

Taiwan notebooks

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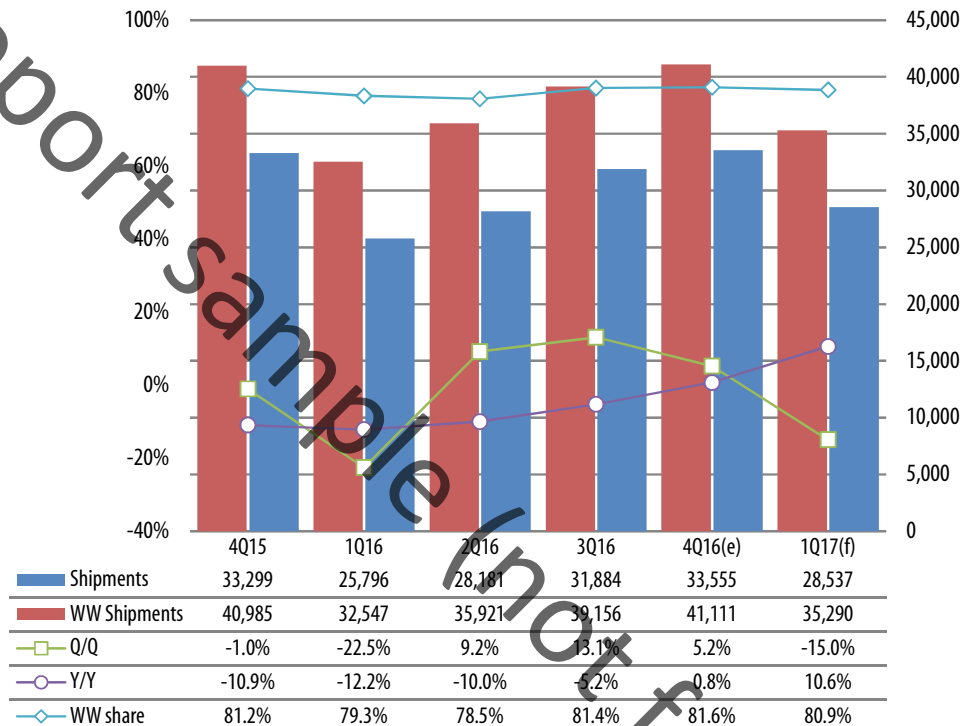
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Introduction

- ✓ Taiwan makers' notebook shipments reached 33.56 million units in the fourth quarter of 2016, rising 5.2% sequentially and 0.8% on year.
- ✓ Taiwan makers' notebook shipments will reach 28.54 million units in the first quarter of 2017, down 15% sequentially but up 10.6% on year.

NOTE: Unless otherwise indicated, all figures and tables in this report refer to output from Taiwan makers.

Chart 1: Notebook shipments, 4Q15-1Q17 (k units)

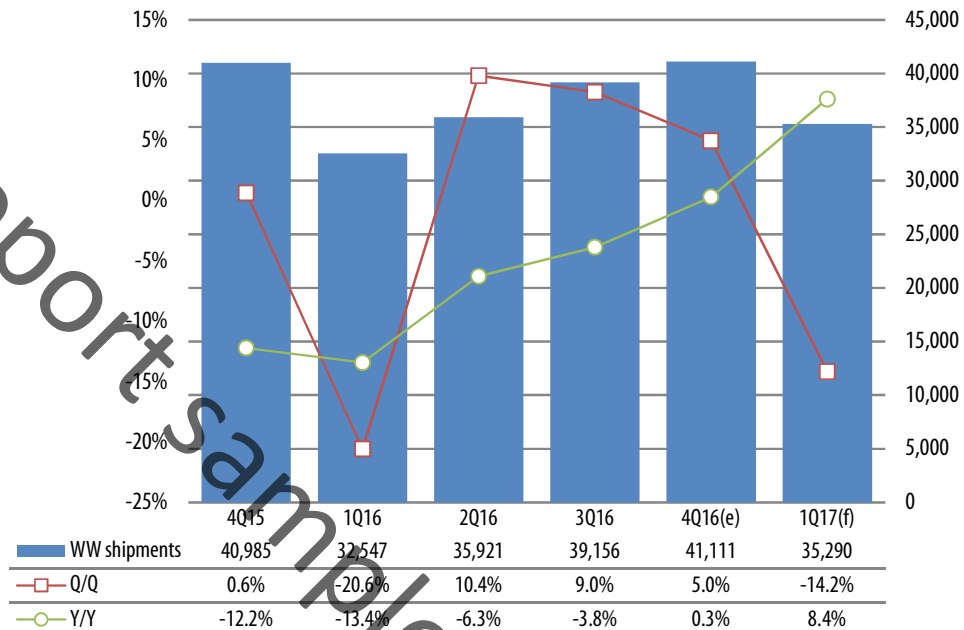


Source: Digitimes Research, February 2017

- ✓ Worldwide notebook shipments saw their first on-year growth in fourth-quarter 2016 since first-quarter 2012, as the notebook market showed signs of a rebound.
- ✓ Shipments were boosted by strong demand from Europe and North America's year-end holiday sales, the release of Apple's new MacBook products, and US-based brand vendors' strong performances. Taiwan makers' notebook shipments reached the peak of the year at 33.56 million units in the fourth quarter of 2016.
- ✓ At the same time, the shortages of components such as display panels and memory also reached their worst in the quarter.
- ✓ Taiwan's notebook shipments are expected to drop 15% sequentially in the first quarter mainly due to seasonality, but the sequential decline will be smaller than that in the same period of last year.
- ✓ Delivery for some brand vendors' orders scheduled for fourth-quarter 2016 has had to be deferred to first-quarter 2017 because of component shortages, which also sent prices rising.
- ✓ Demand for Windows 10-based models from the enterprise sector is expected to increase in the first quarter.

- ✓ New Chromebooks and gaming notebooks released in the first quarter are also expected to help prevent a sharp decline in overall shipments in the first quarter.
- ✓ Taiwan's share of worldwide notebook shipments is expected to shrink 0.7pp in the first quarter as Lenovo has increased its in-house production to satisfy orders for the Lunar New Year holiday period from China.

