Benchmarks for tablets give a representative view of device performance. When purchasing a tablet, consumers can use benchmark results that measure battery life, graphics performance, and processor power to better understand these important and varied capabilities. In our hands-on testing at Principled Technologies, we measured the performance of 18 Android™ tablets, 15 Microsoft Windows 8.1 tablets, and three Apple iOS tablets. The tablets varied in size and were from multiple brands. We used an assortment of benchmarks to produce scores for the devices. In terms of processor, 22 tablets were powered by Intel, nine had ARM processors, one had a Samsung Exynos processor, three had Qualcomm processors, and one had a MediaTek processor.

TABLETS WE TESTED

For presenting our test results, we separated the tablets into publicly available price-based categories. These prices are in US dollars. For detailed information about the tablets we tested, see Appendix A. Figure 1 shows the tablets we tested priced up to $250.

	Processor make	Operating system (OS)
Acer Iconia A1-810-L615	ARM	Android 4.4.2
Acer Iconia A1-830-1633	Intel®	Android 4.2.2
Acer Iconia W4	Intel	Windows 8.1
Amazon® Kindle Fire HD	ARM	Android Fire OS 11.3.2.4
Amazon Kindle Fire HDX	Qualcomm	Android Fire OS 13.3.2.4
Asus MeMO Pad 7 ME176CX-A1-WH	Intel	Android 4.2.2
Asus MeMO Pad 8 ME180A-A1-WH	ARM	Android 4.2.2
Asus MeMO Pad 8 ME181C-A1-BK	Intel	Android 4.4.2
Dell™ Venue™ 7	Intel	Android 4.4.2
Dell Venue 8	Intel	Android 4.4.2
Dell Venue 8 Android	Intel	Android 4.4.2
Dell Venue 8 Pro	Intel	Windows 8.1
HP 8 1401	ARM	Android 4.4.2
Lenovo® IdeaTab™ A3000	ARM	Android 4.2.2
Lenovo Miix2	Intel	Windows 8.1
Samsung® Galaxy Tab® 3	ARM	Android 4.1.2

Figure 1: General information about the tablets we tested priced up to $250.

Figure 2 shows the tablets we tested priced at $251 to $299.

	Processor make	Operating system (OS)
Acer Iconia A3-A10-L662	MediaTek	Android 4.2.2
Apple iPad Mini	ARM	iOS 7.1.2
Asus Transformer Pad TF103C	Intel	Android 4.2.2
Samsung Galaxy Tab 4	Qualcomm	Android 4.4.2

Figure 2: General information about the tablets we tested priced $251 to $299.

Figure 3 shows the tablets we tested priced at $300 to $399.

	Processor make	Operating system (OS)
Apple iPad Mini with Retina Display	ARM	iOS 7.1.2
Asus Transformer Book T100	Intel	Windows 8.1
Asus VivoTab Note 8 M80TA-B1-BK	Intel	Windows 8.1
Samsung Galaxy Tab PRO 8.4	Qualcomm	Android 4.4.2

Figure 3: General information about the tablets we tested priced $300 to $399.

Figure 4 shows the tablets we tested priced at $400 to $598.

	Processor make	Operating system (OS)
Apple iPad Air	ARM	iOS 7.1.2
BYD T11B	Intel	Windows 8.1
Dell Venue 11 PRO	Intel	Windows 8.1
HP Pro Tablet 610 G1	Intel	Windows 8.1
Lenovo ThinkPad 8	Intel	Windows 8.1
Lenovo Yoga 2	Intel	Windows 8.1
Samsung Galaxy Note 10.1	Samsung	Android 4.3

Figure 4: General information about the tablets we tested priced $300 to $399.

Figure 5 shows the tablets we tested priced at $599 and up.

	Processor make	Operating system (OS)
Dell Venue 11 PRO	Intel	Windows 8.1
HP ElitePad 1000 G2	Intel	Windows 8.1
Lenovo ThinkPad 10 64 GB	Intel	Windows 8.1
Lenovo ThinkPad 10 128 GB	Intel	Windows 8.1
Microsoft Surface Pro 3	Intel	Windows 8.1

Figure 5: General information about the tablets we tested priced $300 to $399.

BENCHMARKS WE USED

In addition to measuring the battery life of each device while browsing the Web, we ran the following benchmarks to test the tablets:

- Futuremark® 3DMark®
- GeekBench 3, Single-core and Multi-core
- Basemark OS II
- Passmark® PerformanceTest™ Mobile
- WebXPRT 2013

We ran each test three times and report the median of the runs. For detailed testing steps, see Appendix B.

BATTERY LIFE COMPARISON

Many consumers consider battery life to be a crucial feature when purchasing a tablet. We measured battery life by running down the battery of each tablet while browsing the Internet with a the default Web browser.

Up to $250 price range

Figure 6 shows the results of the battery life test for tablets up to $250. The Intel processor-powered Acer Iconia W4 had the longest battery life at 9 hours and 31 minutes and the ARM processor-powered HP 8 1401 had the shortest battery life at 4 hours and 1 minute.

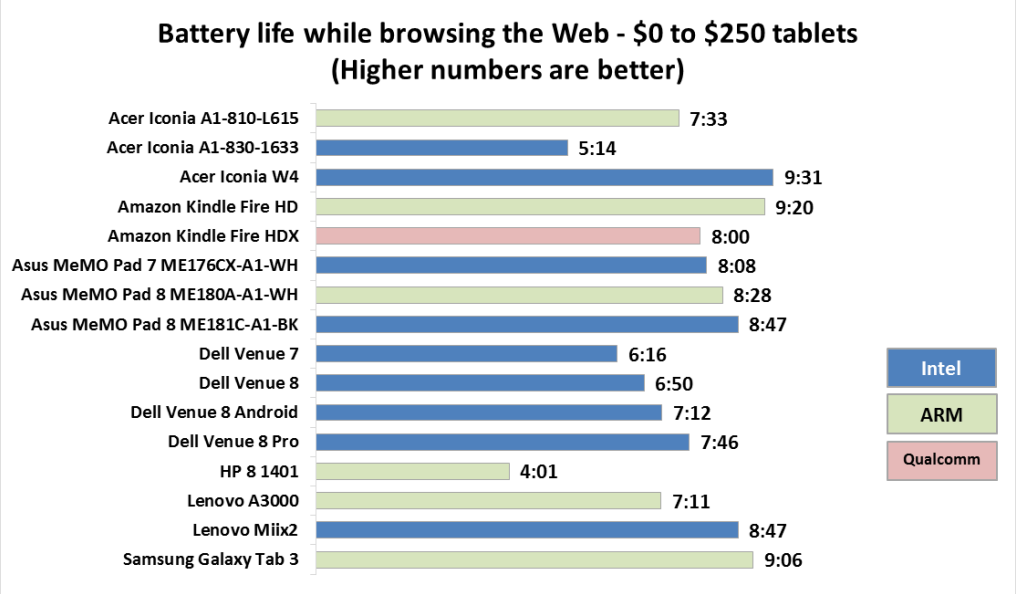


Figure 6: The battery life of each tablet while browsing the Web in hours and minutes.

$251 to $299 price range

Figure 7 shows the results of the battery life test for tablets priced at $251 to $299. The Samsung Galaxy Tab 4 had the longest battery life at 10 hours and 5 minutes and the Intel processor-powered Asus Transformer Pad TF103C had the shortest battery life at 7 hours and 14 minutes.

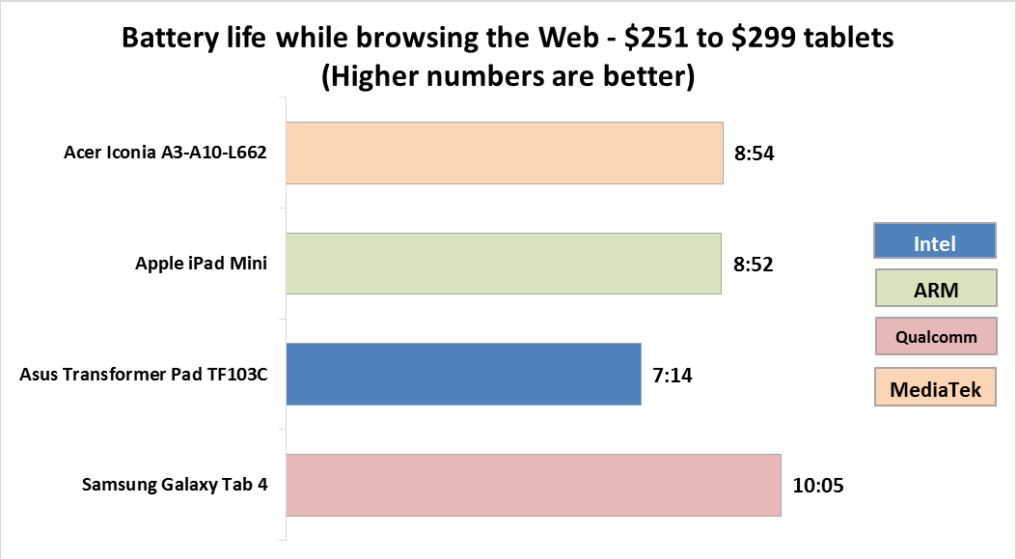


Figure 7: The battery life of each tablet while browsing the Web in hours and minutes.

$300 to $399 price range

Figure 8 shows the results of the battery life test for tablets priced at $300 to $399. The Intel processor-powered Asus Transformer Book T100 had the longest battery life at 10 hours and 14 minutes and the Intel processor-powered Asus VivoTab Note 8 had the shortest battery life at 8 hours.

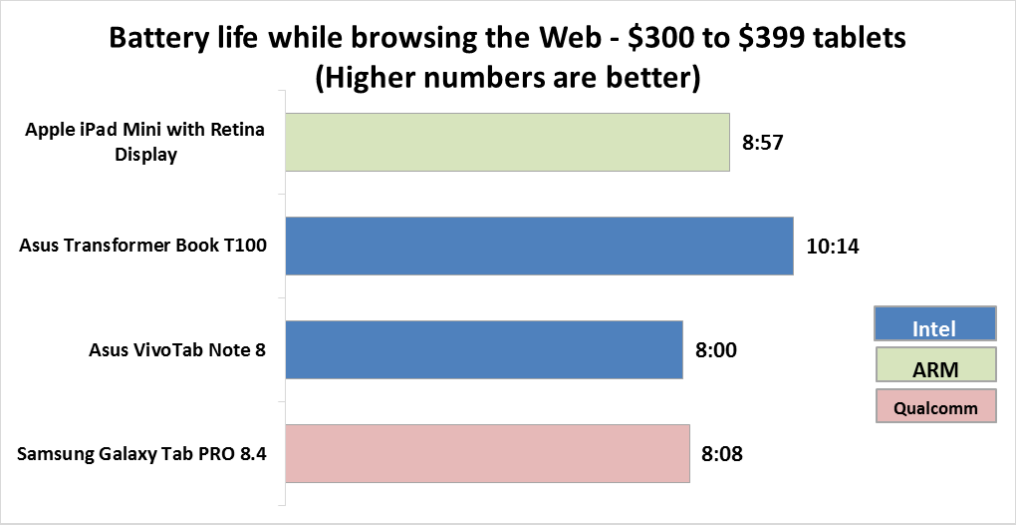


Figure 8: The battery life of each tablet while browsing the Web in hours and minutes.

$400 to $598 price range

Figure 9 shows the results of the battery life test for tablets priced at $400 to $598. The Intel processor-powered HP Pro Tablet 610 G1 and the Apple iPad Air had the longest battery life at 9 hours and 7 minutes and the Intel processor-powered Lenovo Yoga 2 had the shortest battery life at 5 hours and 33 minutes.

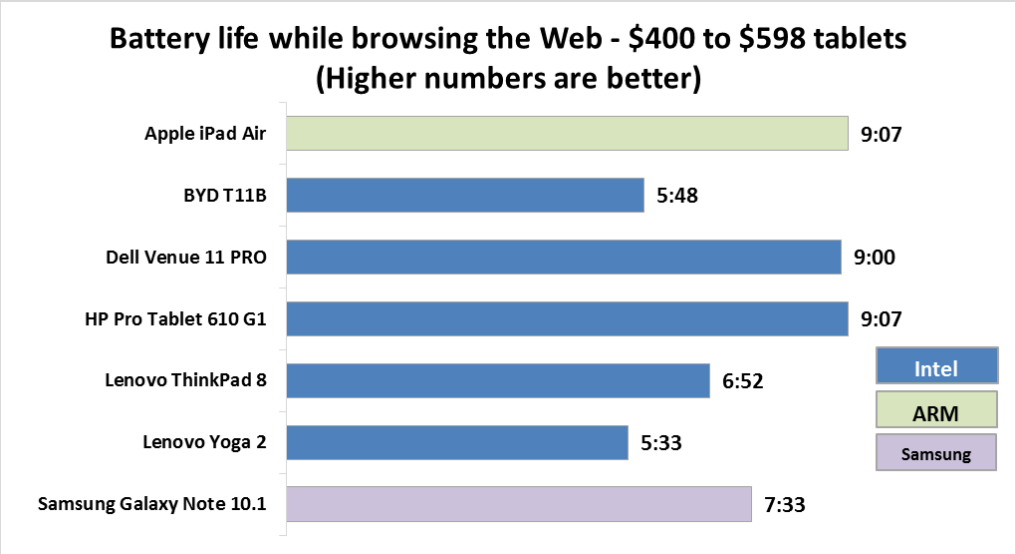


Figure 9: The battery life of each tablet while browsing the Web in hours and minutes.

