smartphones are smaller than those for door locks, for example. In a smartphone, the algorithm enables tiny modules to process fingerprints quickly and accurately. CrucialTec has developed its own algorithms via its subsidiary Crucial Soft, an in-house algorithm developer, which it says ensures high accuracy and low memory and power consumption.

For the first time, CrucialTec's algorithm has been adopted in LGE's V10, launched in 4Q15. Through its subsidiary Crucial Package, CrucialTec can do its own module packaging (cutting IC chips on wafers and modularising), as well as colour coating and adding waterproof technology, enabling it to keep its costs down. The most important part of the module packaging process is the coating of the chip, given its fragility (to ensure the integrity of the chips, it is important to protect them, and that the coating technology maintains a high fingerprint recognition rate).

CrucialTec is also working on its own FPS IC chip design via its subsidiary Crucial Chips. Having its own algorithms and packaging fab enables the company to reduce costs and to get instant customer feedback. CrucialTec has 400 IP intellectual property rights and is the most experienced in mass production among its competitors globally, in our view (it manufactured more than 300m optical trackpads and 40m FPS modules over 2012-15).

The cost of raw materials for an FPS module (the FPS IC Chip) is still relatively high in that it accounts for 50% of COGS. However, the arrival of new FPS IC chipmakers, such as IDEX ASA (IDEX NO), Next Biometrics Group (NEXT NO) of Norway, and Silead and Goodix of China (all not rated), is leading to IC prices dropping. Along with the falling price of IC chips, CrucialTec aims to cut costs further by buying IC chips from other manufacturers, thus reducing its exposure to its main chip supplier, FPC.

**The China smartphone makers rely heavily on CrucialTec for FPS modules**

Although CrucialTec, together with O-Film, are the dominant global leaders in FPS, they have been unable to penetrate the Samsung and Apple supply chains. This is because Samsung manufacturers FPS in house using IC chips and algorithms from Synaptics (SYNA US) and Egis Technology (6462 TT), while Apple uses proprietary technology from Authentec, which it acquired for USD356m in 2012. XinTec (3374 TT) and ASE (2311 TT) are widely known to be Apple’s main FPS module manufacturers.

The company has done better in the China supply chain, gaining a captive share, as the China smartphone manufacturers rely heavily on CrucialTec (and O-Film) for FPS – FPC of Sweden currently supplies most of the IC chips for CrucialTec’s FPS modules. We estimate that FPC has a more than 95% of share of the ex-Samsung/Apple FPS IC market currently (CrucialTec and O-Film had a 60%:40% split of the bifurcated FPS module market for the ex-Samsung/Apple market for 2015, with this number moving to 50:50 for 2016, according to CrucialTec).

**Smartphone manufacturers: supply chain for fingerprint sensors**

	Apple	Samsung	Others
<b>Chip</b>	Authentec	Synaptics / Egistec	FPC / IDEX / Silead / Goodix / Elan
<b>Foundry</b>	TSMC	TSMC	SMIC/UMC
<b>Algorithm</b>	Authentec	Synaptics / Egistec	Precise, CrucialTec
<b>Module</b>	ASE	Self	CrucialTec, O-Film
<b>Packaging</b>	Xintec	Self	CrucialTec, Signetics

Source: Company, Daiwa

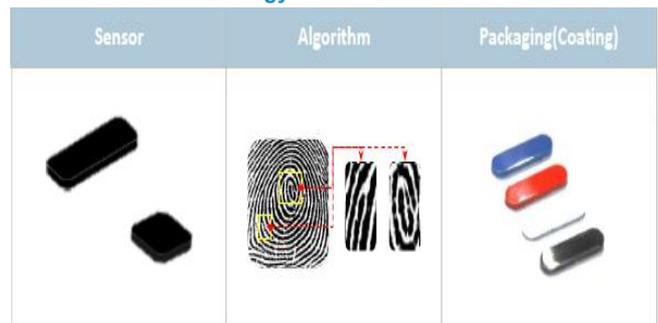
**CrucialTec: FPS modules**

**BTP -> OTP + Fingerprint Verification Technology**



Source: Company, Daiwa

**CrucialTec: FPS technology**



Source: Company, Daiwa

## 2016 to see a surge in FPS smartphones

### FPS smartphone shipments to rise by 50% YoY for 2016E

**FPS penetration ratio to rise from 30% in 2015E to 42% in 2016E**

The smartphone FPS market is expanding rapidly, which we believe augurs well for CrucialTec, as the key beneficiary. According to Acuity Market Intelligence, the smartphone FPS market will expand at a CAGR of 90% from USD0.7bn in 2014 to USD33.3bn in 2020. Apple created the FPS smartphone market in 2013 by launching the iPhone 5S. In 2014, global smartphone shipments were around 1.28bn, of which FPS smartphone shipments accounted for 270m, equal to a 21% penetration ratio. Most of the FPS smartphone shipments comprised Apple's iPhone 6, iPhone 6+(190m sold) and Samsung's Galaxy S5 and Galaxy S5 Mini (50m sold).

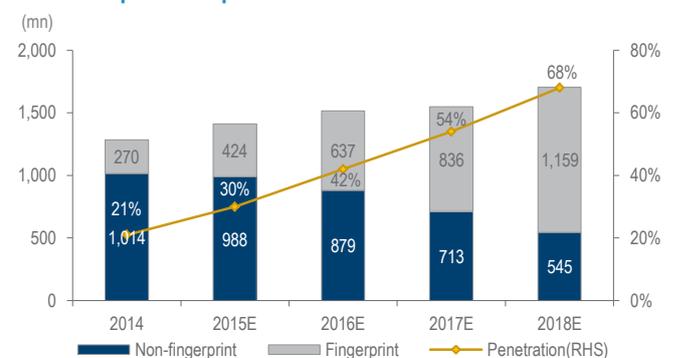
In 2015, FPS smartphone shipments increased by 57% YoY to 424m, according to Acuity Market Intelligence estimates, with a 30% penetration ratio. We forecast FPS smartphone shipments (including Samsung and Apple) to reach 637m (+50% YoY) for 2016.

FPS smartphone market forecasts



Source: Acuity Market Intelligence, Daiwa Research

FPS smartphone shipment forecasts



Source: Daiwa Research

### Google and Alibaba to drive strong FPS demand

**FPS sales have surged, not only because of Samsung Pay and Apple Pay, but thanks to Google and Alibaba**

With Apple and Samsung taking the lead in applying fingerprint verification for mobile payment services, demand for fingerprint verification systems on smartphones has been rising over the past years. Fingerprint verification does not involve any complicated process but supports a simple payment settlement. Moreover, due to its high security level, smartphone providers prefer it to any other methods. If 2015 was the year in which Apple and Samsung started to develop a market for FPS smartphones, we think 2016 will be the year that other smartphone makers also start to apply FPS to their products. In addition to Samsung Pay and Apple pay, we believe that what will mainly stimulate demand for FPS will be: 1) Google, which has a 70% share of the global smartphone OS market, and 2) Alibaba, with a 50% mobile payment market share in China.

**The new Android OS, Marshmallow, supports FPS**

1) With the heating up of the offline mobile payment market, Google has incorporated Android Pay and the Android fingerprint API into its most recent OS, Marshmallow. As a result, the smartphone providers within Android's ecosystem are likely to launch more FPS-enabled smartphones going forward. With the delivery of fingerprint API, Google launched 2 new FPS-enabled Nexus smartphones recently.