Chart 2: Worldwide notebook shipments, 4Q15-1Q17 (k units)



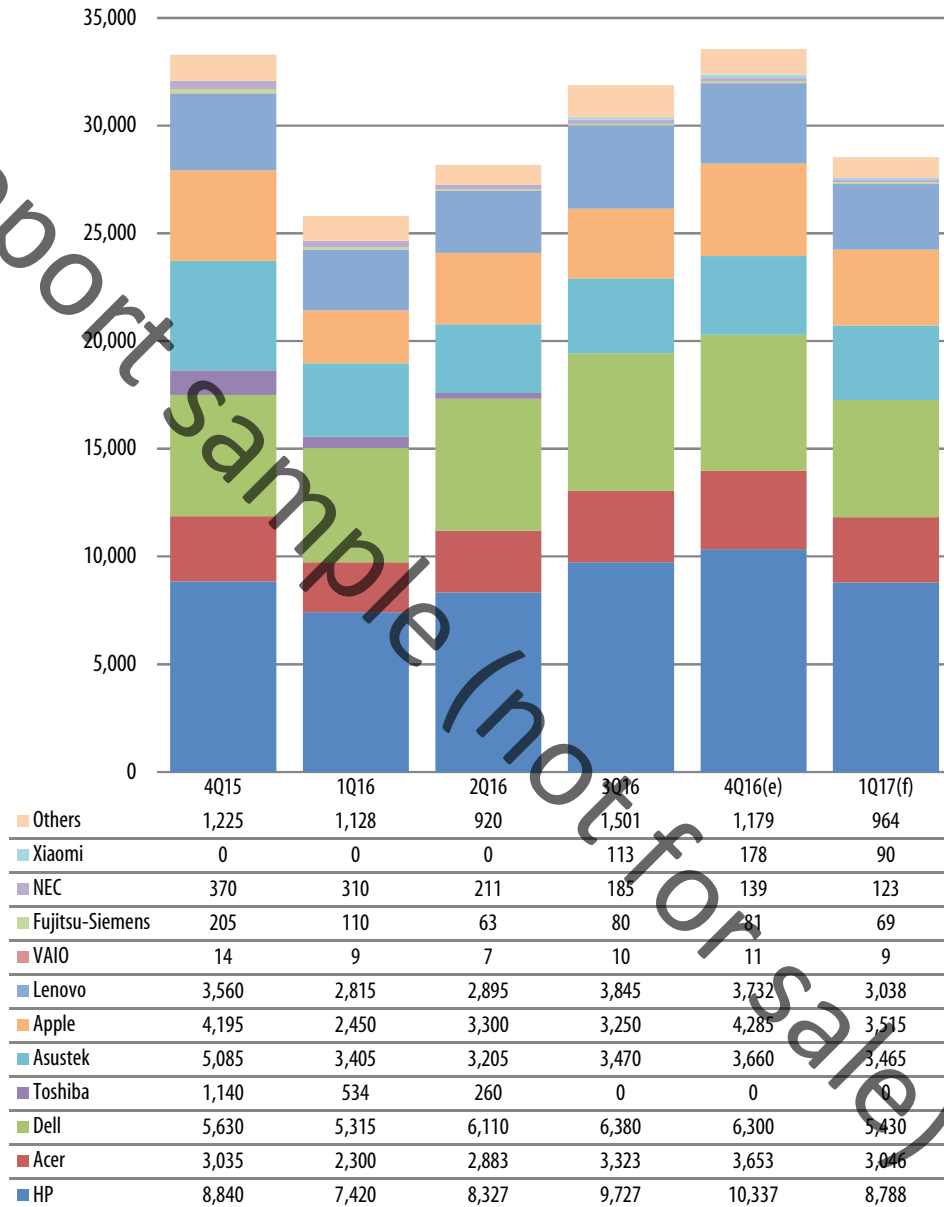
Source: Digitimes Research, February 2017

- ✓ Worldwide notebook shipments surpassed 41.11 million units in the fourth quarter of 2016 with a 0.3% on-year growth.
- ✓ In the first quarter of 2017, the volume is expected to go down by 14.2% sequentially to reach 35.29 million units, a drop that is less steep than that seen in first-quarter 2016.
- ✓ Worldwide notebook shipments will have a smaller sequential decline than that for Taiwan's in the first quarter as China is expected to have better notebook sales than the US and Europe, creating stronger demand for entry-level models made by China-based makers.
- ✓ Worldwide notebook shipments are also expected to achieve on-year growth in the first quarter of 2017.