$599 and up price range

Figure 10 shows the results of the battery life test for tablets priced at or over $599. The Intel Core i3 4020Y processor-powered Microsoft Surface Pro 3 had the longest battery life at 8 hours and 32 minutes and the Intel Core i3 4020Y processor-powered Dell Venue 11 PRO had the shortest battery life at 8 hours and 3 minutes.

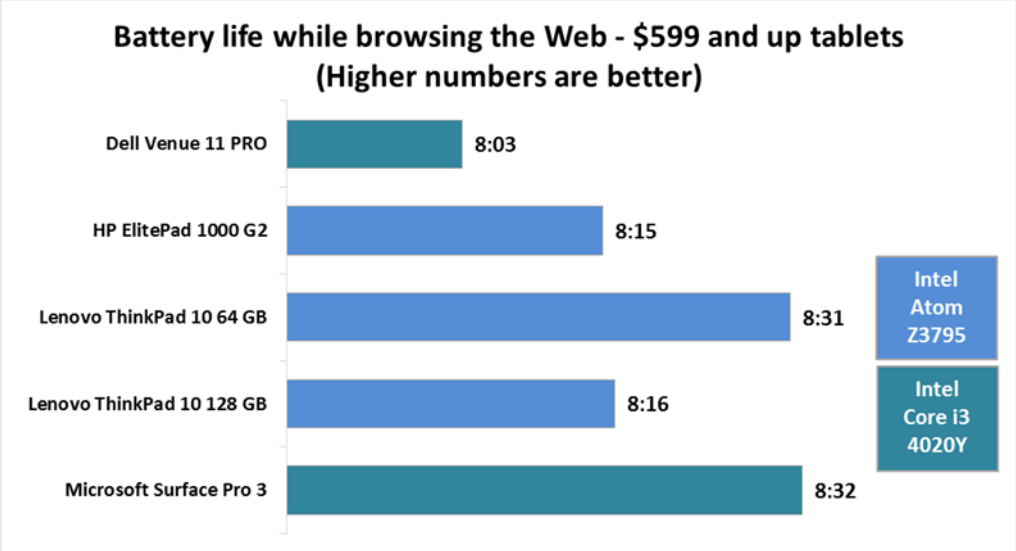


Figure 10: The battery life of each tablet while browsing the Web in hours and minutes.

PERFORMANCE COMPARISON

Perhaps the strongest consideration for consumers looking to purchase a tablet is performance. Benchmarks measure performance in different ways—some focus on processors or operating systems while others cover a wide range of factors, including graphics. Processor benchmarks generally attempt to measure how quickly the processor performs an array of calculations. In general, the shorter the time in which the processor calculates, the higher the benchmark score. We chose seven varied performance-measuring benchmarks for our testing.

Futuremark 3DMark

Viewing graphic-heavy apps, large images, or running a graphics-heavy game can cause a tablet to run slow. The 3DMark benchmark runs graphical and computational tests to generate a score for the tested device. The benchmark rates a system's graphics and virtual physics performance, and higher scores generally demonstrate powerful hardware. Testing one or more parts with individual workloads creates each component score. Each workload focuses on a specific combination of effect and techniques

Up to $250 price range

Figure 11 shows the results from our 3DMark testing for tablets up to $250. Of these, the tablet with the highest score was the Amazon Kindle Fire HDX at 16,547 and the tablet with the lowest score was the ARM-powered Samsung Galaxy Tab 3 at 2,022.

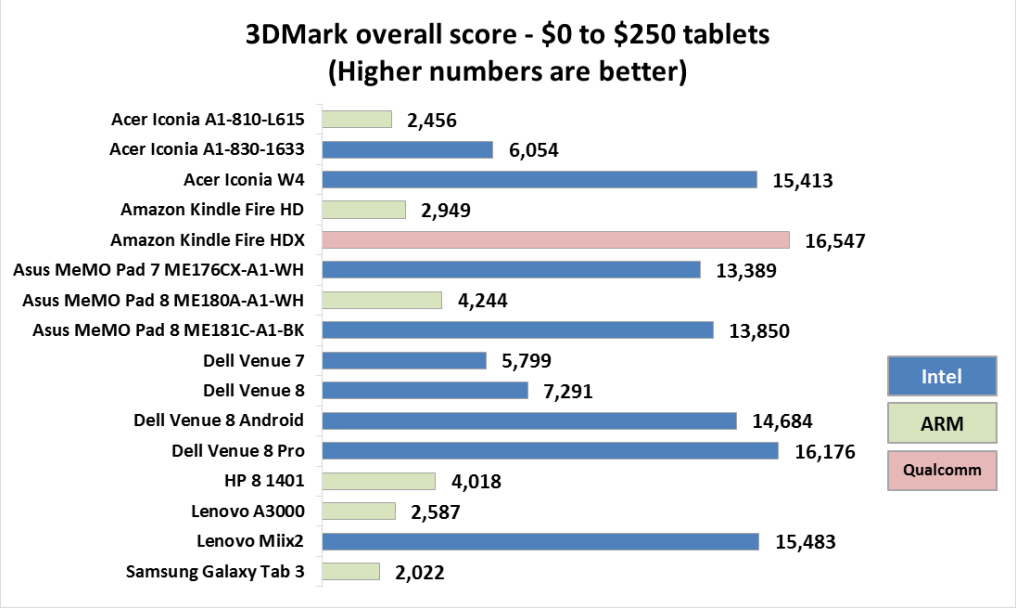


Figure 11: Graphics-based 3DMark scores for each tablet up to $250.

$251 to $299 price range

Figure 12 shows the results from our 3DMark testing for tablets priced at $251 to $299. Of these, the tablet with the highest score was the Intel processor-powered Asus Transformer Pad TF103C at 14,366 and the tablet with the lowest score was the MediaTek-powered Acer Iconia A3 A10 at 2,530.

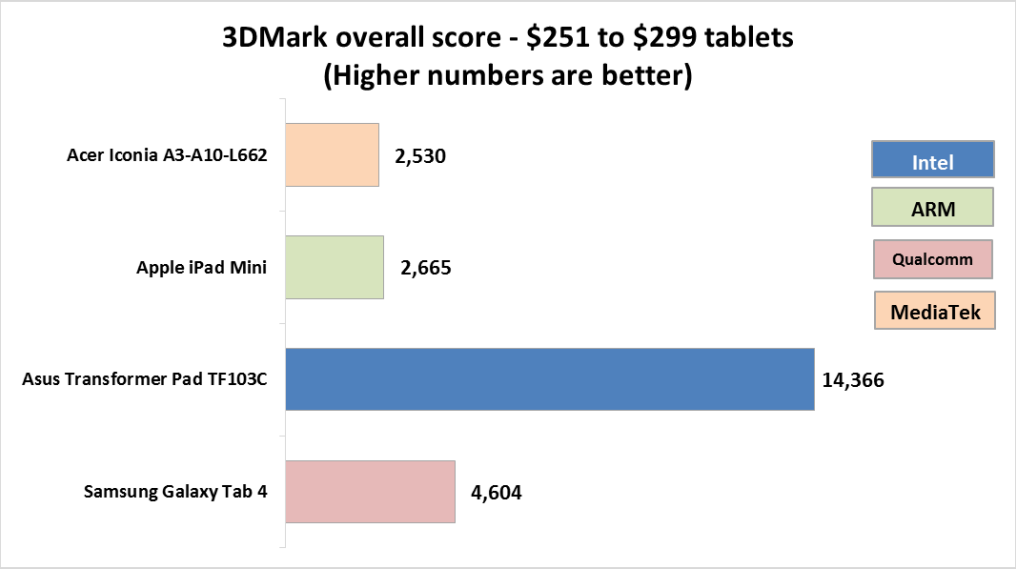


Figure 12: Graphics-based 3DMark scores for each tablet priced at $251 to $299.

$300 to $399 price range

Figure 13 shows the results from our 3DMark testing for tablets priced at $300 to $399. Of these, the tablet with the highest score was the Intel processor-powered Asus Transformer Book T100 at 16,276 and the tablet with the lowest score was the ARM-powered Apple iPad Mini with Retina Display at 14,766.

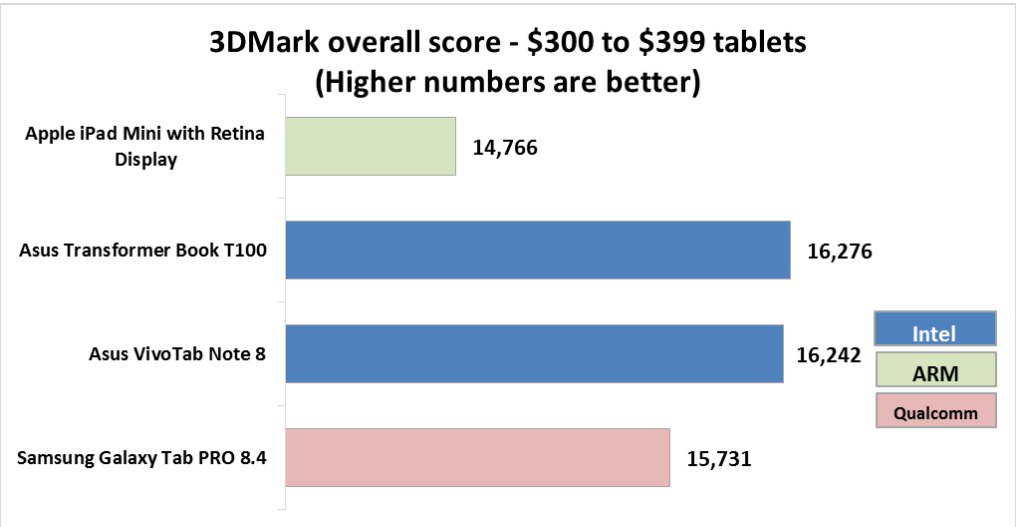


Figure 13: Graphics-based 3DMark scores for each tablet priced at $300 to $399.

$400 to $598 price range

Figure 14 shows the results from our 3DMark testing for tablets priced at $400 to $598. Of these, the tablet with the highest score was the Intel processor-powered Dell Venue 11 PRO at 18,684 and the tablet with the lowest score was the Intel processor-powered HP Pro Tablet 610 G1 at 11,456.

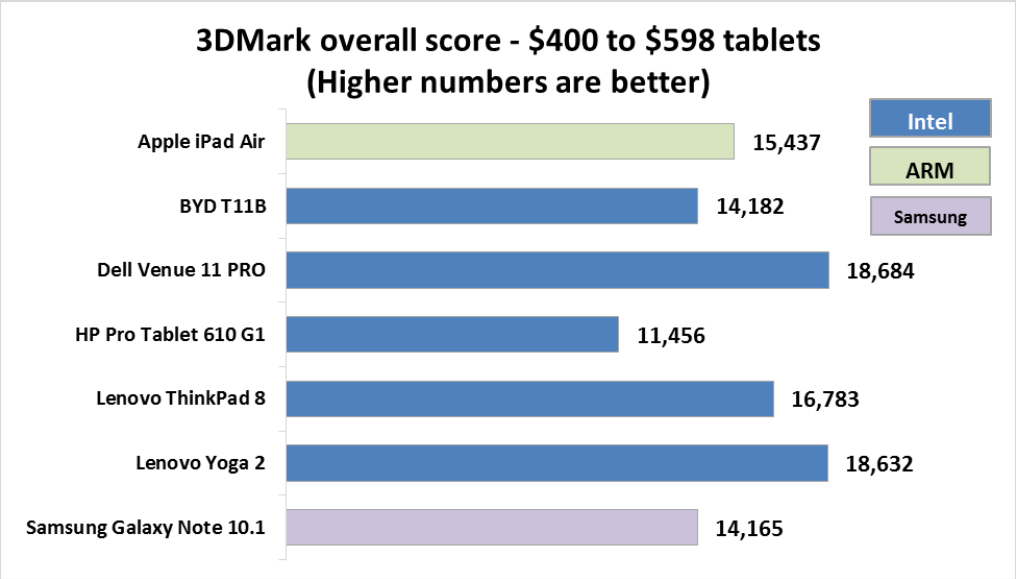


Figure 14: Graphics-based 3DMark scores for each tablet priced at $400 to $598.