**Alipay's QR code requires FPS**

2) The mobile payment market in China started to take off in 2013 and, based on our market research, mobile payments now account for more than 50% of all the payments made in China. In addition, the transaction volume made via mobile payments was around CNY252bn (up 64.3% YoY) for 3Q15, according to iResearch. The US and China now lead the global mobile payment market (in terms of the number of transactions done via mobile), Alibaba's Alipay has more than 60% of the mobile payment market share in China with over 270m active users (as of August 2015). Alipay also provides offline mobile payment services based on its large number

of subscribers and strong market power. Offline Alipay is a QR code based that works with any type of smartphone. As such, user verification is becoming important and Chinese smartphone manufacturers are rapidly adopting FPS to satisfy customers who want to use Alipay offline.

#### Nexus running Marshmallow: fingerprint use



Source: Google, Daiwa Research

#### How to use QR code Alipay offline



Source: Daiwa Research

## FPS demand is strong even without Apple and Samsung

### CrucialTec's customers are eager to adopt FPS

#### Most of CrucialTec's customers are China-based

Although CrucialTec does not do business with the world's top-2 smartphone manufacturers (Apple and Samsung), we believe the level of demand for FPS in 2016 will be more than enough for CrucialTec to fulfil. Furthermore, its customer group is well diversified, allowing the company to keep its earnings stable regardless of the performances of certain customers in the market. We would also point out that CrucialTec's major customers are gradually gaining market share in the global smartphone market against Apple and Samsung, and aggressively adopting FPS.

Among its 14 customers, most are Chinese smartphone manufacturers eager to adopt fingerprint sensors to enhance their product quality. According to IHS, 9 of the top 10 Chinese smartphone brands released FPS smartphones in 2015. Furthermore, the penetration of FPS in the top-10 Chinese smartphone brands is expected to have reached 14.0-15.0% in 2015. In 2016, with an increase of 120m shipment units, the penetration ratio should rise to 30-35%.

#### Huawei is CrucialTec's biggest customer

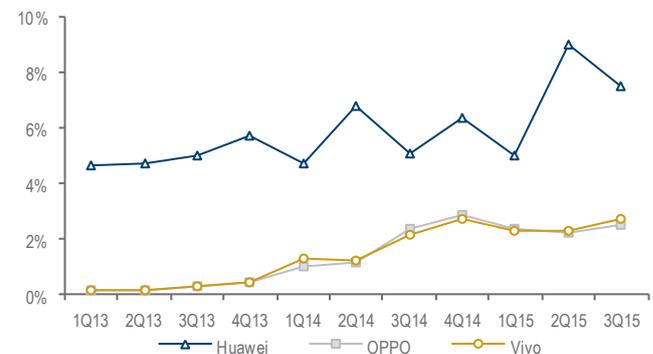
Starting from supplying FPS to Fujitsu in 2013, CrucialTec secured Chinese companies such as Huawei and Gionee as clients in 2014. Based on this experience, CrucialTec has since added global customers such as HTC, Meizu, Sony, Google, LG, and Microsoft. Its biggest customer is Huawei, which accounted for 30-40% of CrucialTec's revenue in 2015. CrucialTec's market share in Huawei is about 60%. Huawei was ranked No.3 in the global market and No.1 in China selling over 100m units in 2015. Huawei launched its first FPS-adopted smartphone, 'Ascend Mate 7', in September 2014 using CrucialTec's BTP module. Huawei also launched a new high-end smartphone, 'Ascend Mate 8', in November 2015.

#### CrucialTec: BTP customer history

Date	Customer
Jun 2013	Fujitsu
Aug 2013	Pantech
Jan 2014	Gionee
Feb 2014	BBK (VIVO)
Sep 2014	Huawei
Mar 2015	<b>BTP accumulated sales reached over 10million</b>
Apr 2015	HTC
Jun 2015	Meizu
Sep 2015	Sony
Sep 2015	Google - Nexus 6P, 5X
Sep 2015	LGE
Oct 2015	Microsoft
Dec 2015	VIVO X6

Source: Company, Daiwa Research

#### Market-share trends of CrucialTec's major customers



Source: Daiwa Research

### Tight supply and demand for FPS anticipated in 2H16

#### CrucialTec should be able to sustain its market share

In our view, the biggest concern for smartphone component manufacturers like CrucialTec will be market-share losses or severe price cuts by customers due to the entry of new competitors or a slowdown in demand. However, this concern about FPS should be limited at least in 2016, as we expect tight demand and supply of FPS modules in 2H16. As such, we forecast CrucialTec's utilisation rate to reach close to 100% at the end of 2016.

The total addressable market (TAM) for CrucialTec comprises other smartphone manufacturers other than Apple and Samsung. Amongst the 270m FPS smartphone shipments in 2014, CrucialTec's TAM was 37.8m (ex-Apple/Samsung shipments). We

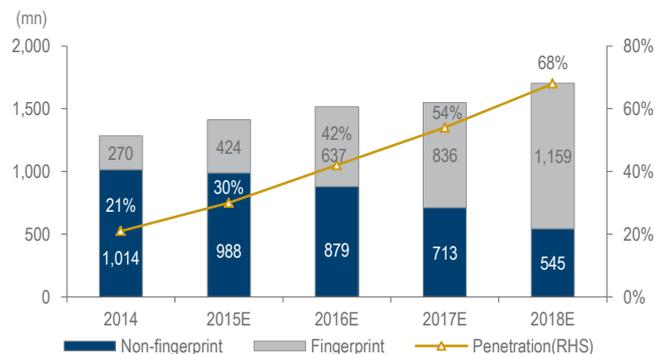
estimate that the TAM increased to 96.6m (155% YoY) in 2015. Taking this into account, we anticipate that CrucialTec's TAM in 2016 will grow by 190% to 280m.

#### FPS smartphone forecasts (m)

	2014	2015E	2016E	2017E	2018E
Smartphones	1,283.5	1,412.1	1,515.5	1,549.0	1,703.9
Non-fingerprint	967.5	913.1	879.0	712.5	545.2
Fingerprint	316.0	499.0	636.5	836.5	1,158.7
Fingerprint YoY		57.9%	27.6%	31.4%	38.5%
FP penetration	24.6%	35.3%	42.0%	54.0%	68.0%
FP ex-Apple/Samsung	37.8	96.6	280.3	467.0	770.6
FP ex- Apple/Samsung YoY		155.4%	190.1%	66.6%	65.0%

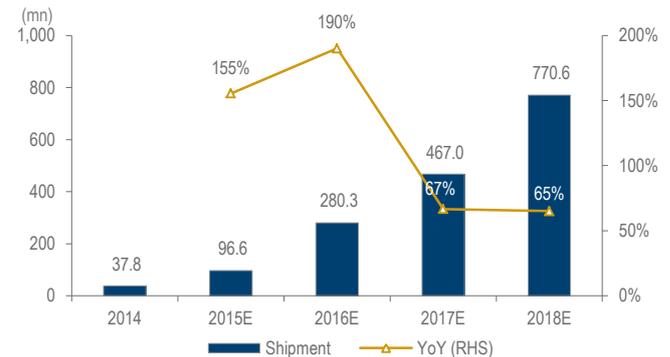
Source: IHS, Daiwa Research

#### Global fingerprint smartphone shipment forecasts



Source: Daiwa Research

#### Ex-Apple/Samsung FPS smartphone shipment forecasts



Source: Daiwa Research

## Cross-checking with guidance from Fingerprint Cards

**FPC expects FPS smartphone sales to reach 750m in 2016 vs. our forecast of 637m**

According to the guidance from Sweden's FPC, the penetration rate for FPS smartphones, including Apple and Samsung, is expected to be over 30% in 2015, and in particular, could rise to over 50% in 2016. This penetration rate equates to around 750m FPS-enabled smartphones, which is more aggressive than our estimate of 637m.