Shipments breakdown

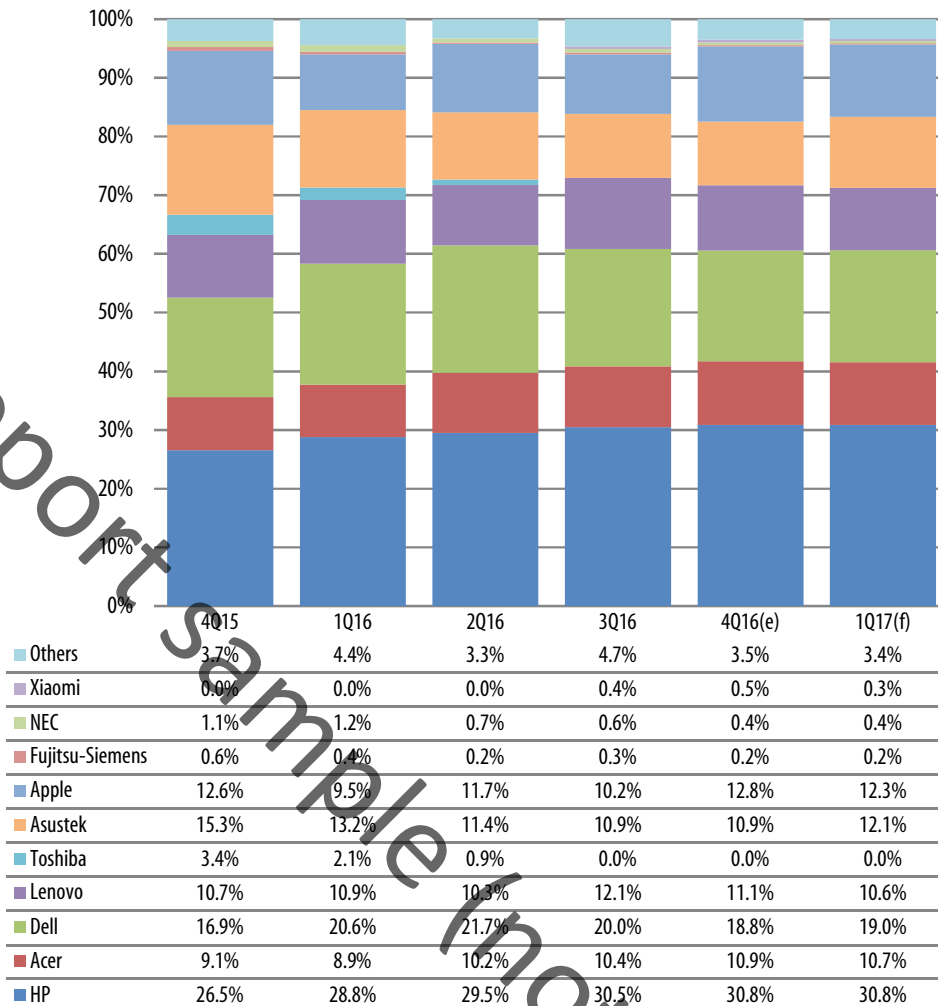
Clients

Chart 3: Notebook shipments to top-10 clients, 4Q15-1Q17 (k units)



Source: Digitimes Research, February 2017

Chart 4: Notebook shipment share by top-10 clients, 4Q15-1Q17

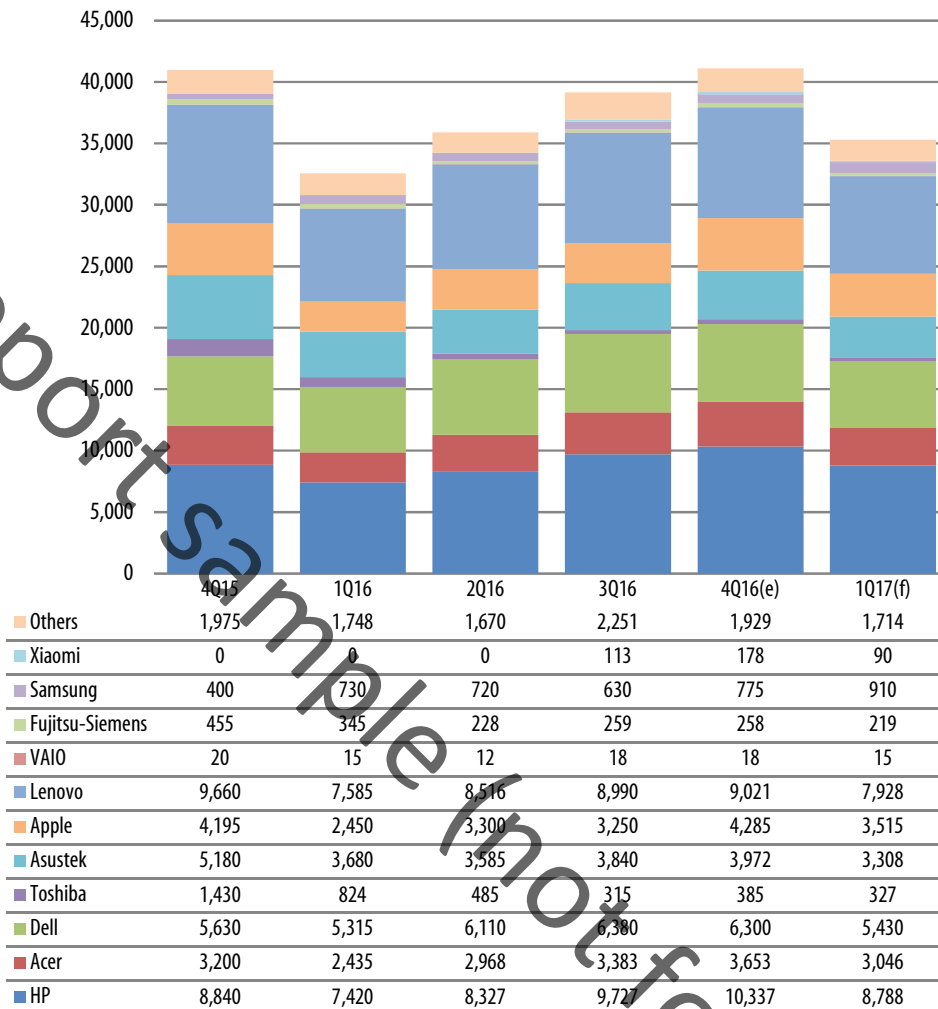


Source: Digitimes Research, February 2017

- ✓ Apple surpassed Lenovo to become the third-largest client of Taiwan's notebook makers in the fourth quarter of 2016, while Xiaomi surpassed NEC to rank seventh.
- ✓ Hewlett-Packard's (HP) notebook shipments surpassed 10 million units in the fourth quarter of 2016 with its share of Taiwan's notebook shipments remaining at above 30% and staying as the largest client of Taiwan makers.
- ✓ HP's shipments to the consumer and enterprise segments were both better than expected in the fourth quarter of 2016, while its share in China's notebook market was on the rise.
- ✓ Dell's shipments were down slightly from a quarter ago in the fourth quarter of 2016, but the volume was higher than that of the same quarter a year ago. The on-year growth was due to Dell's strong shipments in both small- to medium-size enterprise and consumer segments.
- ✓ Apple released its new MacBooks at a much later time than originally expected and the notebooks' high prices and weak battery performance are expected to impact their demand. But Apple still placed aggressive orders for the products for the fourth quarter of 2016.
- ✓ In the first quarter of 2017, Acer will become the fifth-largest client of Taiwan makers, surpassing Asustek Computer. Asustek's shipments are expected to decrease in the first quarter due to the vendor's strong focus on 2-in-1 devices, which are considered by Digitimes Research as tablets and increasing notebook outsourcing to China-based makers.

- ✓ Huawei's notebook orders that have been outsourced to Taiwan makers will not enter mass production until March and become available in the market until April.