$599 and up price range

Figure 15 shows the results from our 3DMark testing for tablets priced at or over $599. Of these, the tablet with the highest score was the Intel Core i3 4020Y processor-powered Microsoft Surface Pro 3 at 33,709 and the tablet with the lowest score was the Intel Atom Z3795 processor-powered Lenovo ThinkPad 10 128 GB at 17,860.

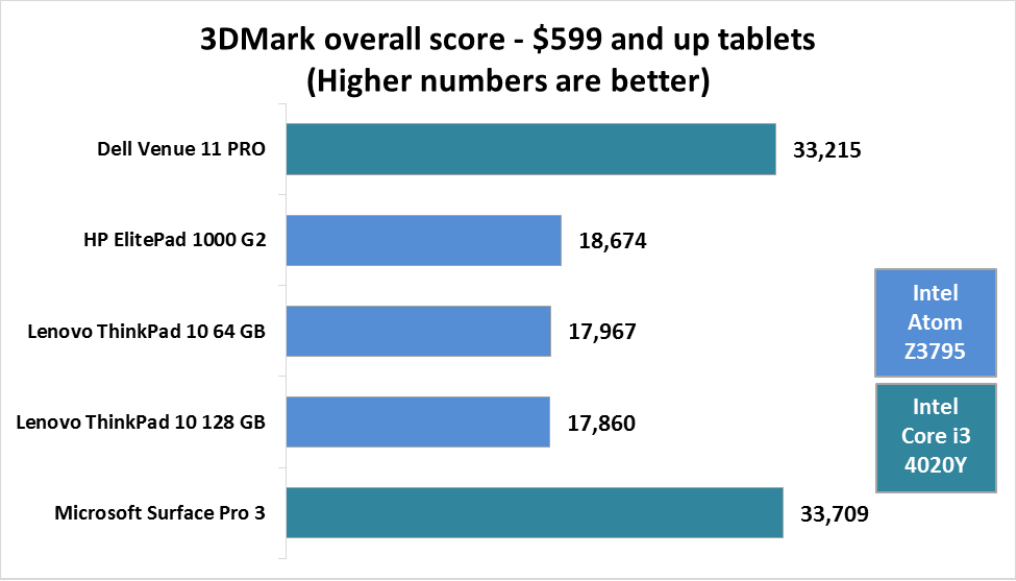


Figure 15: Graphics-based 3DMark scores for each tablet priced at or over $599.

GeekBench 3

The GeekBench 3 benchmark measures processor performance and has single-core and multi-core tests. Its workloads derive from real-world scenarios to help determine how a device will handle tasks and applications. The workloads are divided into the following four areas of performance:

- Integer performance (making heavy use of integer instructions)
- Floating point performance (performing a variety of processor-intensive tasks especially important in video games, digital content creation, and high-performance computing applications)
- Memory performance (testing the memory hardware)
- Stream performance (measuring memory bandwidth)

Single-core test

The single-core test stresses only one core to produce a result. Many consumer applications run only one thread at a time, so this test is designed to serve as a real world measure of common consumer workloads.

Up to $250 price range

Figure 16 shows the results from our Geekebench single-core testing for tablets up to $250. Of these, the Amazon Kindle Fire HDX had the highest score at 885 and the ARM-powered HP 8 1401 had the lowest score at 278.

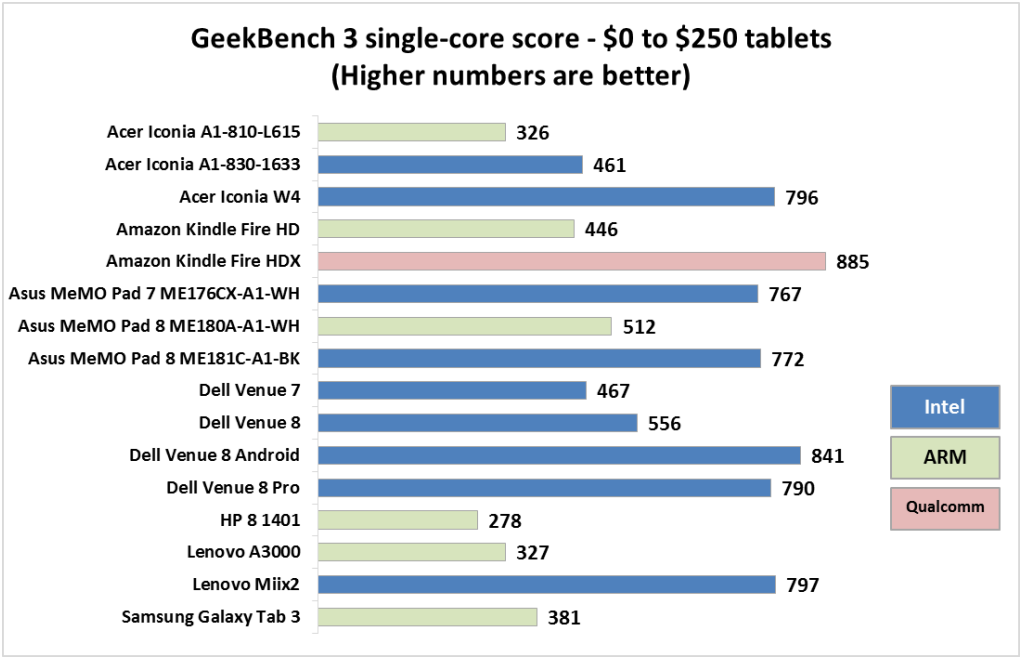


Figure 16: Single-core performance for each tablet up to $250.

$251 to $299 price range

Figure 17 shows the results from our Geekebench single-core testing for tablets $251 to $299. Of these, the Intel processor-powered Asus Transformer Pad TF103C had the highest score at 767 and the ARM-powered Apple iPad Mini had the lowest score at 264.

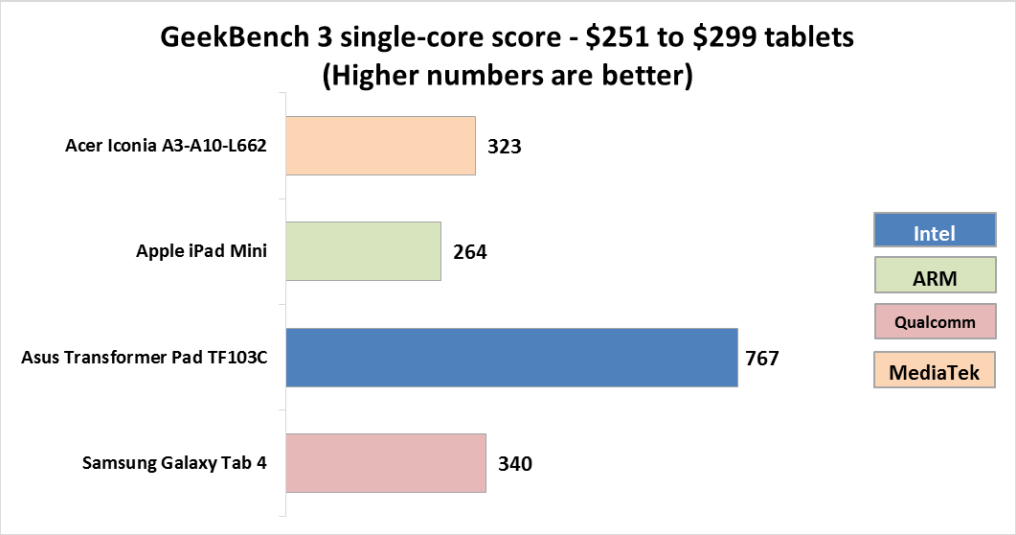


Figure 17: Single-core performance for each tablet priced at $251 to $299.

$300 to $399 price range

Figure 18 shows the results from our Geekebench single-core testing for tablets $300 to $399. Of these, the ARM-powered Apple iPad Mini with Retina Display had the highest score at 1,399 and the Intel processor-powered Asus Transformer Book T100 had the lowest score at 791.

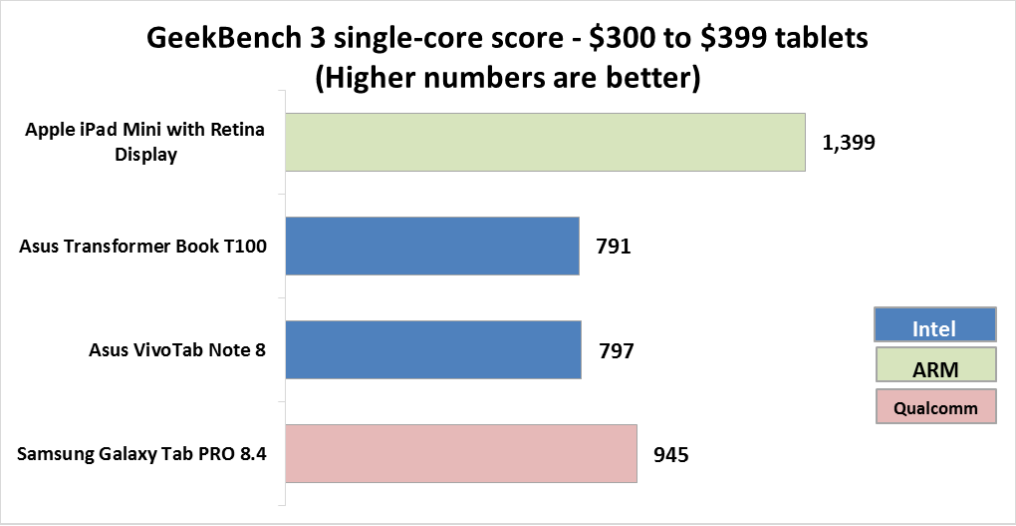


Figure 18: Single-core performance for each tablet priced at $300 to $399.

$400 to $598 price range

Figure 19 shows the results from our Geekebench single-core testing for tablets $400 to $598. Of these, the ARM-powered Apple iPad Air had the highest score at 1,483 and the Intel processor-powered BYD T11B had the lowest score at 771.

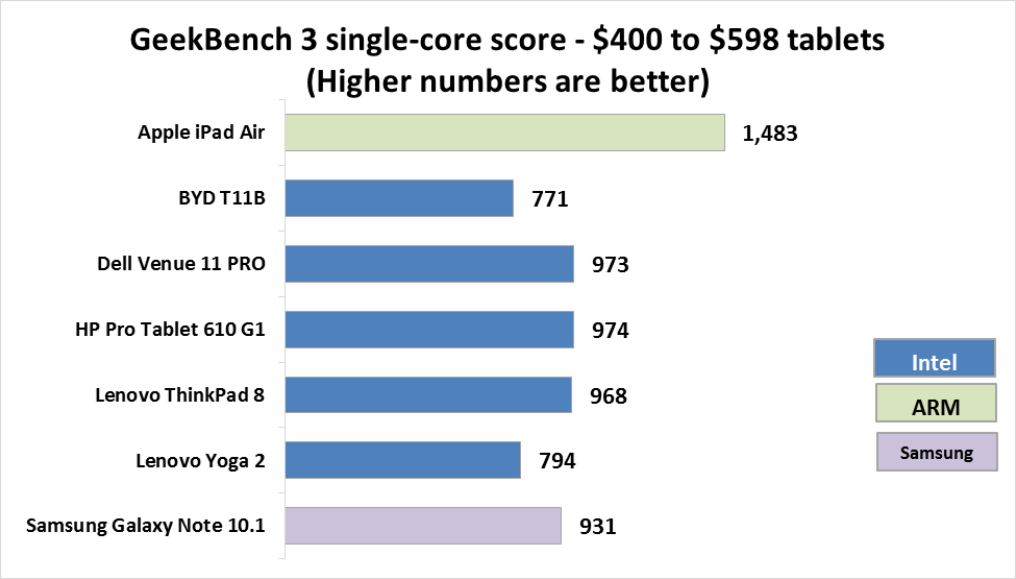


Figure 19: Single-core performance for each tablet priced at $400 to $598.

$599 and up price range

Figure 20 shows the results from our Geekebench single-core testing for tablets priced at or over $599. Of these, the Intel Core i3 4020Y processor-powered Dell Venue 11 PRO had the highest score at 1,586 and the Intel Atom Z3795 processor-powered Lenovo ThinkPad 10 64 GB had the lowest score at 966.