**FPC targets to ship 250m to 365m FPS chips in 2016**

Excluding Apple, FPC claims its share of the FPS market was 45% for 2015, equivalent to 86m unit shipments. The remaining 55% may have been occupied by Samsung's Synaptic. FPC targets a market share of 50-70% in 2016, and we believe this will be backed by market-share gains by its current customers rather than by FPC entering the value chain of Samsung or Apple. If FPC's guidance of 50-70% is realised, it would account for around 265-365m FPS smartphone shipments (750m of total FPS – 230m from Apple = 520m x 50% to 70% = 260m to 365m).

Similar to this, FPC's revenue guidance also suggest its sales volume will be between SEK6.5bn and SEK8.5bn (USD0.76bn and USD1bn). If we assume the chip ASP is USD3, this would be equivalent to between 250m and 330m shipments.

**If FPC is right, FPS would fall short of its guidance**

From FPC's guidance, we calculate that the TAM for CrucialTec and O-Film would be between 250m and 365m and the annual capacities of both companies in 2016 would be 240m combined. This means that both companies would have to run at full capacity with a 100% production yield to meet the demand.

#### Daiwa interpretation of FPC's guidance 2016

FPC guidance 2016	Implications and our estimates from guidance
SEK6.5bn-8.5bn (USD0.76-1bn)	250-330m shipments
2015 FPS penetration, 30% or above	Total FPSP over 420m (Apple 220m, Samsung 95m, Others 105m)
2016 FPS penetration, 50% or above	Total FPSP over 750m (Apple 230m, Samsung 140m, Others 380m)
FPC market share (excluding Apple) in 2015: 45%	86m shipments
FPC market share (excluding Apple) in 2016: 50-70%	265-364m shipments

Source: Fingerprint Cards, Daiwa

## Arrival of new competitors should be limited, at least in 2016

### To enter the market, a competitor needs to secure IC chips, capacity and production yield

Given the strong demand for FPS modules, the arrival of competitors is possible. However, in order to enter the market, these competitors need to secure IC chips, capacity and ramp up to ensure the necessary production yield, all of which take time, and create high barriers to entry.

- 1) **IC chips:** newcomers would have to obtain IC chips from FPC or the other chipmakers like Goodix. However, for 2016, we see the supply of chips being tight because FPC will be busy with CrucialTec and O-Film, and Goodix will need time to ramp up because it is also a newcomer.
- 2) **Capacity and production yield:** In an article on [en.ofweek.com](http://en.ofweek.com) in November 2014, O-Film announced that it would build its first FPS fab, with a monthly capacity of 4m modules, the largest capacity in China at that time. O-Film now has a monthly capacity of 10m modules, that same as CrucialTec. It took more than a year for CrucialTec and O-Film to stabilise their production yields. Therefore, we believe it would take a while for a competitor to build a fab and ramp up to a stable production yield as well.

To conclude, we expect CrucialTec and O-Film to remain the only 2 suppliers in the ex-SEC/Apple market in 2016. Although there is always competition in the IT industry, with players losing and gaining market share, we think the chance of new players entering the FPS module segment and stealing share from CrucialTec and O-Film is unlikely, at least for the rest of 2016.

**CrucialTec: FP-enabled smartphones launched in 2014**

Date	Company	Brand
2014.01	<b>Gionee</b>	T1
2014.02	Samsung	Galaxy S5
2014.04	Mlais	Note Pro
2014.05	Fujitsu	Arrow NX F-05F
	Pantech	Vega Iron 2
2014.06	<b>Gionee</b>	Elife E8
	Samsung	Z
	<b>Elephone</b>	P2000
	Vifocal	C1000
	<b>Goophone</b>	M3+
	Huawei	Honor 6
2014.07	Samsung	Galaxy S5 Mini
	<b>Corewise</b>	CFON640
	<b>Elephone</b>	P300
	<b>Huawei</b>	Ascend G8
2014.08	Swipe	Sense
	Iberty	Auxus Note 5.5
2014.09	Samsung	Galaxy Note 4
	<b>Huawei</b>	Ascend Mate 7
	Apple	iPhone 6, iPhone 6+
	<b>Elephone</b>	G6
	<b>Timmy</b>	E88
	Xolo	Q2100
2014.10	Otium	Z4
	Fujitsu	Arrows M305/KA4
	Philips	Aurora i966
	Bluboo	X6
	<b>Oppo</b>	N3
2014.11	Vega	Pop-up Note
	<b>Meizu</b>	MX4 Pro
2014.12	Motorola	Nexus 6
	<b>Kingzone</b>	N3
	<b>Xiaomi</b>	Redmi Note 2

**CrucialTec: customers that launched FP-enabled smartphones in 2015**

Date	Company	Brand	Date	Company	Brand
2015.01	<b>HTC</b>	One M9+	2015.1	Sony	Z5
	<b>Elephone</b>	P5000		<b>QiKU</b>	Terra, q Luna
	<b>THL</b>	2015		<b>Lenovo</b>	Vibe P1
2015.02	<b>Ecco</b>	E04 Aurora		Freetel	Samurai Kiwami
	<b>Kingzone</b>	N3+		Gigaset	Gigaset ME
2015.03	Samsung	Galaxy S6		NextBit	NextBit Robin
	<b>OnePlus</b>	OnePlus Two		<b>Huawei</b>	Mate S
2015.04	<b>Bluboo</b>	X500, XTouch		LGE	Nexus 5X
	Saygus	V2		BLU	BLU Pure XL
	<b>Newman</b>	Button (CM810)		<b>Coolpad ivvi</b>	ivvi K2
	<b>LeTV</b>	LeMax		<b>Meizu</b>	Pro 5
2015.05	<b>Yulong</b>	Tiptop Pro		<b>OnePlus</b>	OnePlus 2 Mini
	Sharp	Aquos Zeta SH-03G		Apple	iPhone 6S
	<b>Elephone</b>	P7000			6S Plus
	<b>Oppo</b>	R7 plus		<b>Huawei</b>	Honor 5X
	<b>ZTE</b>	Nubia Z9 Exclusive		<b>Doogee</b>	Doogee Y200
	<b>ZTE</b>	Xiao Xian 2		Google	Nexus 5X
	<b>Mstar</b>	S700			Nexus 6P
2015.06	<b>Huawei</b>	Honor 7	2015.10	Fujitsu	Arrows Fit F-01H
	<b>Lenovo</b>	Zuk Z1		<b>Smartisan</b>	T2
	Motorola	Moto X		Fujitsu	Arrow NX F-02H
	<b>Elephone</b>	P8000		Microsoft	Lumia 950
	<b>Meizu</b>	MX5			950 XL (iris)
	<b>Xiaomi</b>	Mi 5		Red Pepper	NX Plus
	<b>Gionee</b>	Allview X2 Extreme		<b>ZTE</b>	Blade S7
	Ulephone	Be Touch 2		<b>HTC</b>	One A9
	<b>Oukitel</b>	U8		<b>LeTV</b>	Le 1S
	<b>Doogee</b>	F5/F2015		Sharp	Aquos Zeta SH-01H
	<b>Blackview</b>	Alife P1 Pro	2015.11	<b>UMI</b>	Iron Pro
	<b>ZTE</b>	Nubia X8		Pepsi	Pepsi P1
2015.07	<b>Huawei</b>	Nexus Google		<b>Cubot</b>	Cubot S600
	<b>Yulong</b>	Coolpad Note3		<b>InnJoo</b>	InnJoo 2 (Two)
	LGE	V10		<b>Vivo</b>	Vivo X6
	<b>ZTE</b>	Axon A2015		<b>Xiaomi</b>	Redmi Note 3
	Turing	Turing Phone		<b>Shallots</b>	Helio X20
	<b>UMI</b>	Hammer S		<b>ZTE</b>	Small Fresh 3
2015.08	<b>Huawei</b>	Mate 8		Ulephone	Power
	<b>Lenovo</b>	Vibe X3		<b>Ivvi</b>	K3M Small Bone
	Samsung	A8	2015.12	<b>Coolpad</b>	MAX A8-930
	<b>Huawei</b>	Honor 7i		Viaan	V-Eternal 4G
	Tecno	Phantom 5		<b>vkworld</b>	Discovery S2
	Leagoo	Elite 1		<b>Bluboo</b>	Xfire2
	<b>UMI</b>	Fair		Samsung	Galaxy A9
	<b>QiKu</b>	Qihoo 360		Cherry Mobile	Flare Selfie
	<b>Blackview</b>	BV9000		Wickedleak	Wammy Note 5
	<b>ZTE</b>	V5 Pro		iNew	iNew L5
				<b>ZTE</b>	Axon Max
				<b>YU</b>	Yutopia Yu5050
				<b>Bluboo</b>	Bluboo X9
				<b>Lenovo</b>	A7010
				<b>Elephone</b>	M3 Pro
				<b>Gionee</b>	Marathon M5 Plus
				<b>TCL</b>	Play 2
				<b>Huawei</b>	Enjoy 5S
				Panasonic	Eluga Mark
				<b>LeTV</b>	LeMAX Pro