Chart 5: Global top-10 vendors' shipments, 4Q15-1Q17 (k units)



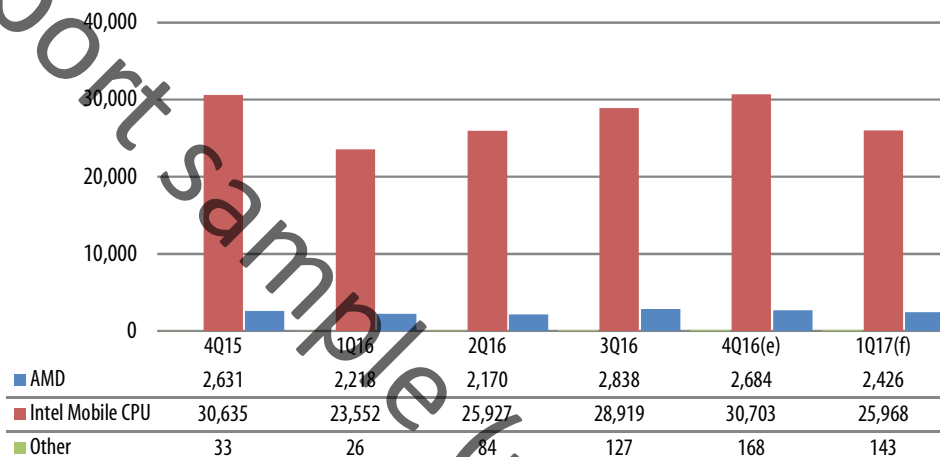
Source: Digitimes Research, February 2017

- ✓ The worldwide top-4 notebook vendors did not see any change in terms of ranking in the fourth quarter of 2016, but HP had widened its shipment lead on Lenovo.
- ✓ Lenovo continued suffering from high inventory in the retail channel in the fourth quarter of 2016 and the surging component prices also slowed down the company's pace on creating new notebook projects.
- ✓ On the other hand, in addition to its rapid expansion in Europe and North America's notebook markets, HP had also been aggressively promoting specially designed notebooks via China's retail and online shopping channels, allowing the US-based vendor to further penetrate into the market.
- ✓ However, Lenovo is expected to narrow its shipment gap with HP in the first quarter of 2017 thanks to demand during the Lunar New Year holidays. Currently, over 40% of Lenovo's shipments are supplied to China's notebook market and demand during the Lunar New Year holidays will benefit the China-based vendor most.
- ✓ Dell's notebook shipments are expected to drop 13.8% sequentially in the first quarter, but the company is seeing increasing demand for Chromebooks and from North America's enterprise sector.

- ✓ Although Asustek is expected to focus on pushing gaming notebooks in Asia, weakening demand for mainstream consumer notebooks will still take its toll on the Taiwan-based vendor, who is expected to see a 16.7% sequential decline in first-quarter notebook shipments.
- ✓ Samsung Electronics will be the only top-11 vendor to enjoy a sequential shipment growth in the first quarter thanks to new Chromebooks, ultra-thin notebooks and gaming notebooks that were unveiled at CES 2017.
- ✓ For non-top-11 vendors, Taiwan-based Clevo and China-based regional vendors, which mainly focus on China's gaming market, will also benefit from the Lunar New Year holiday demand.

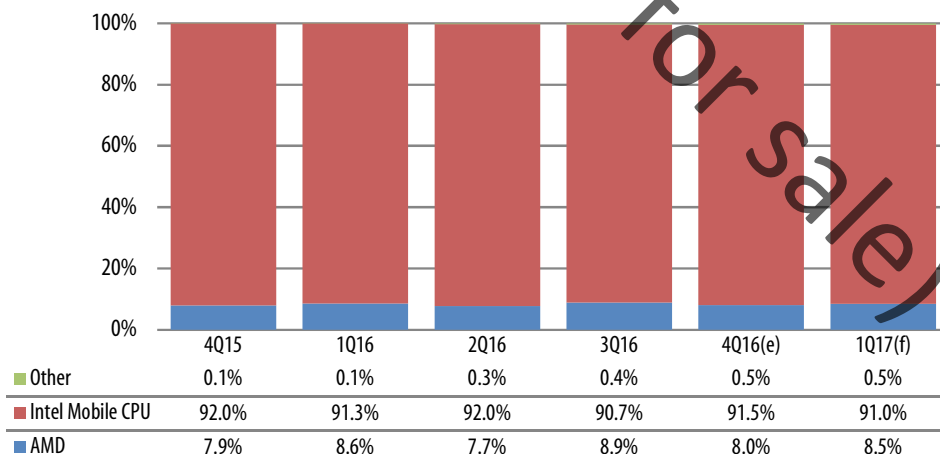
CPUs

Chart 6: Notebook shipments by CPU, 4Q15-1Q17 (k units)