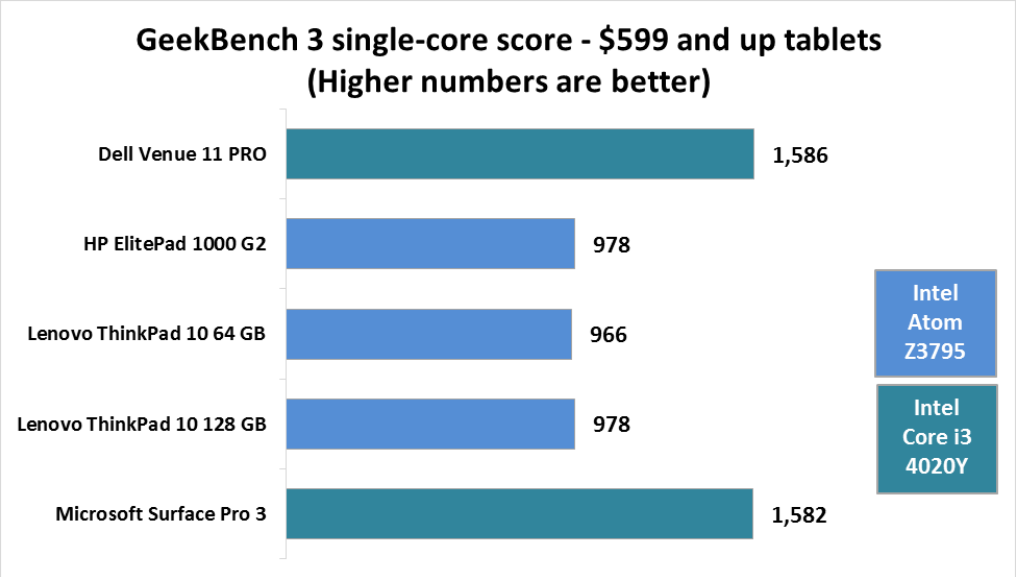


Figure 20: Single-core performance for each tablet priced at or over $599.

Multi-core test

The multi-core test stresses multiple cores to produce a result, similar to the single-core test in procedure and environment. The key difference is the measure of multiple threads, which attempts to push the limits of the system and demonstrate maximum capabilities of the tested device.

Up to $250 price range

Figure 21 shows the results from our Geekebench multi-core testing for tablets up to $250. Of these, the Amazon Kindle Fire HDX had the highest score at 2,664 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 672.

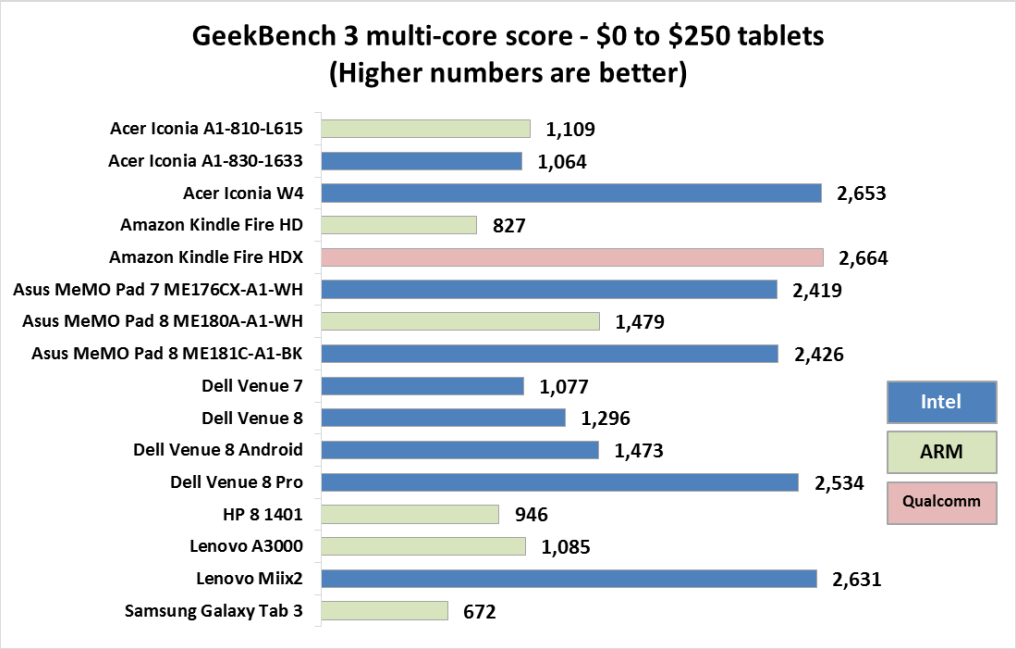


Figure 21: Multi-core performance for each tablet up to $250.

$251 to $299 price range

Figure 22 shows the results from our Geekebench multi-core testing for tablets $251 to $299. Of these, the Intel processor-powered Asus Transformer Pad TF103C had the highest score at 2,384 and the ARM-powered Apple iPad Mini had the lowest score at 497.

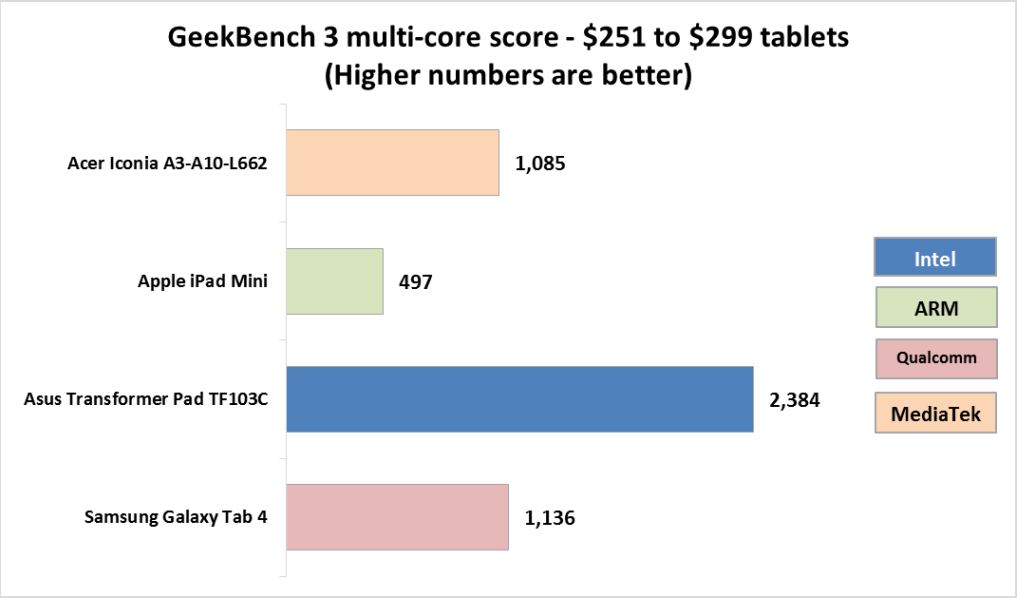


Figure 22: Multi-core performance for each tablet priced at $251 to $299.

$300 to $399 price range

Figure 23 shows the results from our Geekebench multi-core testing for tablets $300 to $399. Of these, the Samsung Galaxy Tab PRO 8.4 had the highest score at 2,862 and the ARM-powered Apple iPad Mini with Retina Display had the lowest score at 2,530.

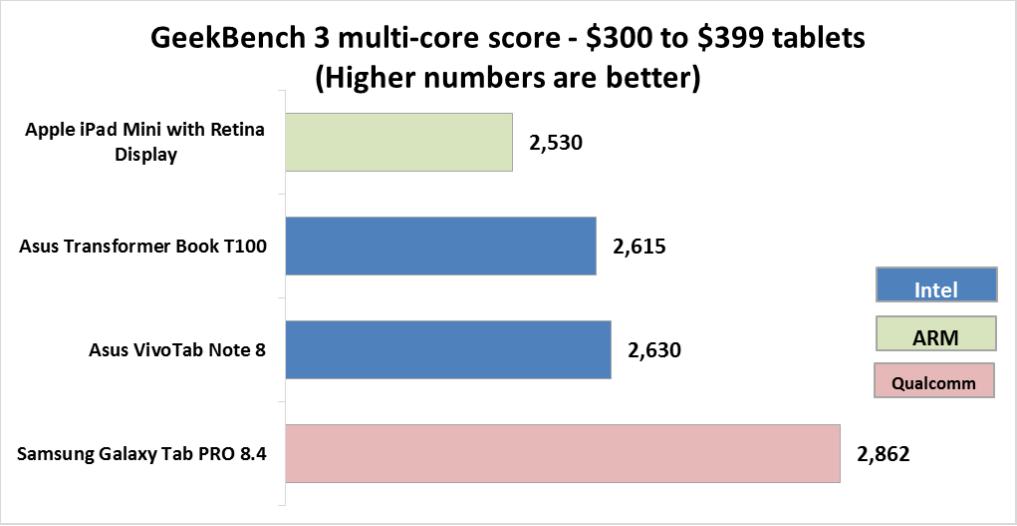


Figure 23: Multi-core performance for each tablet priced at $300 to $399.

$400 to $598 price range

Figure 24 shows the results from our Geekebench multi-core testing for tablets $400 to $598. Of these, the Intel processor-powered Lenovo ThinkPad 8 had the highest score at 3,123 and the Intel processor-powered BYD T11B had the lowest score at 1,348.

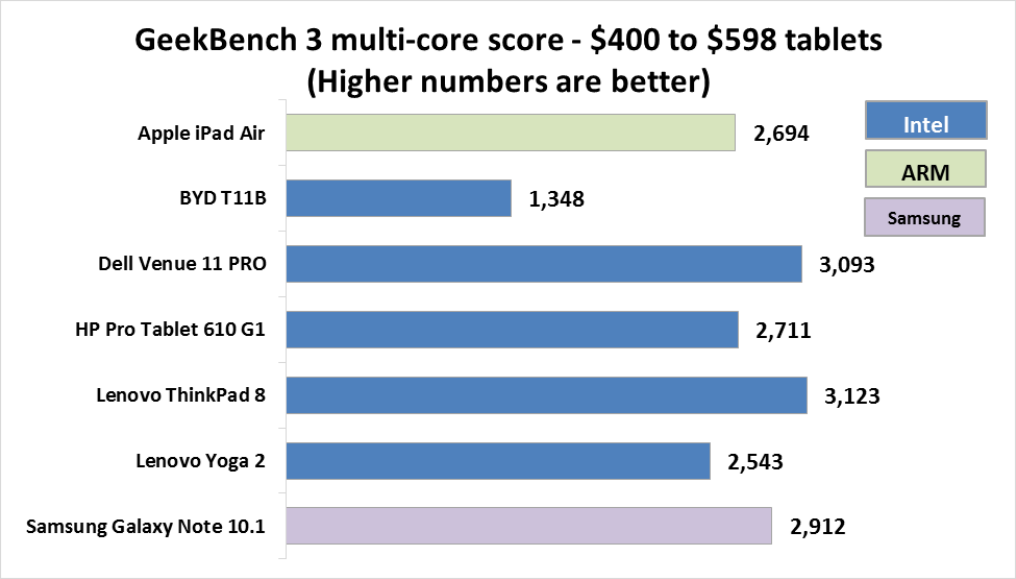


Figure 24: Multi-core performance for each tablet priced at $400 to $598.

$599 and up price range

Figure 25 shows the results from our Geekebench multi-core testing for tablets priced at or over $599. Of these, the Intel Core i3 4020Y processor-powered Dell Venue 11 PRO had the highest score at 3,293 and the Intel Atom Z3795 processor-powered Lenovo ThinkPad 10 64 GB had the lowest score at 3,099.

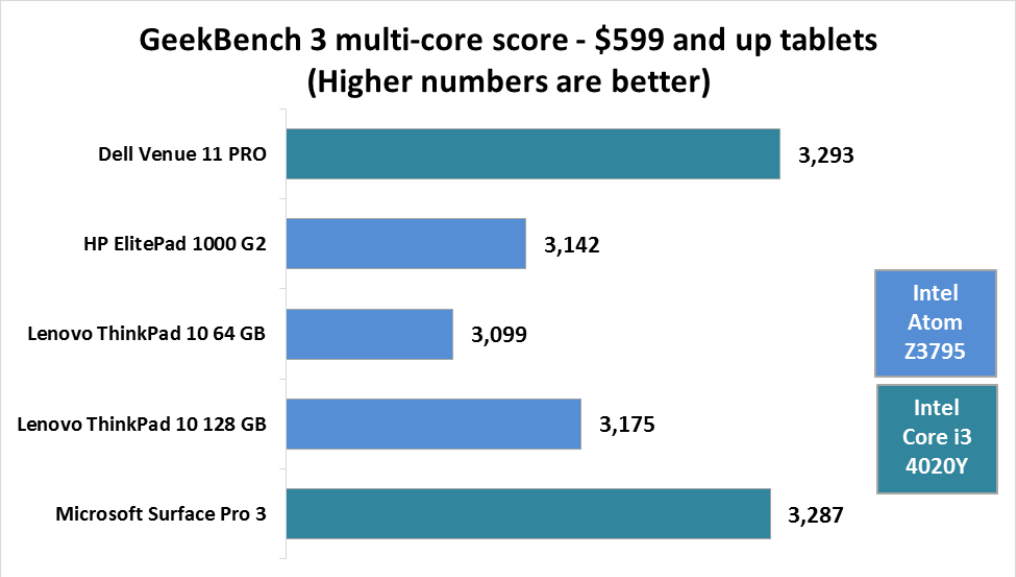


Figure 25: Multi-core performance for each tablet priced at or over $599.