Source: Daiwa

Note: Companies shaded in grey are CrucialTec's customers; companies in bold are China companies

## Earnings outlook

### A turnaround story

**Earnings likely to have turned around in 2015 ...**

As the earnings generated by the mobile case module (MCM) division held by CrucialTec's subsidiary, Samwoo Ems (082660 KS, 32.3% owned), are now recognised as equity method gains after a change in accounting method in August 2015, we forecast CrucialTec's revenue to decline by 4.5% YoY to KRW396.5bn for 2015. However, we forecast an operating profit of KRW13.6bn for 2015, from an operating loss of KRW12.9bn for 2014, backed by strong revenue growth for the FPS division. Given that the company's FPS shipments started to pick up from 3Q15, to 10.7m from 0 in 3Q14, we expect 30m annual FPS shipments for 2015 at ASP of USD6.8.

**... and growth should come through in earnest in 2016**

For 2016, we expect 636.5m (+50.3% YoY) smartphones to be FP-enabled, with a 42% FPS penetration ratio globally, and look for 280m (+190.1% YoY) of these smartphones to be non-Apple/non-Samsung smartphones in 2016.

Based on this, we forecast revenue of KRW568.5bn (+43.4% YoY) for 2016, given that we estimate FPS shipments of 78m (+157.9% YoY) with a 65.3% utilisation ratio, driven by the aggressive pace of FPS adoption by customers, mainly China smartphone makers. We also assume that the company's FPS ASP will decrease by 14.3% YoY to USD5.8 for 2016 as sales volume increases.

We forecast the operating profit to grow by 335.2% YoY to KRW59.1bn (operating profit margin of 10.4%), stemming from the sales-volume growth and falling raw-material costs, as we expect the price of IC chips to fall. We also expect CrucialTec to increase its capacity, from 120m for 2016E to 150m for 2017E, in response to the rising demand for FPS. We also look for a substantial growth in net profit for 2016 to KRW41.4bn from KRW0.9bn for 2015.

#### CrucialTec: earnings forecasts

(KRWbn)	1Q15	2Q15	3Q15	4Q15E	1Q16E	2Q16E	3Q16E	4Q16E	2015E	2016E	2017E
Revenue	92.9	79.5	109.5	114.7	96.9	121.4	177.0	173.3	396.5	568.5	728.3
YoY	-12.9%	-16.2%	1.8%	7.9%	4.3%	52.7%	61.7%	51.1%	-4.5%	43.4%	28.1%
FPS	17.4	20.9	80.9	108.0	89.6	114.5	170.1	167.8	227.2	542.0	703.0
OTP	1.2	0.4	0.4	-	-	-	-	-	1.9	-	-
MFM	0.8	0.2	0.2	0.1	0.4	0.1	0.1	0.1	1.3	0.7	-
PL Lens	5.3	5.3	5.3	5.1	4.8	4.8	4.8	4.3	21.1	18.7	16.3
MCM	65.4	46.5	19.8	-	-	-	-	-	131.7	-	-
Others	2.7	6.2	2.9	1.5	2.0	2.0	2.0	1.0	13.3	7.0	9.0
Operating Profit	0.3	(2.3)	7.0	8.6	8.3	11.5	18.6	20.8	13.6	59.1	81.2
YoY	TB	RR	TB	TB	2278.1%	TB	166.5%	142.5%	TB	335.2%	37.4%
OPM	0.4%	-2.9%	6.4%	7.5%	8.5%	9.4%	10.5%	12.0%	3.4%	10.4%	11.2%
Non OP	(1.7)	(0.9)	(0.3)	(11.0)	(1.5)	(0.0)	0.0	(5.0)	(10.0)	(6.5)	(4.0)
Interest	(1.9)	0.0	0.0	(4.0)	(1.5)	0.0	0.0	(3.0)	(5.9)	(4.5)	(3.0)
Others	0.2	(0.9)	(0.3)	(7.0)	(0.0)	(0.0)	0.0	(2.0)	(4.1)	(2.0)	(1.0)
Net Profit	(1.0)	(2.6)	2.9	(2.4)	5.3	9.0	14.6	12.4	0.9	41.4	59.9
YoY	RR	RR	TB	RR	TB	TB	400.2%	TB	TB	4590.8%	44.6%
NPM	-1.1%	-3.3%	2.7%	-2.1%	5.5%	7.4%	8.3%	7.2%	0.2%	7.3%	8.2%
FX(KRW:USD)	1,100	1,097	1,169	1,158	1,200	1,210	1,220	1,220	1,131	1,213	1,250
Capacity (m)	21	21	30	30	30	30	30	30	102	120	150
FPS shipments (m)	2.2	2.7	10.7	14.8	12.1	15.8	24.5	26.0	30	78	120
YoY	-	-	-	-	445.5%	485.2%	129.0%	75.7%	-	157.9%	53.1%
Utilisation Rate	10.5%	12.9%	35.7%	49.3%	40.3%	52.7%	81.7%	86.7%	29.8%	65.3%	80.0%
FPS ASP(USD)	7.2	7.0	6.5	6.3	6.2	6.0	5.7	5.3	6.8	5.8	4.7
YoY	-	-	-	-	-14.4%	-15.0%	-12.0%	-16.0%	-	-14.3%	-19.0%

Source: Company, Daiwa forecasts

Note: RR means remaining in the red, TB means turning black

## Initiating with a Buy (1) call and TP of KRW24,000

### High growth deserves a high valuation

**Trading at an attractive price, in our view, considering its net-profit growth potential and product**

We initiate coverage of CrucialTec with a Buy (1) rating and 12-month target price of KRW24,000, which is based on an 18.2x 2016E PER, the average 2016E PER of the global FPS players for smartphones (module and packaging companies), based on the Bloomberg-consensus forecasts.