Source: Digitimes Research, February 2017

Chart 7: Notebook shipment share by CPU, 4Q15-1Q17

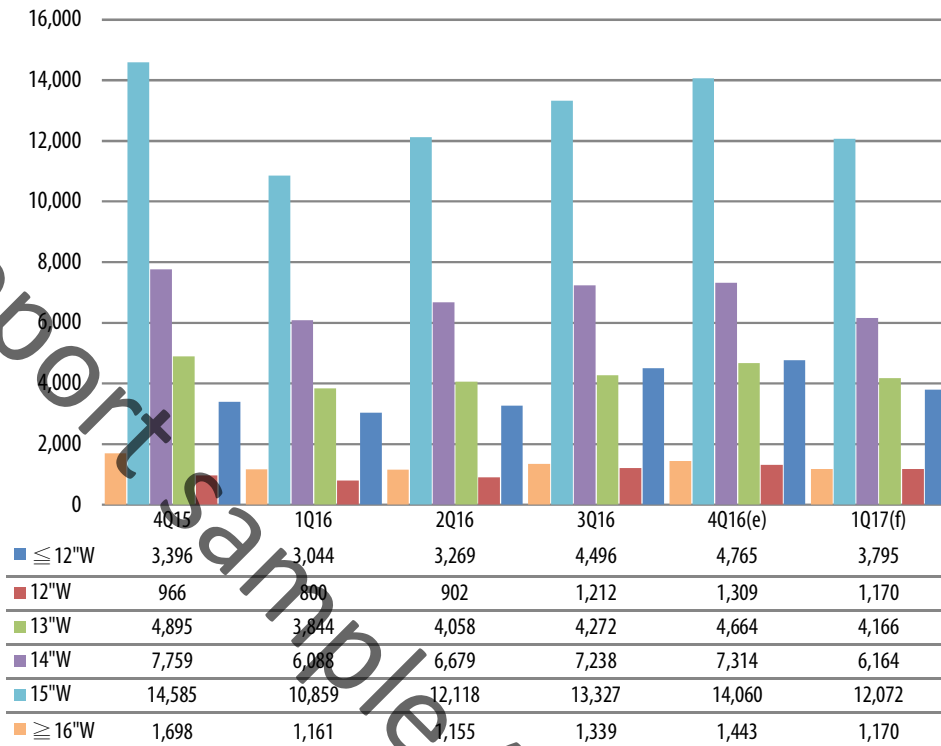


Source: Digitimes Research, February 2017

- ✓ Chromebooks using non-Intel solutions had better shipment performance than expected, pushing shipments to the "Other" segment to grow 32.3% sequentially in the fourth quarter of 2016.
- ✓ Increasing demand for entry-level notebooks from Asia and Microsoft's free Windows licensing plan for inexpensive notebooks will allow AMD-based notebooks to achieve a smaller sequential shipment decline than Intel-based ones.

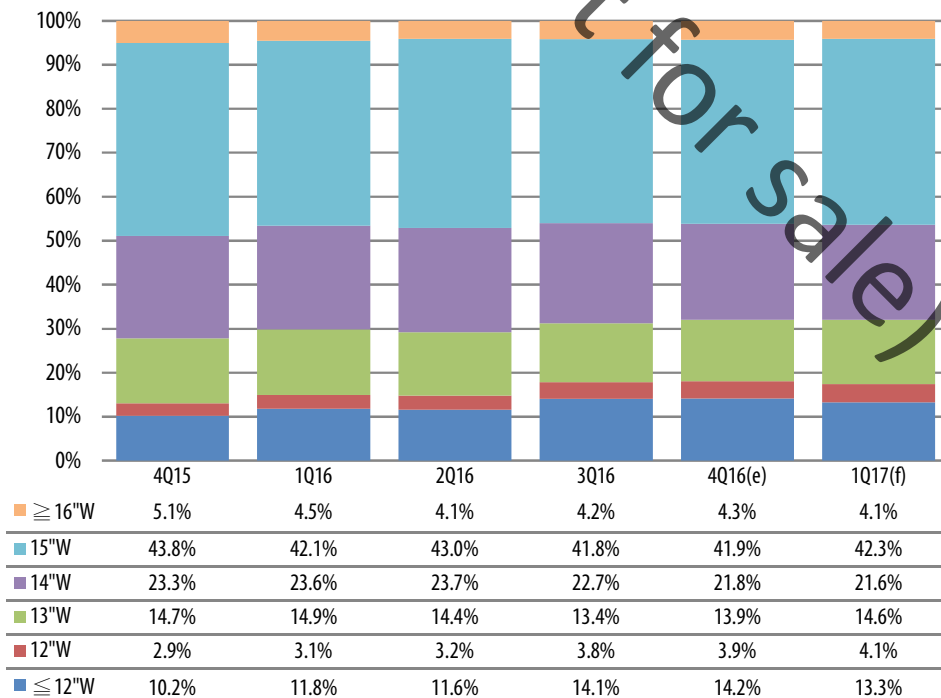
Screen size

Chart 8: Notebook shipments by screen size, 4Q15-1Q17 (k units)



Source: Digitimes Research, February 2017

Chart 9: Notebook shipment share by screen size, 4Q15-1Q17

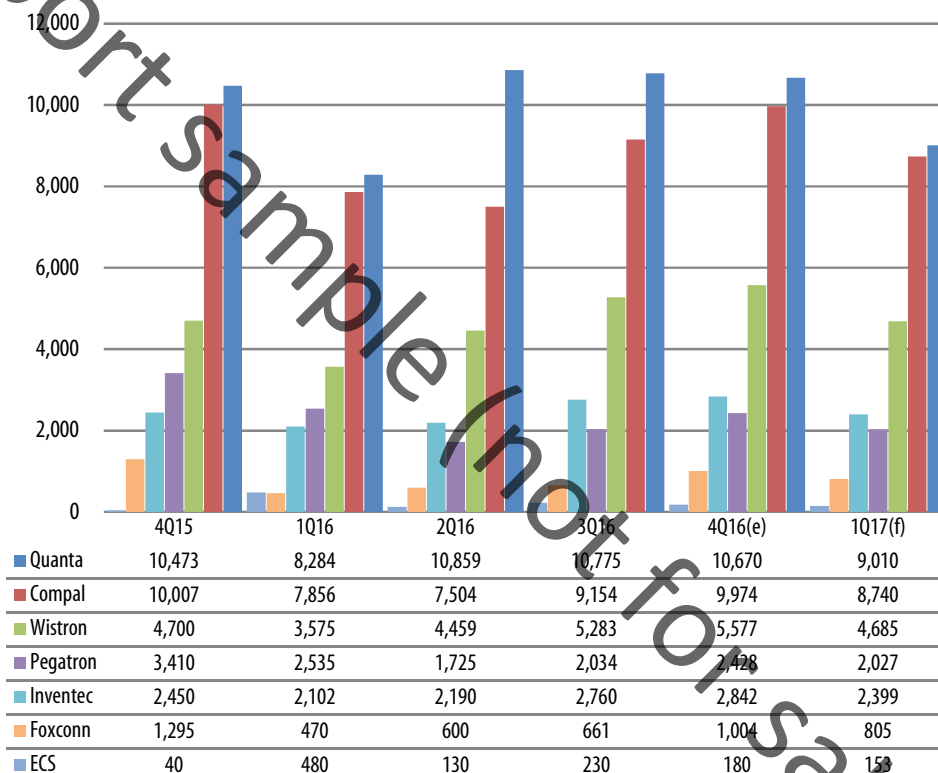


Source: Digitimes Research, February 2017

- ✓ Shipments of 13-inch notebooks had the strongest growth in the fourth quarter of 2016 mainly because Apple shifted its focus to pushing its 13.3-inch notebooks, which accounted for 75% of the company's notebook shipments in the quarter.
- ✓ Taiwan's 14-inch notebook shipments grew slightly by 1% on quarter in the fourth quarter of 2016 since the size was the most popular choice outside of the high-end gaming and ultra-thin models.
- ✓ Thanks to Apple's new MacBooks, 13-inch notebook shipments are expected to see only a 10.7% sequential drop in the first quarter of 2017, a drop that is smaller than Taiwan's overall sequential shipment decline. Other vendors are also becoming more aggressive about adopting 13-inch displays for their new Chromebooks for the first quarter. Xiaomi's new notebook also uses a 13-inch display.