Basemark OS II

Basemark OS II is a system-level benchmark for measuring overall performance of smartphones and tablets. As it is primarily a mobile device benchmark, Basemark OS II does not run on Windows 8.1 operating systems. The benchmark features a suite of tests that measure system, internal, and external memory; graphics; Web browsing; camera; battery; and CPU consumption.

Up to $250 price range

Figure 26 shows the overall Basemark OS II scores for the tablets up to $250. Of these, the Amazon Kindle Fire HDX had the highest score at 990 and the ARM-powered Lenovo A3000 had the lowest score at 219. There are no scores for the Acer Iconia W4, Dell Venue 8 Pro, and Lenovo Miix 2 tablets as their operating system is Windows 8.1.

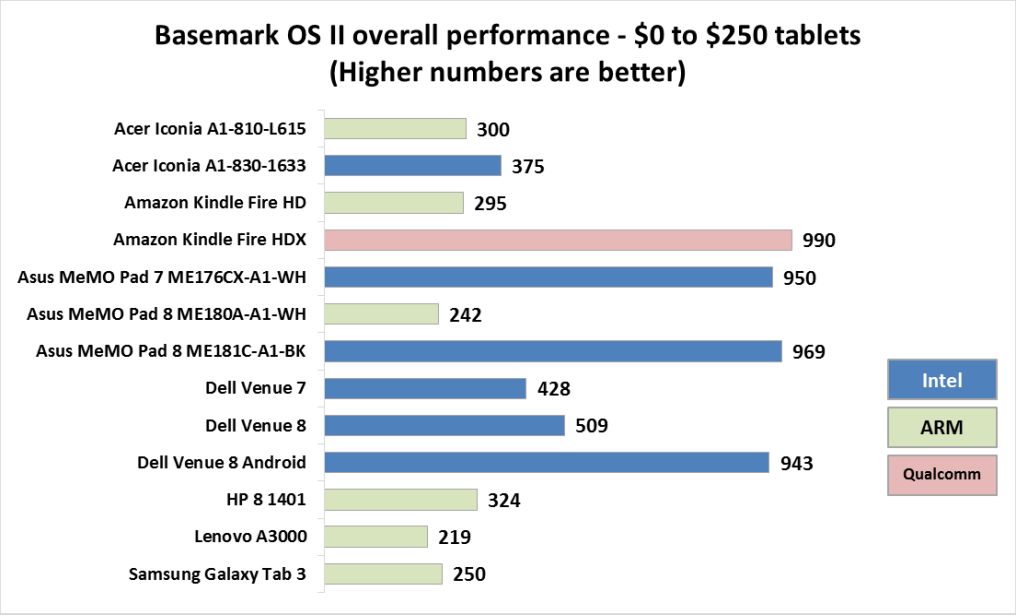
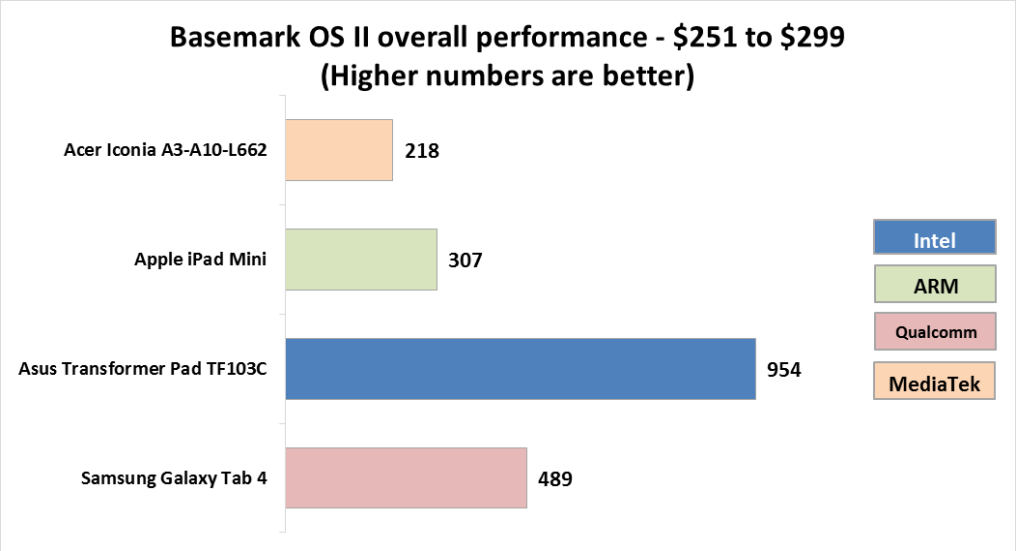


Figure 26: Performance scores for each tablet up to $250.

$251 to $299 price range

Figure 27 shows the overall Basemark OS II scores for the tablets $251 to $299. Of these, the Intel processor-powered Asus Transformer Pad TF103C had the highest score at 954 and the Acer Iconia A3-A10-L662 had the lowest score at 218.

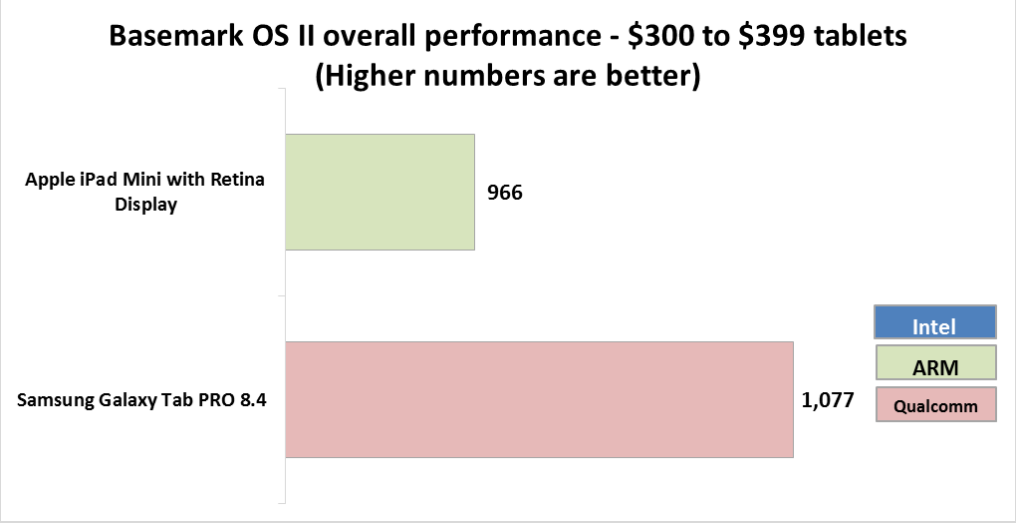
Figure 27: Performance scores for each tablet priced at $251 to $299.



$300 to $399 price range

Figure 28 shows the overall Basemark OS II scores for the tablets $300 to $399. Of these, the Samsung Galaxy Tab PRO 8.4 had the highest score at 1,077 and the Apple iPad Mini with Retina Display had the lowest score at 966. There are no scores for the Asus Transformer Book T100 and Asus VivoTab Note 8 as their operating system is Windows 8.1.

Figure 28: Performance scores for each tablet priced at $300 to $399.



$400 to $598 price range

Figure 29 shows the overall Basemark OS II scores for tablets $400 to $598. Of these, the Apple iPad Air had the highest score at 1,022 and the Samsung Galaxy Note 10.1 had the lowest score at 889. There are no scores for the BYD T11B, Dell Venue 11 PRO, HP ProTablet 610 G1, Lenovo ThinkPad 8, and Lenovo Yoga 2 tablets as their operating system is Windows 8.1.

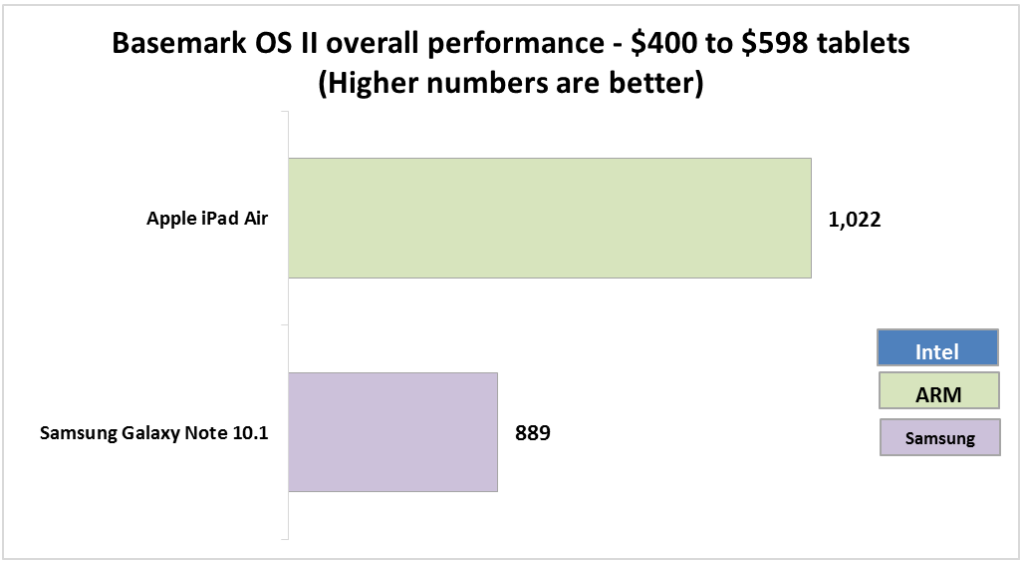


Figure 29: Performance scores for each tablet priced at $400 to $598.

$599 and up price range

All of the tablets we tested in this price range—the Dell Venue PRO 11, HP ElitePad 1000 G2, Lenovo ThinkPad 10 64 GB, Lenovo ThinkPad 10 128 GB, and Microsoft Surface Pro 3—have Windows 8.1 as their operating system so we could not produce a score for the systems with this benchmark.

PassMark PerformanceTest Mobile

PassMark PerformanceTest Mobile tests the speed and general performance of a mobile device. As it is primarily a mobile device benchmark, PassMark PerformanceTest Mobile does not run on Windows 8.1 operating systems. The standard test suite includes the following test categories:

- CPU, including mathematical operations, compression, and encryption
- 2D graphics, including drawing lines, bitmaps, fonts, text, and GUI elements
- 3D graphics, including DirectX 3D graphics and animations elements
- Disk, including reading, writing, and seeking within disk files
- Memory, including allocating and accessing memory speed and efficiency

Up to $250 price range

Figure 30 shows the scores for our PassMark testing with tablets up to $250. Of these, the Intel processor-powered Dell Venue 8 running an Android platform had the highest score at 4,966 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 1,591.