Among the peer group, most of the players have still not established meaningful business yet, with the exception of O-Film, CrucialTec's biggest competitor in the global FPS module market, which has capacity of 120m units a year (the same as CrucialTec). However, instead of applying O-Film's 2016E PER of 26.2x (based on the Bloomberg-consensus forecasts) as our target PER for CrucialTec to derive our target price for the company, we apply the 2016E average of its peer group instead, as we think this is more appropriate. We expect CrucialTec to outperform O-Film in terms of operating margin, EPS growth and ROE in 2016, notwithstanding that it is trading currently at a significant discount to O-Film. We believe one of the main reasons for this is that a significant portion of O-Film's stable earnings growth has come from its strong position in the camera and touch screen module markets, which are 2 areas now on the decline, whereas CrucialTec is now mainly focused on the FPS module market, demand for which should really take off over 2016-17.

#### CrucialTec: peer group

		FPS Module & Packaging								
Company		CrucialTec	O-Film	Xintec	ASE	Primax	Lite-on tech	Holitech Technology	Gen. Interface Solution Holding	Avg
Ticker (Bloomberg)		114120 KS	002456 CH	3374 TT	2311 TT	4915 TT	2301 TT	002217 CH	6456 TT	
Mkt cap (USDm)		289.3	3743.4	234.1	8195.4	504.6	2479.4	2819.8	845.6	
Sales										
	FY15	328.2	3047.2	150.2	8487.6	1931.3	6486.9	1197.5	2748.8	
	FY16	470.6	3648.8	142.7	8987.9	2209.8	6634.1	1928.2	3407.7	
	FY17	602.9	4292.4	N/A	10280.7	2396.2	6913.8	2423.6	4127.9	
OP										
	FY15	11.2	113.2	9.4	739.5	62.8	249.2	87.1	87.5	
	FY16	48.9	160.2	5.0	808.9	77.9	269.0	158.1	125.3	
	FY17	67.2	201.6	N/A	970.5	87.6	288.2	205.8	142.1	
OPM (%)										
	FY15	3.4	3.7	6.2	8.7	3.3	3.8	7.3	3.2	
	FY16	10.4	4.4	3.5	9.0	3.5	4.1	8.2	3.7	
	FY17	11.2	4.7	N/A	9.4	3.7	4.2	8.5	3.4	
NP										
	FY15	0.7	87.6	6.5	581.6	54.4	207.9	70.8	70.7	
	FY16	34.3	133.0	4.8	679.1	63.1	225.8	128.9	93.0	
	FY17	49.6	168.6	N/A	803.0	72.3	246.2	170.2	111.7	
EPS Growth (YoY, %)										
	FY15	N/A	-20.4	-46.8	-19.7	16.4	6.5	126.7	52.0	
	FY16	4,621.4	51.9	-46.8	16.7	16.3	8.6	79.4	29.4	
	FY17	44.6	26.7	N/A	17.2	14.4	9.2	33.6	27.6	
PSR										
	FY15	0.9	1.2	1.6	1.0	0.3	0.4	2.3	0.3	1.0
	FY16	0.6	1.0	1.7	0.9	0.2	0.4	1.5	0.2	0.8
	FY17	0.5	0.9	N/A	0.8	0.2	0.4	1.2	0.2	0.6
P/E (x)										
	FY15	437.5	41.8	20.4	13.9	9.1	11.8	37.9	12.3	21.0
	FY16	9.3	27.5	38.3	11.9	7.8	10.9	21.1	9.5	18.2
	FY17	6.4	21.7	N/A	10.1	6.8	10.0	15.8	7.5	12.0
P/BV (x)										
	FY15	6.0	3.8	N/A	1.7	1.6	1.0	7.8	2.5	3.1
	FY16	3.5	3.4	N/A	1.6	1.4	1.0	5.9	2.1	2.6
	FY17	2.2	3.0	N/A	1.5	1.3	1.0	4.4	1.7	2.2
ROE(%)										
	FY15	1.5	9.5	N/A	12.5	17.5	8.8	20.2	25.1	15.6
	FY16	52.9	13.2	N/A	13.6	18.3	9.3	27.3	25.2	17.8
	FY17	46.4	14.4	N/A	15.0	19.4	10.0	28.1	25.5	18.7
EV/EBITDA (x)										
	FY15	19.2	22.7	N/A	6.2	3.7	3.7	N/A	5.7	8.4
	FY16	6.3	16.6	N/A	6.1	3.0	3.3	N/A	4.8	6.8
	FY17	4.1	13.2	N/A	5.5	2.3	2.8	N/A	3.0	5.4

Source: Bloomberg, Daiwa

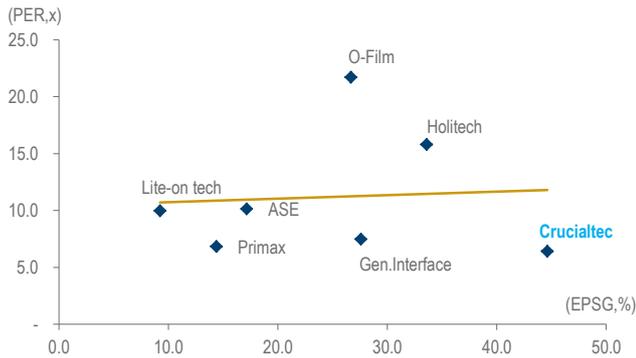
Note: Daiwa forecasts for CrucialTec

**Does not deserve to trade at such a discount to O-Film or even the peer group average**

Comparing CrucialTec with some of its other global peers, CrucialTec stock looks undervalued considering what we regard as the company's strong net-profit growth potential. We believe CrucialTec deserves a valuation premium for its strong EPS growth potential stemming from its newly emerging smartphone component product.

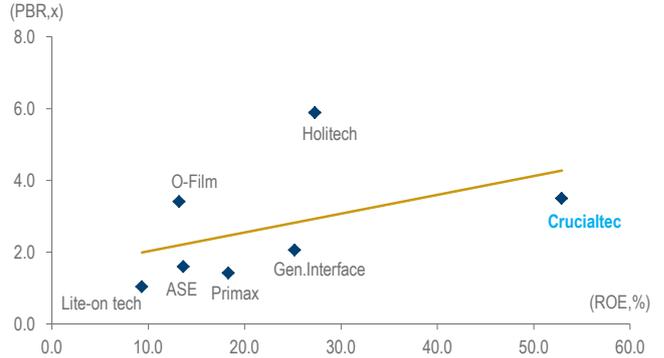
We anticipate CrucialTec stock will be rerated and its valuation gap with peers should narrow once the company starts to record strong earnings growth from 1Q16E.

**CrucialTec: peers PER vs EPS growth (2017E)**



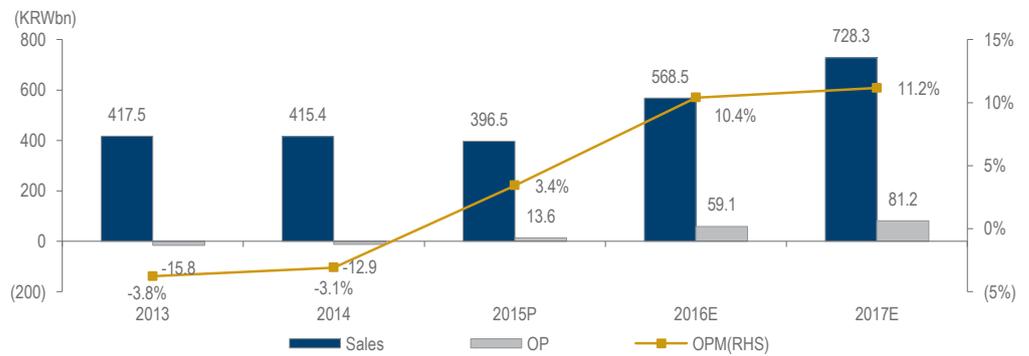
Source: Bloomberg, Daiwa forecasts for CrucialTec