Makers

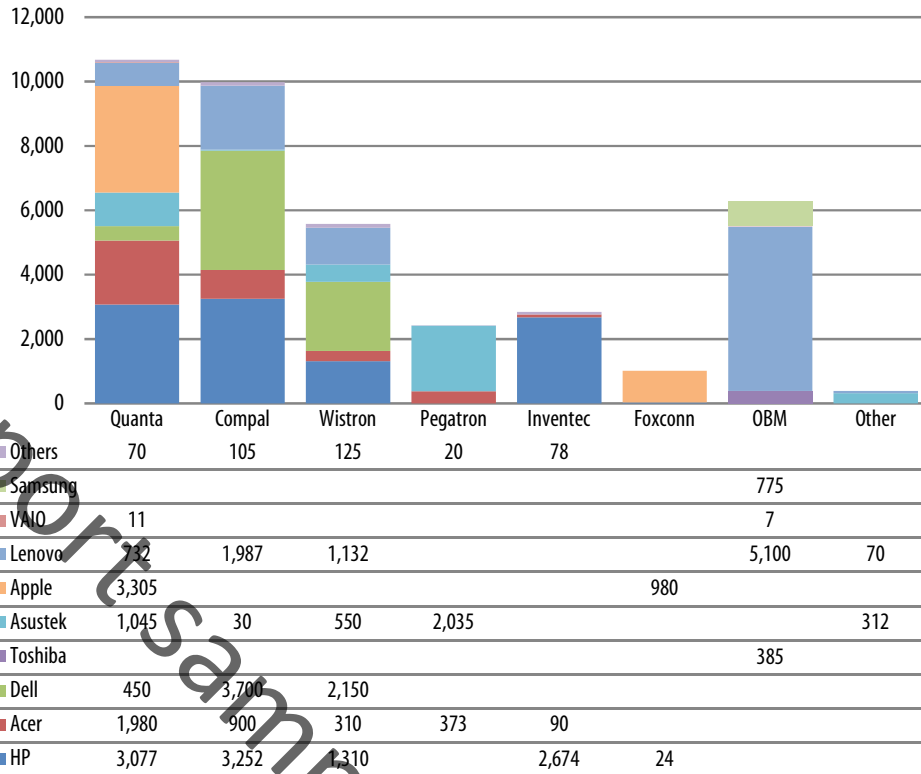
Chart 10: Top makers' notebook shipments, 4Q15-1Q17 (k units)



Source: Digitimes Research, February 2017

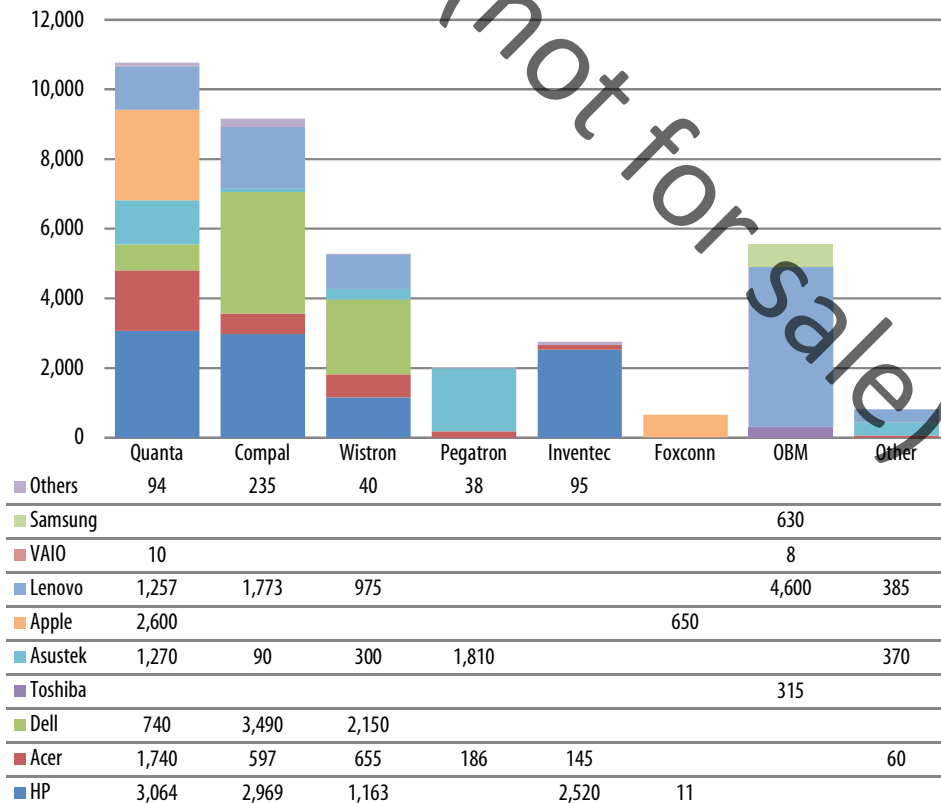
- ✓ With the exception of Quanta Computer and Elitegroup Computer Systems (ECS), all Taiwan-based notebook makers enjoyed sequential shipment growths in the fourth quarter of 2016.
- ✓ Although Quanta landed strong orders from Apple for the fourth quarter of 2016, orders from Lenovo and Dell both went down dramatically.
- ✓ Compal's top-3 clients all increased their orders to the maker in the fourth quarter of 2016, helping Compal's shipments reach slightly less than 10 million units.
- ✓ The gap between Quanta and Compal is expected to narrow to less than 300,000 units in the first quarter of 2017. HP and Dell will continue to outsource a majority of their orders to Compal, their top supplier, in the first quarter. This will allow Compal to catch up with HP.
- ✓ Quanta will continue to see strong orders from Apple, but sharp decreases in orders from Taiwan-based vendors will undermine its shipment performance in the first quarter.