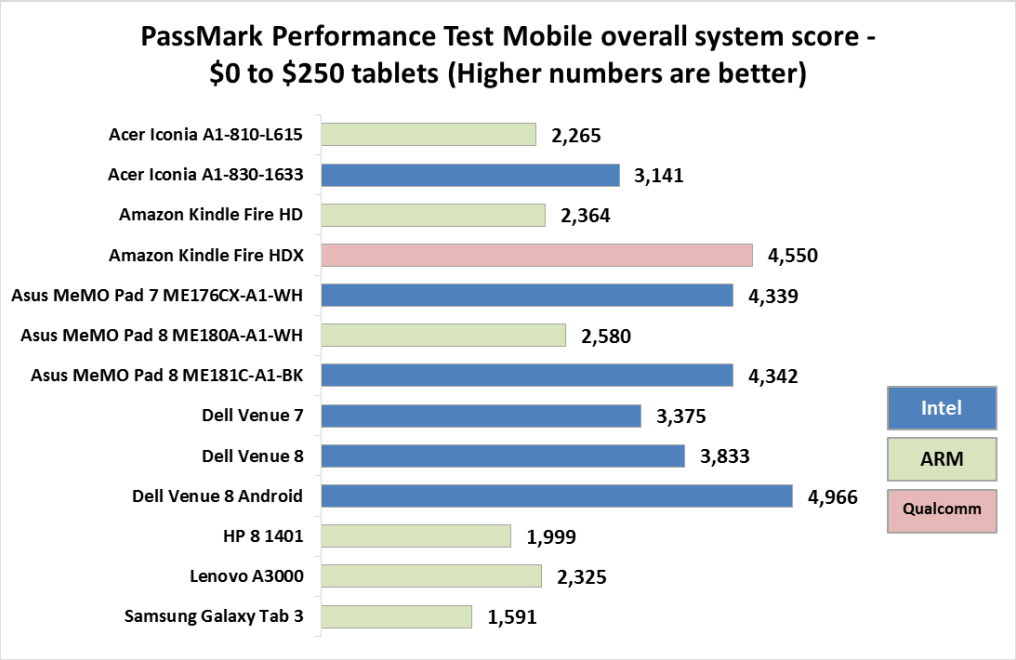


Figure 30: Performance scores for each tablet up to $250.

$251 to $299 price range

Figure 31 shows the scores for our PassMark testing with tablets $251 to $299. Of these, the Intel processor-powered Asus Transformer Pad TF103C had the highest score at 4,518 and the ARM-powered Apple iPad Mini had the lowest score at 1,531.

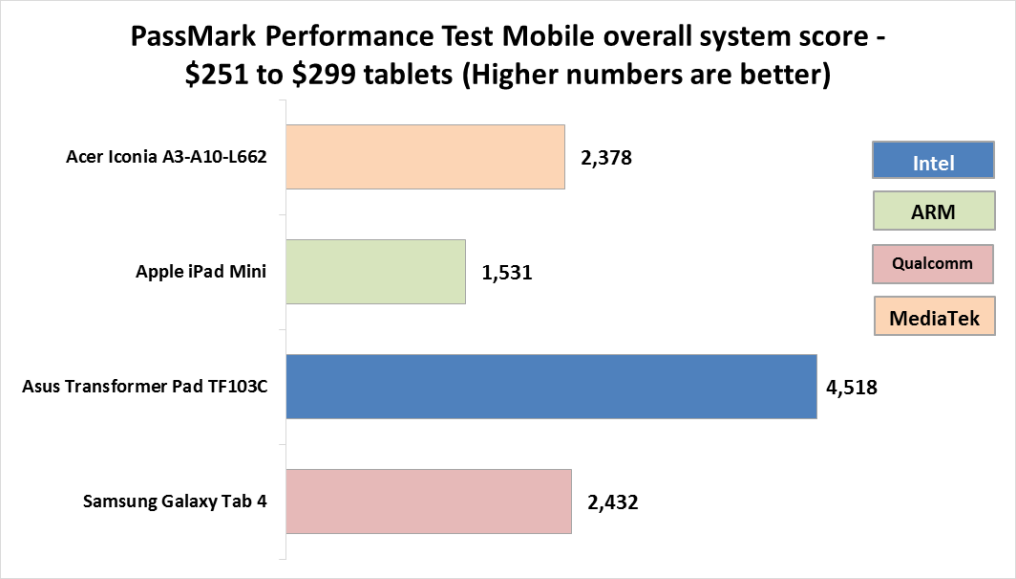


Figure 31: Performance scores for each tablet $251 to $299.

$300 to $399 price range

Figure 32 shows the scores for our PassMark testing with tablets $300 to $399. Of these, the Samsung Galaxy Tab PRO 8.4 had the highest score at 5,487 and the Apple iPad Mini with Retina Display had the lowest score at 2,230. There are no scores for the Asus Transformer Book T100 and Asus VivoTab Note 8 as their operating system is Windows 8.1.

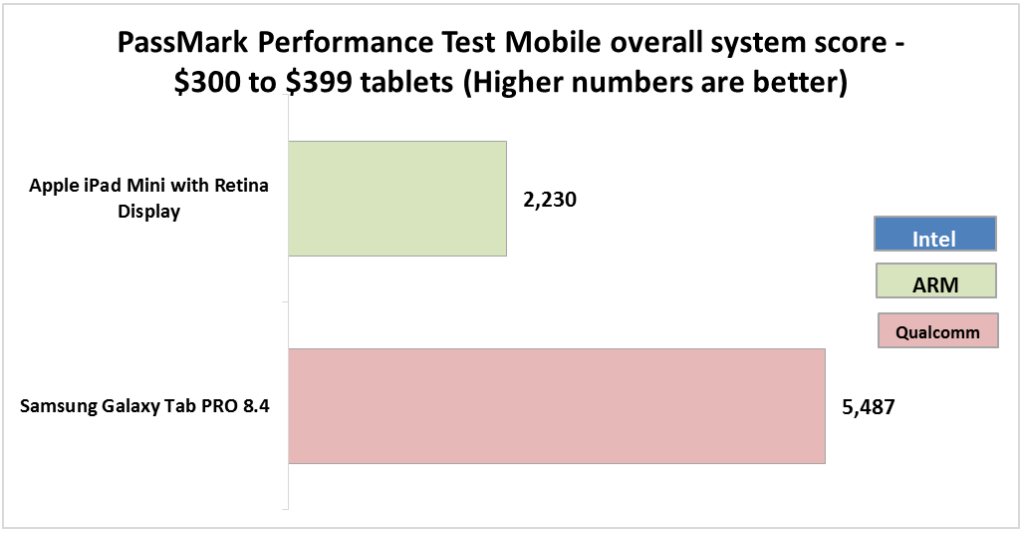


Figure 32: Performance scores for each tablet $300 to $399.

$400 to $598 price range

Figure 33 shows the scores for our PassMark testing with tablets $400 to $598. Of these, the Samsung Galaxy Note 10.1 had the highest score at 5,511 and the Apple iPad Air had the lowest score at 2,362. There are no scores for the BYD T11B, Dell Venue 11 PRO, HP ProTablet 610 G1, Lenovo ThinkPad 8, and Lenovo Yoga 2 tablets as their operating system is Windows 8.1.

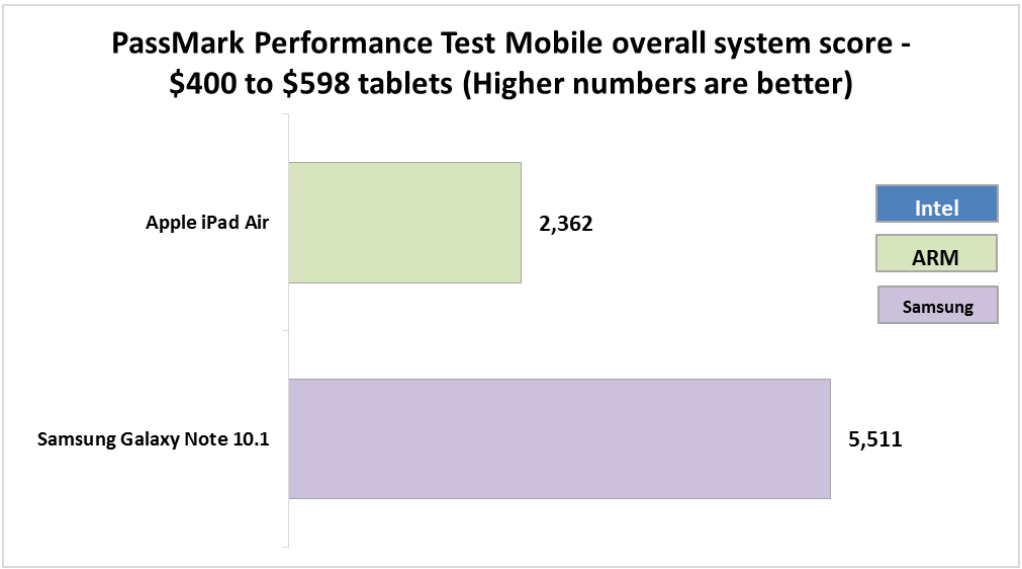


Figure 33: Performance scores for each tablet $400 to $598.

$599 and up price range

All of the tablets we tested in this price range—the Dell Venue PRO 11, HP ElitePad 1000 G2, Lenovo ThinkPad 10 64 GB, Lenovo ThinkPad 10 128 GB, and Microsoft Surface Pro 3—have Windows 8.1 as their operating system so we could not produce a score for the systems with this benchmark.

WebXPRT 2013

WebXPRT 2013 measures Web-browsing performance of any Web-enabled device handling common Web tasks by simulating everyday usage scenarios. The benchmark times how long (in milliseconds) the tested device takes to complete tasks from four workloads. Then, the benchmark uses the times to calculate a single-number overall score.

Up to $250 price range

Figure 34 shows the WebXPRT 2013 scores for the tablets up to $250. Of these, the Intel processor-powered Dell Venue 8 running an Android platform had the highest score at 431 and the ARM-powered HP 8 1401 had the lowest score at 120.

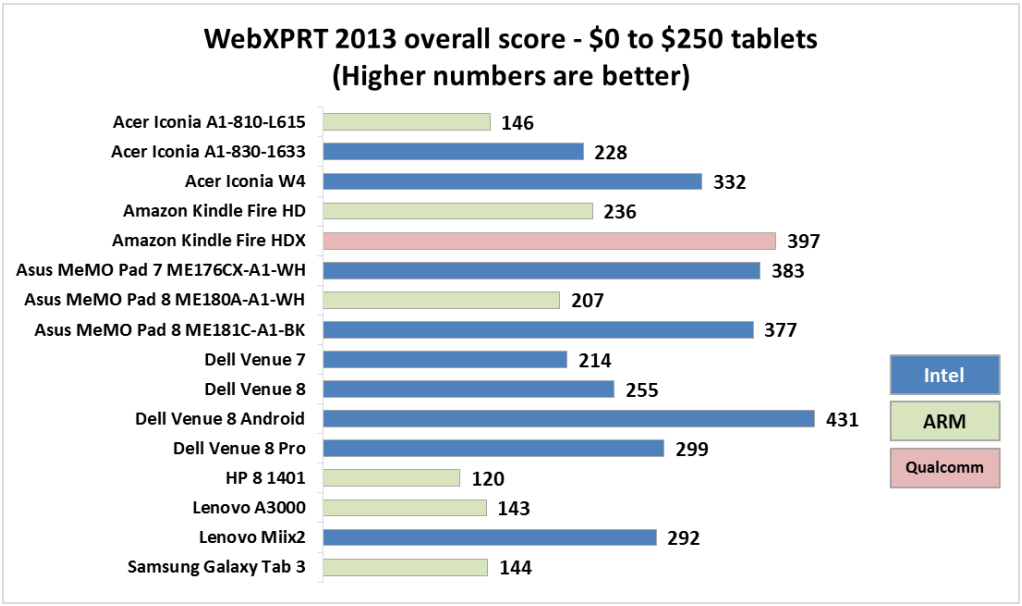


Figure 34: Web browsing performance scores for each tablet up to $250.

$251 to $299 price range

Figure 35 shows the WebXPRT 2013 scores for the tablets $251 to $299. Of these, the Intel processor-powered Asus Transformer Pad TF103C had the highest score at 388 and the Acer Inconia A3-A10-L662 had the lowest score at 138.

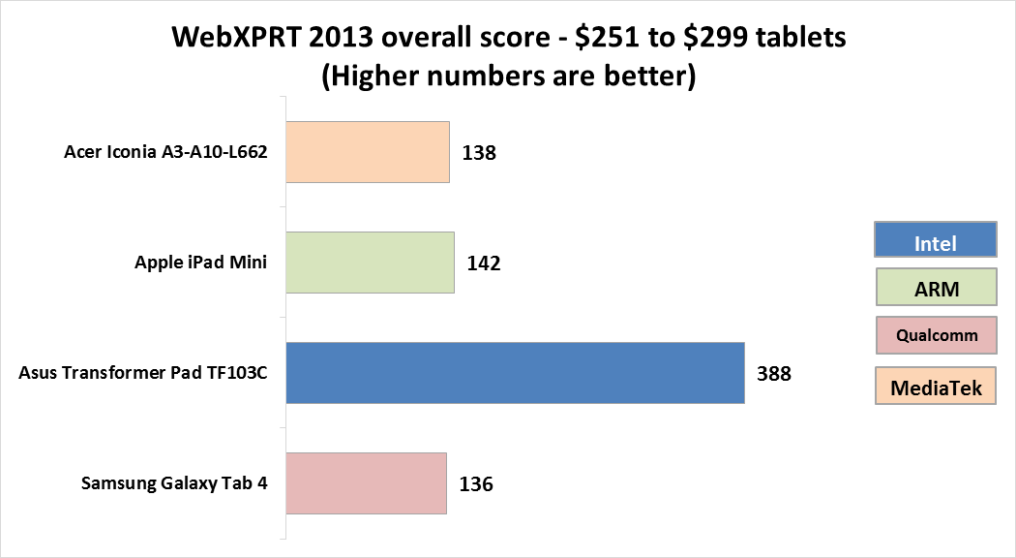


Figure 35: Web browsing performance scores for each tablet $251 to $299.