**CrucialTec: peers PBR vs ROE (2016E)**



Source: Bloomberg, Daiwa forecasts for CrucialTec

**CrucialTec: earnings forecasts**



Source: Company, Daiwa forecasts

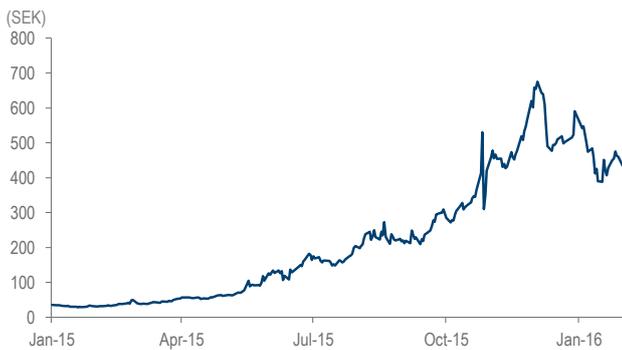
**FPS stocks are hot**

**Why not CrucialTec?**

FPC of Sweden is a pure fingerprint producer that derives 100% of its revenue from the production of fingerprint sensors. CrucialTec was instrumental in FPC's development, having accounted for over 50% of FPC's revenue in 2015. Thanks to CrucialTec turning around in 3Q15, FPC has seen its market cap balloon from USD0.2bn at the beginning of 2015 to USD4.5bn currently. In 2015 alone, its share price rise more than 20-fold.

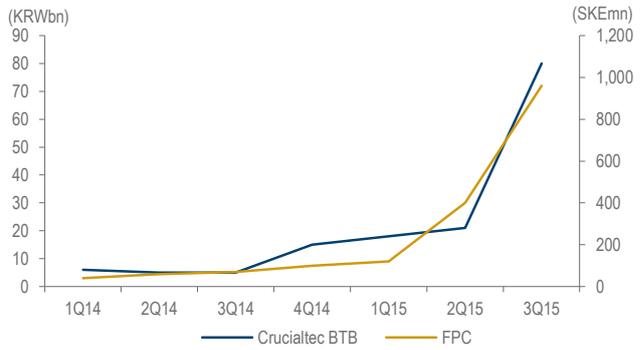
Moreover, given that the share prices of other pure fingerprint players, such as IDEX, Precise Biometrics and Next Biometrics, rose by 4 times, 5 times and 10 times, respectively, for 2015, all indicators point to a surge in FPS players' share prices on the global stock market in 2016. We believe CrucialTec will also show positive share price movements going forward as we expect strong EPS growth and a valuation rerating in 2016.

**FPC: share-price trend**



Source: Bloomberg, Daiwa Research

**Quarterly revenue trends of FPC and CrucialTec's biometric trackpads division**



Source: Bloomberg, Daiwa Research

**Share price trends of IDEX, Precise, Next**



Source: Bloomberg, Daiwa Research

## Company background

### From Blackberry's optical trackpads to Huawei's biometric trackpads

**Used to solely supply optical trackpads to Blackberry**

CrucialTec is a smartphone input solutions manufacturer established in 2001 and listed on the KOSDAQ in 2010. The company initially only supplied optical trackpads (OTP) to Blackberry, but now has a diversified range of products including supplying biometric trackpads (BTP or FPS) to Huawei. Its major products are OTPs, biometric trackpads (BTP), mobile flash modules (MFM), and polarized light (PL) lenses. The major shareholder is the founder and CEO of the company, Gunyong Ahn, who holds a 19% stake.

The company's major subsidiaries are Vietnam CrucialTec Vina (its 100% owned manufacturing subsidiary), smartphone back-cover manufacturer Samwoo Ems (082660 KS, Not Rated, 32.33% owned), IC chip designer Crucialchips (54.45% owned), and FPS algorithm developer Crucialsoft (16.00% owned). Samwoo Ems accounted for 82% of revenue in 2014, but became recognised in equity method gains from August 2015 after a change in accounting methods, which led to a decline in CrucialTec's revenue for 2015.

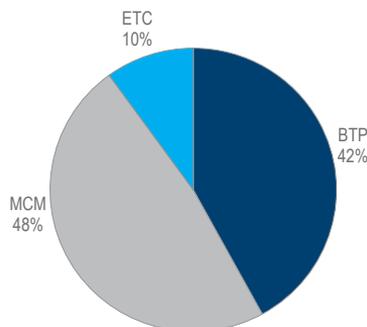
CrucialTec currently has 9.3% diluted shares, of which the founder owns 2.7% of the overhang shares as bonds with warrants.

#### CrucialTec: overhang shares – convertible bonds and bonds with warrants

	Number of shares	Weighting	Strike price	Maturity
CB No.4	655,136	2.1%	7,632	1/28/2018
CB No.6	1,416,731	4.5%	14,117	8/17/2020
BW No.3	851,167	2.7%	8,224	10/9/2017
<b>Overall</b>	<b>2,923,034</b>	<b>9.3%</b>		

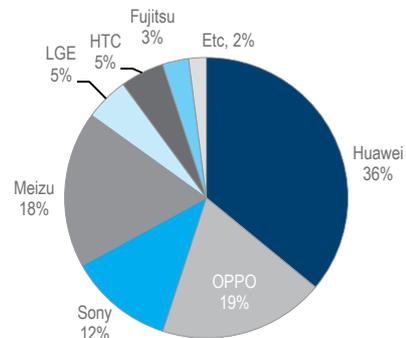
Source: Company, Daiwa Research

#### CrucialTec: revenue proportion by product (3Q15 accumulated)



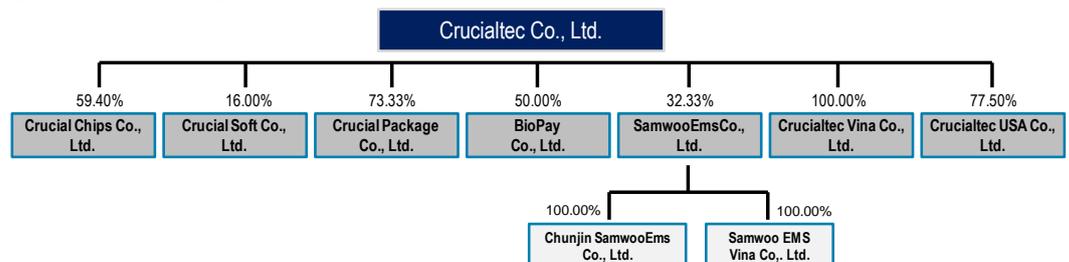
Source: Company, Daiwa Research

#### CrucialTec: revenue proportion by customer (3Q15 accumulated)



Source: Company, Daiwa Research

#### CrucialTec: subsidiaries



Source: Company, Daiwa Research

## Risks to our call

The main risks to our call on CrucialTec are:

- 1) Weak sales by customers: although we anticipate strong shipment growth of ex-Samsung/App FP-enabled smartphones in 2016, if CrucialTec's customers record weak shipments in the smartphone market in 2016, the company may not be able to achieve our earnings forecasts.
- 2) Entry of strong competitors: the entry of competitors with meaningful capacity would pose a threat to CrucialTec. Currently, it has only one competitor in the market: O-Film, and we have not caught wind of any new competitors with meaningful capacity entering the market.
- 3) The emergence of new and different technologies that could replace FPS. Other identification methodologies such as iris sensors may replace FPS, but are not commercialised yet as due to high price and challenges of producing them.