Chart 11: Vendor-maker partnership, 4Q16 (k units)



Source: Digitimes Research, February 2017

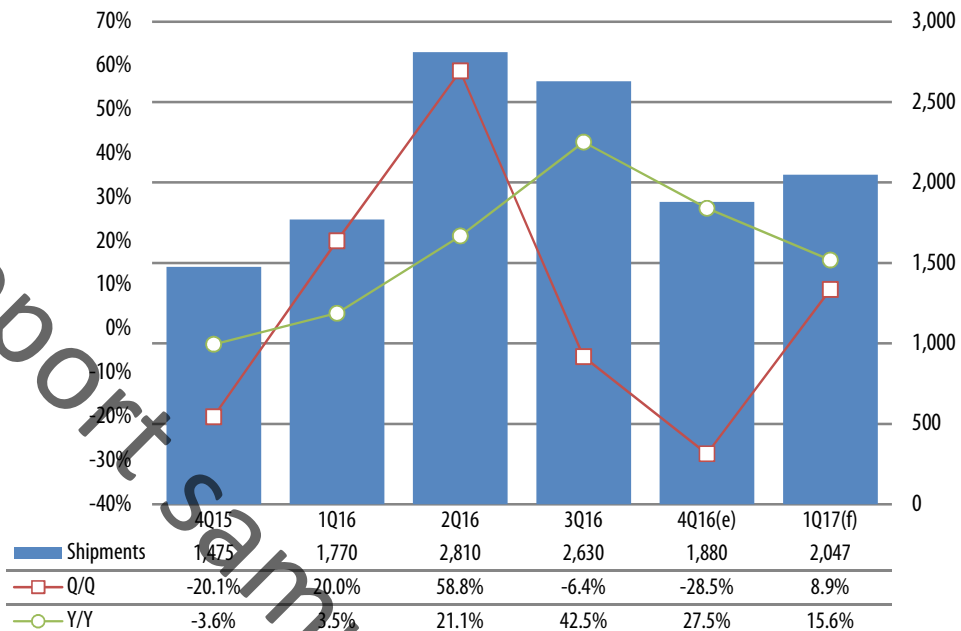
Chart 12: Vendor-maker partnership, 3Q16 (k units)



Source: Digitimes Research, February 2017

Chromebook

Chart 13: Chromebook shipments, 4Q15-1Q17 (k units)



Source: Digitimes Research, February 2017

- ✓ Worldwide Chromebook shipments were worse than Digitimes Research's previous estimates mainly because component shortages were much worse than expected, prompting first-tier brand vendors to turn their focus to mainstream and high-end Windows notebooks with higher profits.
- ✓ Acer returned as the largest Chromebook vendor worldwide in terms of shipments in the fourth quarter of 2016, shipping about 700,000 units.
- ✓ Acer's new mid-range and high-end Chromebooks enjoyed strong demand in Europe and the US in the fourth quarter, which strongly drove the vendor's Chromebook shipment performance in the consumer sector. Its pricing strategy for the education sector also earned the company decent orders.
- ✓ Dell, HP and Lenovo saw their Chromebook shipments shrink to less than 300,000 units each in the fourth quarter of 2016.
- ✓ Chromebook shipments are expected to enjoy growth both on quarter and on year in the first quarter of 2017 as first-tier vendors will start releasing new Chromebooks. The number of their new models is also expected to be a lot more than that of the first quarter 2016.
- ✓ In addition to entry-level models for the education sector, the number of mid-range and high-end models targeting the small- to medium-size enterprise and consumer sectors will also increase dramatically.
- ✓ Shipments to the US education sector will only see limited growth, but shipments to the small- to medium-size enterprise and consumer sectors are expected to grow rapidly.

Important factors

Components

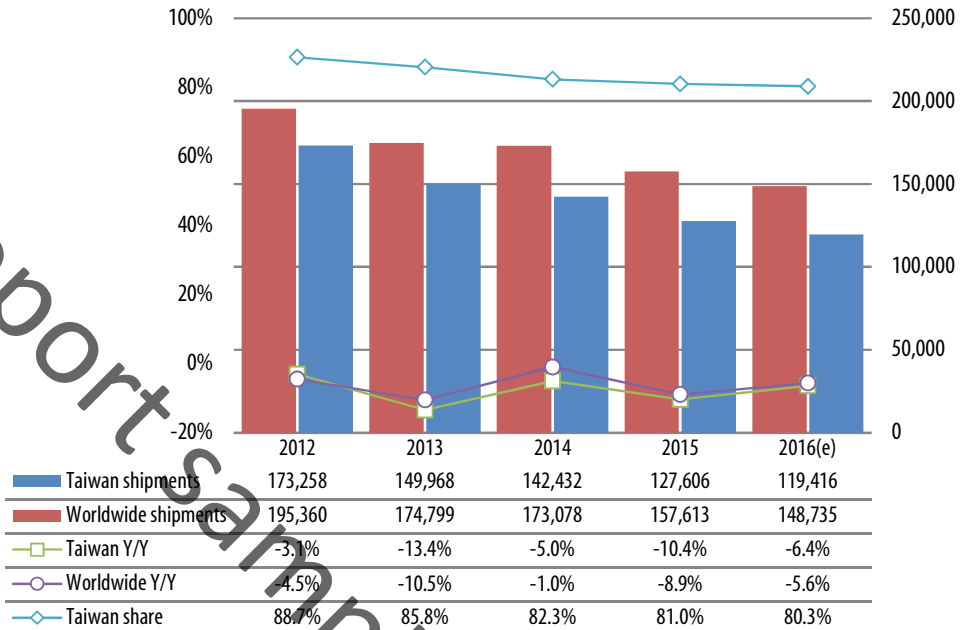
- ✓ Over 40% of Intel-based notebooks are expected to be using Kaby Lake-based CPUs in the first quarter thanks to strong demand for ultra-thin and gaming notebooks.
- ✓ LCD panels, DRAM and solid state drives (SSD) were in shortages in the fourth quarter of 2016, causing their prices to rise. Panels and SSDs will continue to see price increases in first-quarter 2017.
- ✓ Panel prices were up by more than 10% sequentially in the fourth quarter of 2016 and will grow by single-digit percentages in the first quarter.
- ✓ DRAM, which had a significant increase in pricing in the fourth quarter of 2016, will not see a dramatic change in pricing in the first quarter.
- ✓ High-capacity SSD is also expected to see a single-digit percentage boost in first-quarter prices.