$300 to $399 price range

Figure 36 shows the WebXPRT 2013 scores for the tablets $300 to $399. Of these, the ARM-powered Apple iPad Mini with Retina Display had the highest score at 521 and the Intel processor-powered Asus Transformer Book T100 had the lowest score at 331.

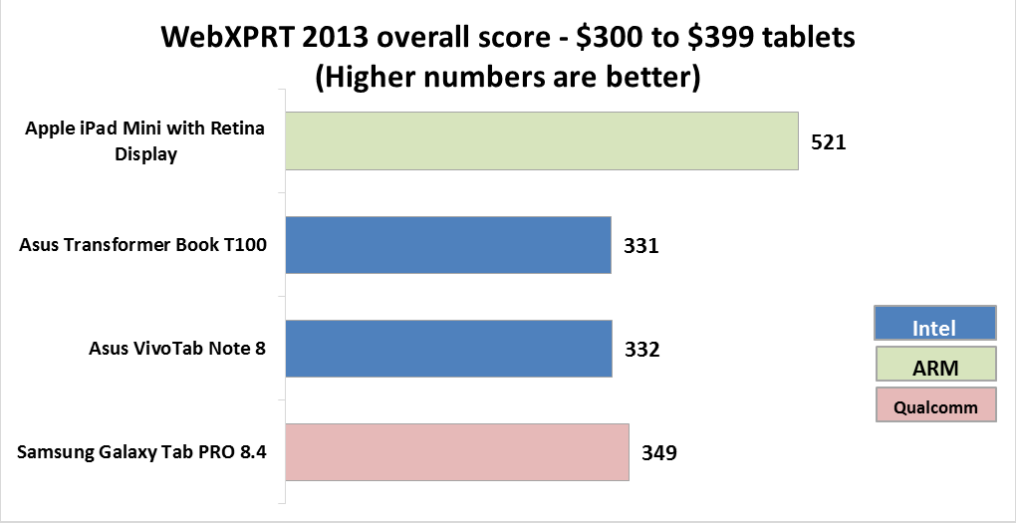


Figure 36: Web browsing performance scores for each tablet $251 to $299.

$400 to $598 price range

Figure 37 shows the WebXPRT 2013 scores for the tablets $400 to $598. Of these, the ARM-powered Apple iPad Air had the highest score at 553 and the Lenovo Yoga 2 had the lowest score at 345.

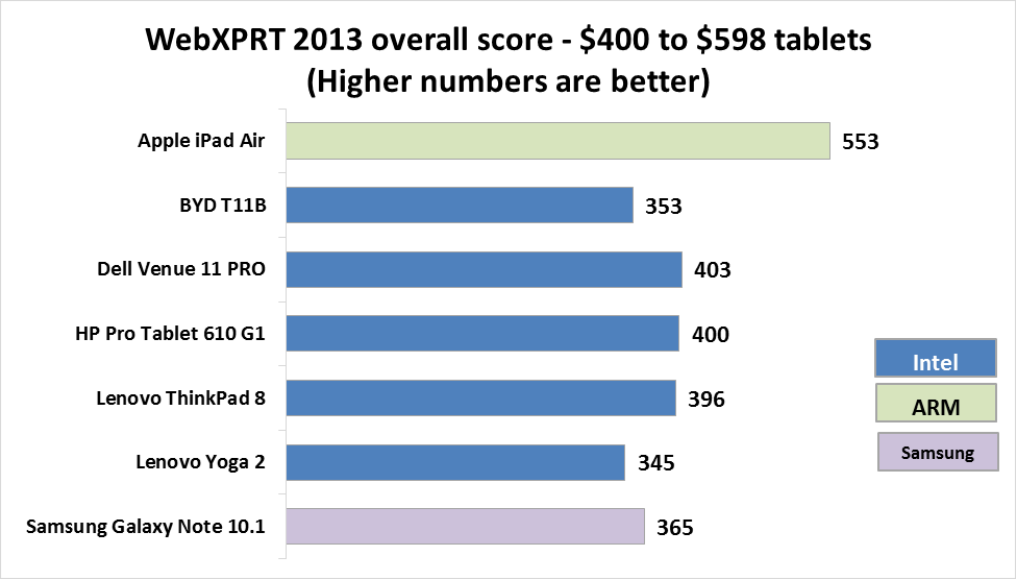


Figure 37: Web browsing performance scores for each tablet $400 to $598.

$599 and up price range

Figure 38 shows the WebXPRT 2013 scores for the tablets priced at or over $599. Of these, the Intel Core i3 4020Y processor-powered Dell Venue 11 PRO had the highest score at 597 and the Intel Atom Z3795 processor-powered Lenovo ThinkPad 10 64 GB had the lowest score at 391.

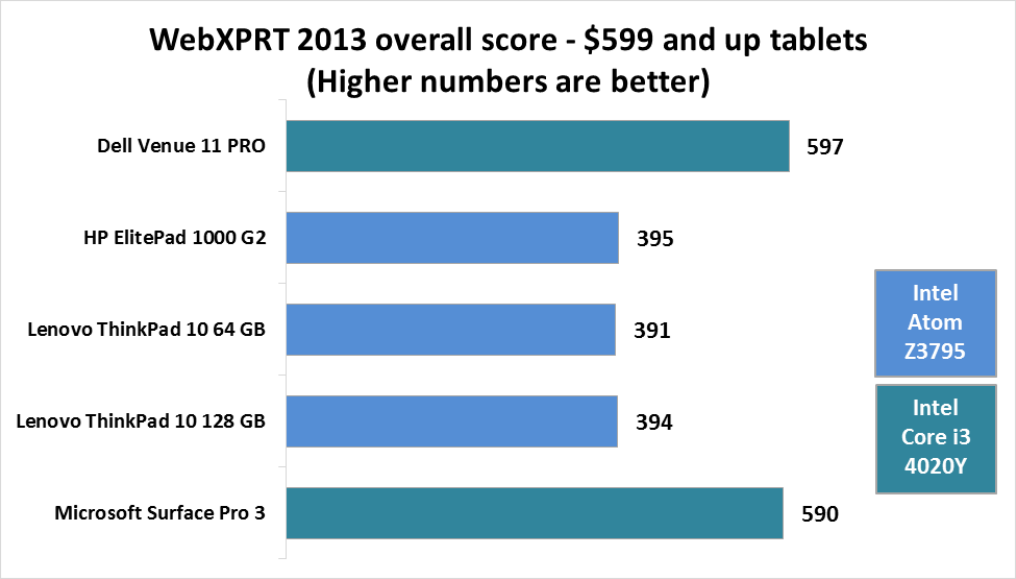


Figure 38: Web browsing performance scores for each tablet at or over $599.

CONCLUSION

When consumers want to purchase tablets, the two biggest factors they consider are battery life and performance. We used six benchmark tests to evaluate these two factors for 36 publicly available tablets. The longest time from our battery life while browsing the Web test came from the Intel processor-powered Asus Transformer Book T100 at 10 hours and 14 minutes . The In terms of performance, the Intel Core i3 4020Y processor-powered Microsoft Surface Pro 3 had the highest score in Futuremark 3DMark testing. The Intel Core i3 4020Y processor-powered Dell Venue 11 PRO had the highest score in the GeekBench single-core, GeekBench multi-core, and WebXPRT 2013 tests. For the BaseMark OS II test, the Samsung Galaxy Tab PRO 8.4 had the highest score. For the PassMark Performance Test Mobile, the Samsung Galaxy Note 10.1 had the highest score.

WHAT WE TESTED

About 3DMark

3DMark is a benchmark that uses 3D graphics and physics simulations to evaluate the graphics capabilities as well as the general performance of a system. For more information about 3DMark, visit www.futuremark.com/benchmarks/3dmark/all.

About GeekBench 3

According to Primate Labs, GeekBench 3 is a processor benchmark with a "new scoring system that separates single-core and multi-core performance, and new workloads that simulate real-world scenarios." For more information on GeekBench 3, visit www.primatelabs.com/geekbench/.

About Basemark OS II

According to RightWare, "Basemark OS II is a system-level All-In-One benchmarking tool designed for measuring overall performance of smartphones and tablets from all platforms, including Android, iOS and Windows phone 8.

"The benchmark features a comprehensive suite of tests and produces an objective overall score as well as a breakdown of each tested area, including system, internal and external memory, graphics, web browsing, camera, battery and CPU consumption."

For more information on Basemark OS II, visit www.rightware.com/consumer/basemark-os-ii/.

About PassMark PerformanceTest Mobile

According to PassMark, PerformanceTest Mobile is designed for "Android device speed testing and benchmarking. PassMark PerformanceTest Mobile allows you to objectively benchmark a Android device using a variety of different speed tests and compare the results to others." For more information about PassMark PerformanceTest Mobile, visit www.passmark.com/products/pt_mobile.htm.

About WebXPRT 2013

WebXPRT 2013 uses scenarios created to mirror the tasks you do every day to compare the performance of almost any Web-enabled device. It contains four HTML5- and JavaScript-based workloads: Photo Effects, Face Detect, Stocks Dashboard, and Offline Notes. From these workloads, the benchmark calculates a composite Overall Score for easy comparison. For more information about WebXPRT, visit www.webxprt.com.

APPENDIX A – THE DEVICES WE TESTED

Figures 39 through 46 present detailed specifications for the tablets we tested.

System information	Acer Iconia A1-810-L615	Acer Iconia A1-830-1633	Acer Iconia A3-A10-L662	Acer Iconia W4	Amazon Kindle Fire HD
Screen size	7.91”	7.89"	10.13"	8.00"	7.01"
Display resolution	1024 x 768	1024 x 768	1280 x 800	1280 x 800	1280 x 800
PPI	162	162	149	189	215
Dimensions (inches)	8.23" x 5.73" x 0.47"	7.98" x 5.46" x 0.38"	10.23" x 6.89" x 0.39"	8.63" x 5.31" x 0.42"	7.49" x 5.00" x 0.42"
Weight (lb.)	0.86	0.83	1.20	0.92	0.75
CPU	MediaTek MT8125 ARM Cortex-A7 quad-core @ 1.2GHz	Intel Atom Z2560 dual-core @ 1.6GHz	MediaTek MT8125 quad-core @ 1.2GHz	Intel Atom Z3740 quad-core @ 1.33GHz-1.86GHz	ARM Cortex-A9 dual-core @1.5GHz
Storage	8 GB	16 GB	16 GB	32 GB	8 GB
Browser	Android browser	Android browser	Android browser	Internet Explorer	Android browser
OS	Android 4.4.2	Android 4.2.2	Android 4.2.2	Windows 8.1 32-bit	Fire OS 11.3.2.4
RAM	1 GB	1 GB	1 GB	2 GB	1 GB
Price as of 08-01-14 (USD)	$179.99	$179.99	$257.99	$199.99	$134.00

Figure 39: Detailed information for the tablets we tested.

System information	Amazon Kindle Fire HDX	Apple iPad Air	Apple iPad Mini	Apple iPad Mini with Retina Display	Asus MeMO Pad 7 ME176CX-A1-WH
Screen size	7.04"	9.73"	7.91"	7.91"	7.03"
Display resolution	1920 x 1200	2048 x 1536	1024 x 768	2048 x 1536	1280 x 800
PPI	322	263	162	324	215
Dimensions (inches)	7.30" x 5.03"x 0.38"	9.44" x 6.67" x 0.31"	7.88" x 5.31" x 0.31"	7.88" x 5.31" x 0.31"	7.44" x 4.48" x 0.45"
Weight (lb.)	0.67	1.06	0.69	0.73	0.65
CPU	Qualcomm Snapdragon 800 8074 quad-core @ 2.2GHz	Apple A7 dual-core @ 1.4GHz	Apple A5 ARM Cortex-A9 dual-core @ 1.0GHz	Apple A7 dual-core @ 1.3GHz	Intel Atom Z3745 quad-core @ 1.33GHz-1.86GHz
Storage	16 GB	16 GB	16 GB	16 GB	16 GB
Browser	Silk browser	Safari	Safari	Safari	Android Browser
OS	Fire OS 13.3.2.4	iOS 7.1.2	iOS 7.1.2	iOS 7.1.2	Android 4.4.2
RAM	2 GB	1 GB	512 MB	1 GB	1 GB
Price as of 08-01-14 (USD)	$244.00	$499.00	$299.00	$399.00	$129.99

Figure 40: Detailed information for the tablets we tested.