## Appendix: offline mobile payment market and fingerprint sensors

### Samsung Pay to boost offline smartphone payment market in 2016

#### Samsung Pay is off to a successful start in Korea

We believe Samsung Pay could boost the global offline smartphone payment market from 2016 and this trend is likely to continue in the long term. Since Samsung Pay launched its smartphone-based payment service in August 2015 in Korea, it has recorded over 1m domestic subscribers and more than 10m transactions (worth over KRW250bn). Samsung Pay also kicked off its mobile payment service in the US in September 2015 and is expanding into China and Europe in 2016.

#### What is Samsung Pay?

Samsung Pay is a mobile payment service provided by Samsung. It is based on a unique mobile wallet technology known as magnetic secure transmission (MST). This new smartphone-based payment service was launched in August 2015, after Samsung acquired the US-based mobile payment solution start-up, LoopPay, in February 2015. Since then, it has installed MST technology in its high-end smartphone models, such as Galaxy S6 and S6 edge, enabling customers to import their credit-card details into their smartphones so they can settle payments by tagging their smartphones to conventional credit card readers without having to swipe a credit card.

Samsung Pay also applies near field communication (NFC) technology, as does its competitors (Apple and Android Pay). Samsung Pay uses token information, instead of a credit card number for each transaction, and does not leave any transaction records in the smartphone handset. In addition, the payments are made via fingerprint verification and Samsung's mobile security platform (KNOX Solutions supports the highly secured payment service).

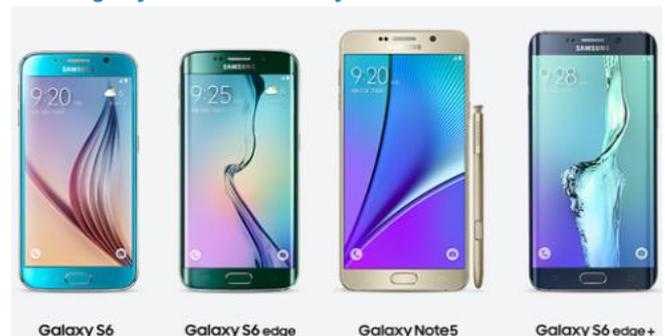
Samsung plans to install Samsung Pay not only in high-end models but also in mid-end models from 2016. Samsung recently launched the mid-end Galaxy A 2016 edition (priced between USD250-300), which supports Samsung Pay.

#### Samsung Pay service



Source: Samsung Electronics, Daiwa Research

#### Samsung Pay available in Galaxy series in 2015



Source: Samsung Electronics, Daiwa Research

### Samsung Pay to go global in 2016

#### Samsung Pay in the US

Beyond Korea, Samsung plans to expand Samsung Pay into the global market, including China, England, Canada, Spain, Singapore, Taiwan, Hong Kong, Brazil and Australia. Samsung Pay started its mobile payment services in the US in September 2015, and thus far, we see that it has appealed to customers and stores more than Apple Pay has. While Apple and Android Pay require a new NFC register to be installed, Samsung Pay supports both NFC registers as well as traditional credit card readers. This ensures that it can be used at 85% of retailers, which account for 30 million stores in the US. The penetration

ratio of NFC-based card readers is only 10% in the US, while that of traditional credit card readers is above 90%. Furthermore, since Apple Pay collects commission fees from store owners for Apple Pay transactions, store owners have been reluctant to adopt Apple Pay.

As a result, Samsung Pay expects to add 10-15m subscribers in 2016, which translates to 0.8-1.2m subscribers per month, while Apple Pay only had an average of 0.4m subscribers per month, with a total of 3.5m subscribers from October 2014 until June 2015.

Samsung Pay has engaged in partnerships with major telecommunications companies in the US, such as AT&T, T-Mobile, Sprint, US Cellular and Verizon. In addition, Samsung Pay has aligned with major card companies such as Visa, Master Card and American Express, and local banks, including Bank of America, Citi and US Bank. It has also allied with 19 more card issuers in the US for its mobile payment services. Samsung also supports Samsung Pay for online shopping which is available on its Galaxy smartphone. By so doing, Samsung gets to compete with PayPal and Visa's Checkout in the US market.

### Samsung Pay in Europe

The Samsung Pay-attached Galaxy A series was released in Europe on in February 2016. The A3 and A5 have already been registered for sale and are priced at EUR329 and EUR429, respectively. The A7 is also slated for release in February 2016. The A5 and A7 contain a finger-scan sensor and MST technology. As such, Samsung Pay is now available in Europe.

#### Comparison between Samsung Pay and Apple Pay



Source: Loop Pay, Daiwa Research

### Samsung Pay in China

Samsung Pay launched in China in 1Q16, and in order to do so, Samsung formed a partnership with the largest credit-card company in China (UnionPay) and is still working on partnerships with a few national banks. In our view, Samsung Pay's business growth potential in China is attributed to its partnerships with UnionPay and Alibaba. Union Pay has a 73% share in the Asia payment market share and this will allow Samsung Pay to be available across 150 countries at over 26m retailers. Moreover, the company's marketing cooperation with Alibaba, which has a 75% share in the e-commerce market in China, will benefit Samsung Pay, in our view. Samsung Pay will be installed in the new Galaxy A series and sold in China from 1Q16.

### Samsung Pay in China



Source: China Business News, Daiwa Research

### Samsung Galaxy A series in China



Source: Samsung Electronics, Daiwa Research

## Major competitors to join the battle

### Competition to spur market growth

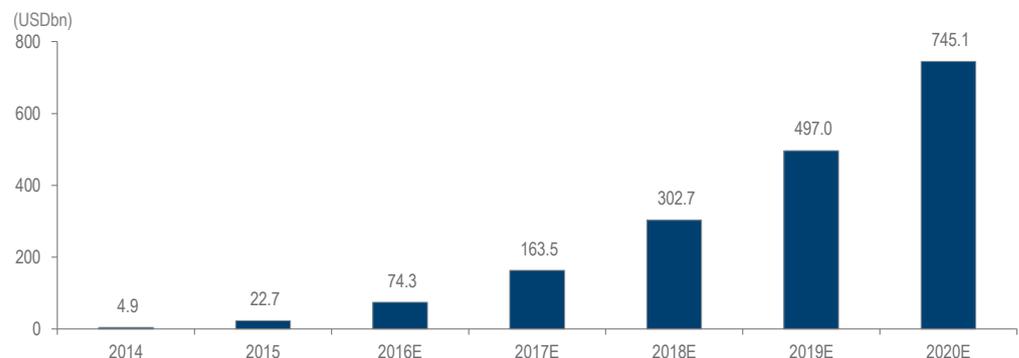
#### Competition will boost FPS adoption

In 2016, we expect a number of global IT companies to join the mobile payment market, and foresee competition heating up. We note that there has been an online-to-offline (O2O) shift in the global payment market. Apple, Google, LG Electronics, Union Pay, Walmart and Swatch have all entered the global payment market; and the word on street is that Xiaomi and Huawei plan to launch similar services.

Although some in the market are concerned that competition in the payment market may become too heated, our upbeat view suggests that the offline mobile-payment market's growth will accelerate as the number of companies in the market rises; and such a cycle has been triggered by Samsung Pay's success, due to its convenient mobile payment method based on MST technology. Moreover, it appears to us that companies are not targeting substantial revenue from payment commission fees, but are rather expecting to enhance the level of loyalty from existing customers, a so-called lock-in effect.