Microsoft's Chromebook strategy

- ✓ Because of the increasing competition from Chromebooks in the small and medium business (SMB) market in 2016, Microsoft is planning to offer a version of Windows 10 for free to fight off Chromebooks' challenge.
- ✓ Chromebooks' penetration in the SMB market greatly increased in 2016 thanks to its pricing advantages. This has brought strong pressure on Microsoft.
- ✓ Windows 10 Creators Update, an upgrade with mixed reality (MX) and 3D creation tools, will be available in March, but the new system is unlikely to greatly affect the market until the second quarter of 2017.

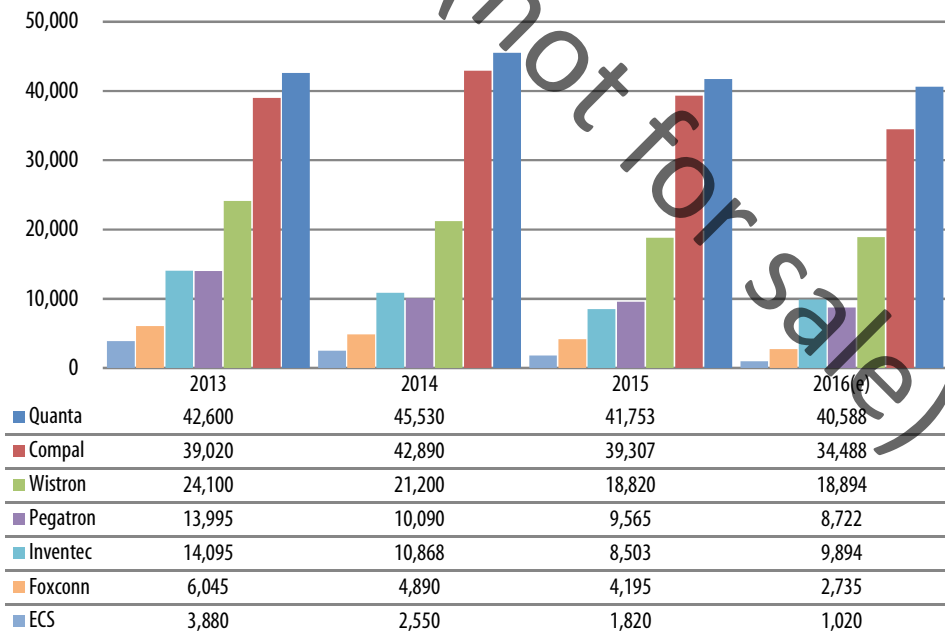
Annual shipments

Chart 14: Taiwan and worldwide notebook shipments, 2012-2016 (k units)



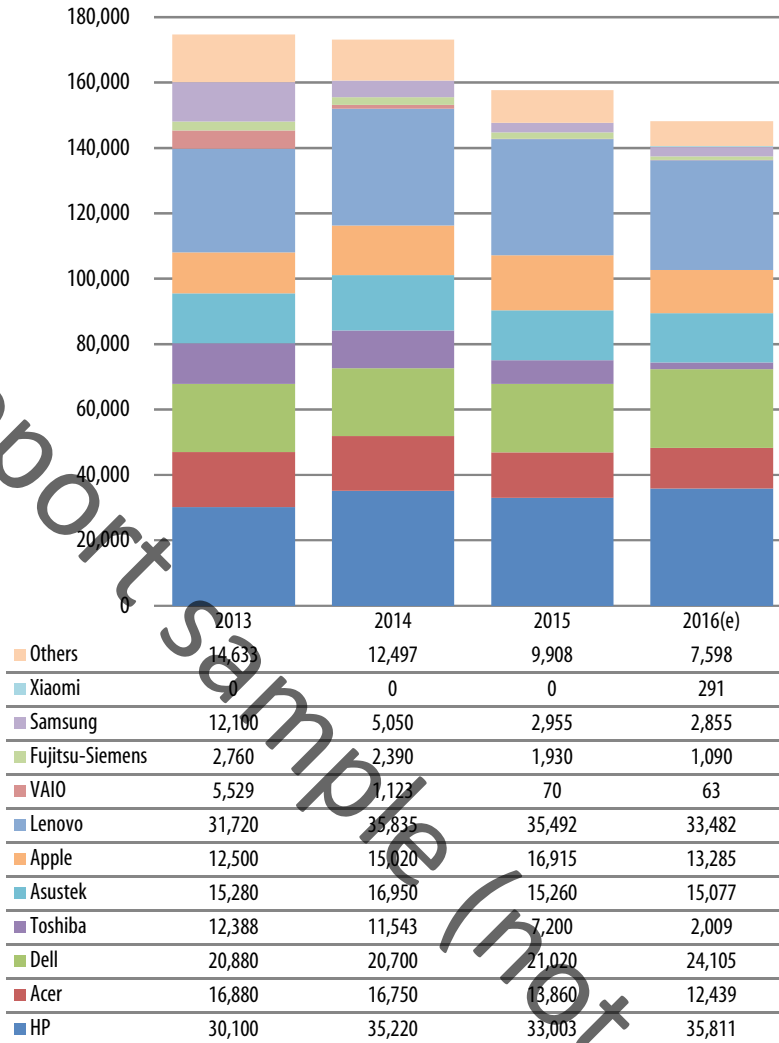
Source: Digitimes Research, February 2017

Chart 15: Top makers' shipments, 2013-2016 (k units)



Source: Digitimes Research, February 2017

Chart 16: Global top-11 vendors' shipments, 2013-2016



Source: Digitimes Research, February 2017