System information	Asus MeMO Pad 8 ME180A-A1-WH	Asus MeMO Pad 8 ME181C-A1-BK	Asus Transformer Book T100	Asus Transformer Pad TF103C	Asus VivoTab Note 8 M80TA-B1-BK
Screen size	8.02"	8.05"	10.14"	10.12"	8.08"
Display resolution	1280 x 800	1280 x 800	1366 x 768	1280 x 800	1280 x 800
PPI	188	188	155	149	187
Dimensions (inches)	8.37" x 5.01" x 0.43"	8.35" x 4.92" x 0.36"	10.36" x 6.76" x 0.43"	10.13" x 7.01" x 0.41"	8.69" x 5.27" x 0.45"
Weight (lb.)	0.80	0.71	1.29	1.24	0.86
CPU	ARM Cortex-A9 quad-core @ 1.6GHz	Intel Atom Z3745 quad-core @ 1.33GHz-1.86GHz	Intel Atom Z3740 quad-core @ 1.33GHz-1.86GHz	Intel Atom Z3745 quad-core @ 1.33GHz-1.86GHz	Intel Atom Z3740 quad-core @ 1.33GHz-1.86GHz
Storage	16 GB	16 GB	64 GB	16 GB	32 GB
Browser	Android Browser	Android Browser	Internet Explorer	Android Browser	Internet Explorer
OS	Android 4.2.2	Android 4.4.2	Windows 8.1 32-bit	Android 4.4.2	Windows 8.1 32-bit
RAM	1 GB	1 GB	2 GB	1 GB	2 GB
Price as of 08-01-14 (USD)	$179.00	$179.00	$349.00	$299.00	$329.00

Figure 41: Detailed information for the tablets we tested.

System information	BYD T11B	Dell Venue 7	Dell Venue 8	Dell Venue 8 Android	Dell Venue 8 Pro
Screen size	11.61"	7.01"	8.05"	8.07"	8.07"
Display resolution	1366 x 768	1280 x 800	1280 x 800	1920 x 1200	1280 x 800
PPI	135	215	188	281	187
Dimensions (inches)	11.96" x 7.70" x 0.43"	7.59" x 4.65" x 0.39"	8.34" x 5.11" x 0.43"	8.53" x 5.12" x 0.38"	8.52" x 5.13" x 0.36"
Weight (lb.)	1.75	0.68	0.81	0.74	0.86
CPU	Intel Celeron N2810 dual-core @ 2.00GHz	Intel Atom Z2560 dual-core @ 1.6GHz	Intel Atom Z2580 dual-core @ 2.0GHz	Intel Atom Z3480 dual-core @ 2.13GHz	Intel Atom Z3740D quad-core @ 1.33GHz-1.83GHz
Storage	64 GB	16 GB	16 GB	16 GB	32 GB
Browser	Internet Explorer	Android Browser	Android Browser	Android Browser	Internet Explorer
OS	Windows 8.1 Pro 64-bit	Android 4.4.2	Android 4.4.2	Android 4.4.2	Windows 8.1 32-bit
RAM	4 GB	2 GB	2 GB	1 GB	2 GB
Price as of 08-01-14 (USD)	Unknown (provided by Intel)	$149.99	$179.99	$199.99	$197.49

Figure 42: Detailed information for the tablets we tested.

System information	Dell Venue 11 Pro	Dell Venue 11 Pro	HP 8 1401	HP ElitePad 1000 G2	HP Pro Tablet 610 G1
Screen size	10.80"	10.80"	7.90"	10.10"	10.13"
Display resolution	1920 x 1080	1920 x 1080	1024 x 768	1920 x 1200	1920 x 1200
PPI	204	204	162	224	224
Dimensions (inches)	11.02" x 6.97" x 0.42"	11.04" x 6.98" x 0.51"	7.89" x 5.36" x 0.35"	10.26" x 7.00" x 0.35"	10.22" x 7.16" x 0.41"
Weight (lb.)	1.68	1.76	0.81	1.44	1.44
CPU	Intel Atom Z3775 quad-core @ 1.46GHz-2.39GHz	Intel Core i3 4020Y dual-core Hyper-Threaded @ 1.5GHz	Allwinner A31 ARM Cortex-A7 quad-core @ 1.0GHz	Intel Atom Z3795 quad-core @ 1.59GHz-2.39GHz	Intel Atom Z3795 quad-core @ 1.59GHz-2.39GHz
Storage	64 GB	128 GB	16 GB	64 GB	32 GB
Browser	Internet Explorer	Internet Explorer	Android Browser	Internet Explorer	Internet Explorer
OS	Windows 8.1 32-bit	Windows 8.1 64-bit	Android 4.4.2	Windows 8.1 64-bit	Windows 8.1 32-bit
RAM	2 GB	4 GB	1 GB	4 GB	2 GB
Price as of 08-01-14 (USD)	$499.99	$799.99	$169.99	$739.00	$529.00

Figure 43: Detailed information for the tablets we tested.

System information	Lenovo IdeaTab A3000	Lenovo Miix2	Lenovo ThinkPad 8	Lenovo ThinkPad 10 64 GB	Lenovo ThinkPad 10 128 GB
Screen size	7.01"	8.01"	8.30"	10.15"	10.15"
Display resolution	1024 x 600	1280 x 800	1920 x 1200	1920 x 1200	1920 x 1200
PPI	169	188	273	223	223
Dimensions (inches)	7.62" x 4.71" x 0.46"	8.48" x 5.19" x 0.36"	8.83" x 5.20" x 0.36"	10.09" x 6.96" x 0.38"	10.09" x 6.96" x 0.38"
Weight (lb.)	0.73	0.76	0.89	1.26	1.27
CPU	MediaTek MT8125 ARM Cortex-A7 quad-core @ 1.2GHz	Intel Atom Z3740 quad-core @ 1.33GHz-1.86GHz	Intel Atom Z3770 quad-core @ 1.46GHz-2.39GHz	Intel Atom Z3795 quad-core @ 1.59GHz-2.39GHz	Intel Atom Z3795 quad-core @ 1.59GHz-2.39GHz
Storage	16 GB	32 GB	64 GB	64 GB	128 GB
Browser	Android Browser	Internet Explorer	Internet Explorer	Internet Explorer	Internet Explorer
OS	Android 4.2.2	Windows 8.1 32-bit	Windows 8.1 32-bit	Windows 8.1 Pro 32-bit	Windows 8.1 Pro 64-bit
RAM	1 GB	2 GB	2 GB	2 GB	4 GB
Price as of 08-01-14 (USD)	$149.00	$199.00	$429.99	$729.00	$829.00

Figure 44: Detailed information for the tablets we tested.

System information	Lenovo Yoga 2	Microsoft Surface Pro 3	Samsung Galaxy Note 10.1	Samsung Galaxy Tab 3	Samsung Galaxy Tab 4
Screen size	11.64"	12.05"	10.12"	7.01"	8.01"
Display resolution	1366 x 768	2160 x 1440	2560 x 1600	1024 x 600	1280 x 800
PPI	135	215	298	169	188
Dimensions (inches)	11.74" x 8.14" x 0.69"	11.49" x 7.92" x 0.38"	9.56" x 6.74" x 0.32"	7.40" x 4.39" x 0.41"	8.26" x 4.88" x 0.37"
Weight (lb.)	2.92	1.77	1.19	0.66	0.70
CPU	Intel Celeron N2920 quad-core @ 1.86GHz-2.00GHz	Intel Core i3 4020Y dual-core Hyper-Threaded @ 1.5GHz	Samsung Exynos 5 Octa 5420 @ 1.9GHz	ARM Cortex-A9 dual-core @ 1.2GHz	Qualcomm Snapdragon 400 quad-core @ 1.2GHz
Storage	500 GB	64 GB	16 GB	8 GB	16 GB
Browser	Internet Explorer	Internet Explorer	Android Browser	Android Browser	Android Browser
OS	Windows 8.1 64-bit	Windows 8.1 Pro 64-bit	Android 4.3	Android 4.1.2	Android 4.4.2
RAM	4 GB	4 GB	3 GB	1 GB	1.5 GB
Price as of 08-01-14 (USD)	$549.00	$799.00	$499.99	$179.99	$269.99

Figure 45: Detailed information for the tablets we tested.

System information	Samsung Galaxy Tab PRO 8.4
Screen size	8.48"
Display resolution	2560 x 1600
PPI	356
Dimensions (inches)	8.62" x 5.05" x 0.30"
Weight (lb.)	0.72
CPU	Qualcomm Snapdragon 800 MSM8974 quad-core @ 2.3GHz
Storage (GB)	16 GB
Browser	Android Browser
OS	Android 4.4.2
RAM (GB)	2 GB
Price as of 08-01-14 (USD)	$329.00

Figure 46: Detailed information for the tablets we tested.

APPENDIX B – HOW WE TESTED

Battery life test

We ran a web browsing battery life rundown test in which a Web site that frequently updates is displayed until the battery fully discharges. Each device started fully charged and set at identical brightness settings (~200 nits). A timer in the background and a video camera captured each run.

Measuring battery life while browsing a Web site

Setting up the test

1. Open the default Web browser on each tablet, and bookmark the www.msn.com Web site.
2. Set the displays to as close as possible to 200 nits.
3. Plug the chargers into a power strip.
4. Make sure the batteries are all 100% charged.
5. Make sure the displays will not automatically turn off during the test.
    a. For iOS devices:
        i. Go to Settings→General→Auto-Lock→Never.
    b. For Windows devices:
        i. Right-click on the desktop→Select Personalize→Screensaver→Change power settings→Change plan settings→Set all options to Never
    c. For Android devices install the RedEye Stay Awake app from the Google Play Store.
6. Set the tablets on a stand with a clock nearby.

Running the test

1. Start the video camera.
2. Open the default Web browser on each phone, and go to the bookmarked Web site.
3. Verify that there is only one tab open in each browser.
4. Unplug the tablets and note the time.
5. After the tablets have fully discharged, review the video to determine when each tablet powers off.
6. Fully charge the tablets.
7. Repeat steps 1 through 7 two more times.

3DMark

Setting up the test

1. Install 3DMark.
    a. Download 3DMark from the appropriate App Store.
    b. To begin the installation, click Install.
    c. After the installation is complete, click Open.
    d. Press OK, Let's go.
    e. Press Install to install the Ice Storm benchmark.
    f. Close 3DMark.

    Setup is complete.

Running the test

1. Launch 3DMark by pressing the 3DMark icon.
2. Press the drop-down arrow to display the different benchmark options.
3. Press Ice Storm Unlimited to start the benchmark.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 two more times.
6. Report the median of the three runs.

GeekBench 3

Setting up the test

1. Install GeekBench 3.
    a. Download GeekBench 3 from the appropriate App Store .
    b. To begin the installation, click Install.
    c. After the installation is complete, close the App Store.

    Setup is complete.

Running the test

1. Launch GeekBench 3 by pressing the GeekBench 3 icon.
2. Press Run Benchmarks.
3. When the test completes, record the results.
4. Repeat steps 1 through 3 two more times.
5. Report the median of the three runs.

Basemark OS II

Setting up the test

2. Install Basemark OS II.
    a. Download Basemark OS II from the appropriate App Store .
    b. To begin the installation, click Install.
    c. After the installation is complete, close the App Store.

    Setup is complete.

Running the test

6. Launch Basemark OS II by pressing the Basemark OS II icon.
7. Press Run Benchmark.
8. When the test completes, record the results.
9. Repeat steps 1 through 3 two more times.
10. Report the median of the three runs.

PassMark PerformanceTest Mobile

Setting up the test

1. Install PassMark PerformanceTest Mobile.
    a. Download PassMark PerformanceTest Mobile from the appropriate App Store .

b. To begin the installation, press Install.
c. Press Accept to accept the license agreement.
d. After the installation is complete, close the App Store.

Setup is complete.

Running the test

1. Launch PassMark PerformanceTest Mobile by pressing the PassMark PerformanceTest Mobile icon.
2. Touch the Screen to continue.
3. Press Run Benchmark to start the benchmark.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 two more times.
6. Report the median of the three runs.

WebXPRT 2013

Running the test

1. Open the default Web browser and go to www.principledtechnologies.com/benchmarkxprt/webxprt/.
2. Click Run WebXPRT 2013.
3. At the Ready to test your browser screen, click Continue.
4. Click Start.
5. When the test completes, record the results.
6. Repeat steps 1 through 5 two more times.
7. Report the median of the three runs.

ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.