According to Statista (a statistics portal for market data), transactions made through smartphone-based payment services such as Samsung, Apple and Android Pay totalled USD22.7bn in 2015, and are likely to rise by about 100.95% YoY every year to reach USD745.1bn by 2020. Moreover, Statista forecasts that by 2020, the number of subscribers for mobile payment apps will have reached 455.1m, and this would present global IT organisations with a huge incentive to take most of the market share. However, revenue from commission fees may not be that high.

#### Offline mobile payment market



Source: Statista, Daiwa Research

#### 1) Apple (NFC type)

Apple launched its own NFC-based mobile payment service known as Apple Pay in the US in 2014, and expanded to the UK, Australia and Canada in 2015. Apple is planning to enter the payment markets in Hong Kong, Singapore, Spain and China in 2016, according to recent media reports. In China, Apple Pay has formed a partnership with Union Pay, the only credit-card company in China, which will allow those who have iPhones, Apple Watches and iPads to use Apple Pay anywhere in the country. So far, about 15 local banks have agreed to adopt Apple Pay, which is slated to start services in early 2016, as soon as related testing and verifications are done. Apple Pay will be only available on the iPhone 6 or equivalent/higher models.

#### 2) Google (NFC type)

Google also started providing NFC-based Android Pay in September 2015. The strongest competitive advantage that Android Pay has is based on the worldwide penetration of Android phones and its user numbers. Android Pay has expanded its service beyond the US to Australia. Currently, local banks, Domino's Pizza and McDonald's in Australia use Android Pay. LG Electronics recently attached Android Pay to its reference phone with Google, Nexus 5X. Android Pay will be available in Google's most recent operating

system, Marshmallow, and in the previous version, KitKat, on the Nexus 5X. This means that Android Pay will be available on most Android phones globally, as this account for 80% of global smartphones. Its competitors, Apple and Samsung Pay, have only applied the technology to their most recent smartphone models. However, Android Pay will be available on a majority of Android OS-based smartphones globally, likely enabling Android Pay to capture a large share in the global mobile payment market.

### 3) LG Electronics (white card type)

LG Electronics announced LG Pay in January 2016. LG Electronics introduced a 'white card' type payment method also in January 2016 for the first time in the Korea market. The white card type payment method is a payment system that imports credit card information into the white card and synchronises this with smartphone data in order to make payments. An advantage is that LG Pay works via both traditional card readers and NFC devices globally, but a disadvantage may be that a separate white card needs to be carried along with a smartphone at all times.

#### Mobile Pay comparison

	Samsung Pay	Apple Pay	Android Pay	LG Pay
Year of release	Aug-15	Oct-14	Sep-15	Early 2016
Service methodology	NFC, MST	NFC	NFC	White card (Any payment methodology)
Countries available	Korea, US, China, Europe	US, UK, Canada, Australia, China	US, China	Korea

Source: Company, Daiwa Research

### 4) Alibaba (QR code type)

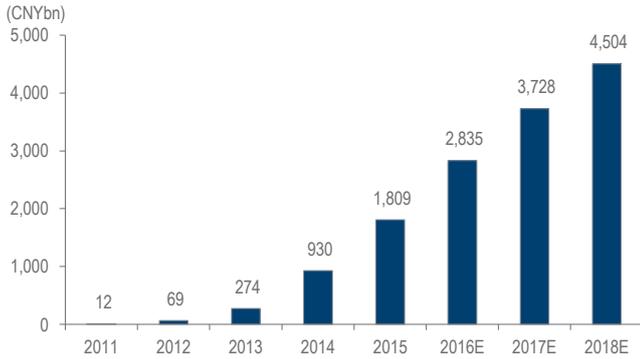
Alibaba currently leads the global mobile payment market, with an over 50% market share and 400m active users. Alipay works like cash in Alibaba's subsidiary online shopping mall, Taobao, as well as at hotels, restaurants and other stores in China. Utility bills such as water and electricity can also be paid via Alipay. It can spread amongst a huge number of customers quickly since it is a QR code type payment method rather than an NFC-based one. However, Alipay works via a smartphone application, and hence, security levels can be low, especially when it comes to the user verification process. Consequently, as Alipay's service and users increase, we expect it to adopt fingerprint verification technology for smartphones in China.

### 5) Union Pay (NFC type)

A giant in China's offline payment market, Union Pay has formed partnerships with Samsung and Apple Pay to compete with Alibaba. Union Pay also launched a mobile payment platform known as QuickPass in conjunction with 20 commercial banks in China. Quickpass's core objective is to draw its existing loyal customers into the online payment market using NFC technology, and China's biggest credit-card company, Union Pay, has an exclusive (99%) market share in the POS-based payment market in China currently.

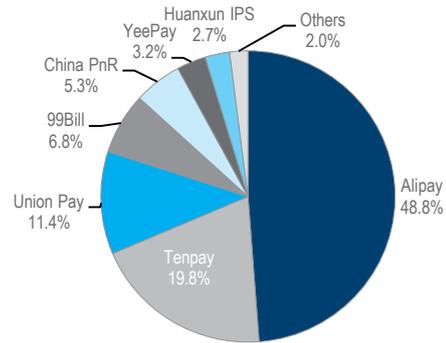
Union Pay was established in 2002 as a China banking card union and since then, has issued 5bn cards across over 40 countries. It is now a global leading credit-card company with a market share on a par with that of Visa and Mastercard. Its notable business growth in China was bolstered after Union Pay introduced QuickPass (which allows payments via smartphones and wearable devices) in 2010. Moreover, according to media reports, Union Pay has been keen to enter the global market, and was ranked No.1 (above Visa and Mastercard) in terms of the number of cards issued in 2014, with a market share of 52%. Union Pay plans to continue to cooperate with other Android online payment technologies.

**China: Gross merchandise volume of the mobile shopping market**



Source: Statista.com, Daiwa forecasts

**China mobile payment market share (2015)**



Source: China Internet Watch, Daiwa

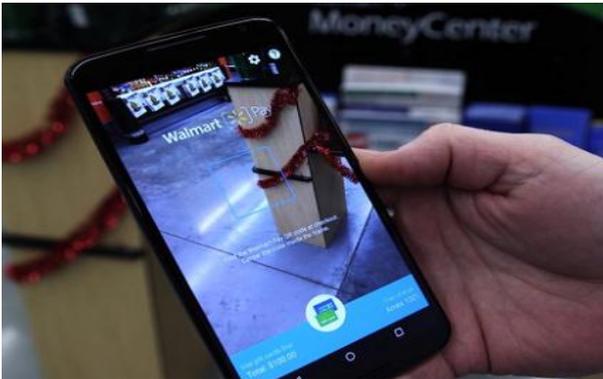
**6) Walmart (QR code type)**

According to the *New York Times*, Walmart recently added a mobile payment system known as Walmart Pay into its own smartphone application. Like Alipay, Walmart Pay is based on QR code technology. This allows shoppers to use the cameras on their smartphones to scan a QR code and pay for purchases instead of swiping a credit card. Users need to register their credit cards on the Walmart website. Walmart is slated to introduce Walmart Pay in February 2016 at its Bentonville store in Arkansas state, and the company has plans for a nationwide launch during 1H16.

**7) Swatch (NFC type)**

The Swatch group launched the payment-function-attached smart watch brand 'Swatch Bellamy' in China in January 2016. For this launch, Swatch entered into contracts with Visa and Union Pay. Swatch Bellamy will soon be released in Switzerland and the US, to compete with the Samsung smart watch and Apple Watch. To enter the global payment market, Swatch has applied for more than 170 smart watch-related patents.

**Walmart Pay**



Source: Walmart, Daiwa

**Swatch 'Bellamy'**



Source: Swatch, Daiwa

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