



## Charge laptops faster, get more port options, and run at cooler temperatures with Dell Business Docks

Dell Business Dock - WD15 and Dell Business Thunderbolt Dock - TB16 outperformed USB Type-C and Thunderbolt 3 docks from HP, Lenovo, and Belkin

Docks bridge the gap between the mobility of laptops and the full desktop experience complete with monitor, mouse, and keyboard. Docks used to be model specific: each laptop fit into a certain dock. Today's docks are different. They can support multiple laptop models—sometimes from different vendors. While this makes it easier for businesses with varied systems to buy in bulk, it creates another technology decision: Which dock can give the greatest functionality across a range of users?

At Principled Technologies, we compared popular business-class USB Type-C and Thunderbolt™ 3 docks from several vendors—Dell™, HP, Lenovo®, and Belkin®—and paired them with laptops from Dell, HP, and Lenovo.

In our experience, the Dell Business Dock - WD15 (USB Type-C) and Dell Business Thunderbolt Dock - TB16 (Thunderbolt 3) worked with all the systems from the other vendors and offered the greatest number of port types, offering convenience to users who need to connect peripherals. The two Dell docks provided the fastest battery charge rates in their respective categories, which is a boon for a mobile workforce. The Dell docks also registered the lowest surface temperatures while completing typical user tasks, which can potentially improve a dock's lifespan. If you're in the market for docks for your employees, the Dell Business Dock - WD15 and Dell Business Thunderbolt Dock - TB16 could be the solution to meet your team's wide range of needs.



### Charge

your battery up to 22% faster  
so you can disconnect without worry

### Connect

more types of devices with more port types

### Keep cool

and improve reliability by running  
up to 39.8°F/22.1°C cooler under stress

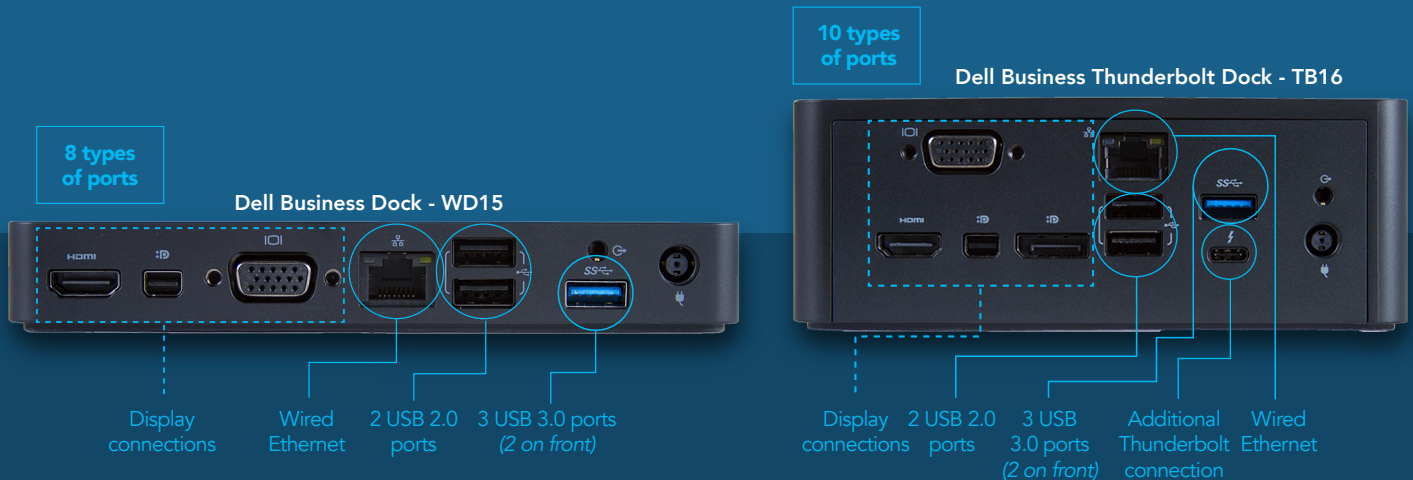
## How we set up our tests

We chose eight popular docks on the market (four USB Type-C and four Thunderbolt 3), pairing each dock with a laptop from the same vendor. Belkin does not make laptops, so we paired its dock with the Dell laptop.



## How do you connect?

Do your employees want to connect their laptops to monitors and other peripherals? Docks can help them do just that. Most modern laptops require either USB Type-C or Thunderbolt 3 to connect to docks, so Dell offers docks that connect both ways: the Dell Business Dock - WD15 (USB Type-C) and the Dell Business Thunderbolt Dock - TB16. You can choose one type or mix and match based on your workforce. Here's a quick look at what each dock offers:





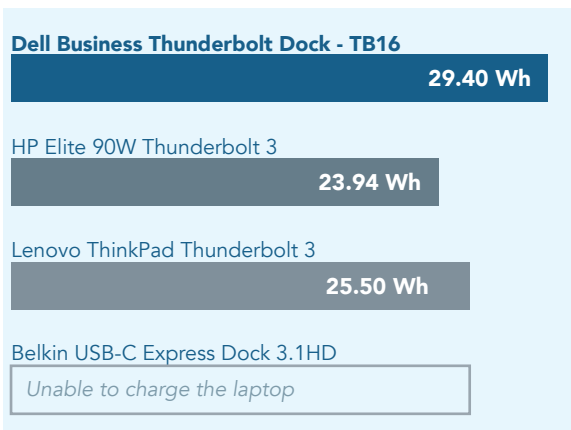
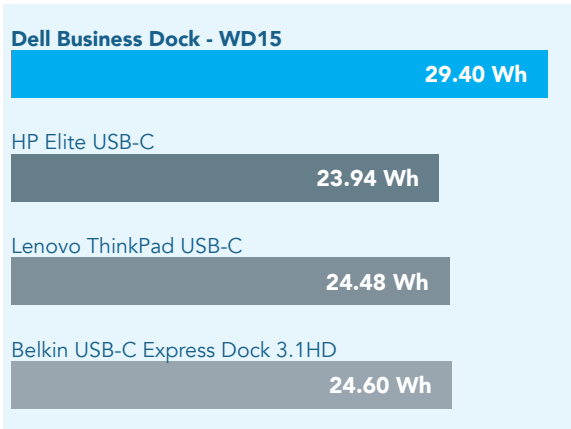
## Charge laptop batteries faster with Dell docks

Laptops are great because they're mobile: employees can take them along to meetings, to lunch, or to a colleague's office down the hall, and have all the information they need at their fingertips. Electrical outlets aren't always available, though, so employees are often running on battery power. A dock that can charge batteries quickly is extremely convenient. If employees know that when they plug into their dock between meetings they'll get a significant charge, they'll find it easier to book several closely scheduled meetings in a day—they can just do their work without worrying their technology will hamstring them.

The Dell Business Dock - WD15 and Dell Business Thunderbolt Dock - TB16 support Dell ExpressCharge, which can improve battery charging rates for supported Dell laptops, delivering up to 130 watts. In fact, our tests showed that after 30 minutes of charging time on the Dell docks, the Dell laptops reached 54% battery life, which was up to 22.8% more than competitor combinations. And the Belkin Thunderbolt dock couldn't charge the Dell system at all. (Note: During our charging tests, all systems were powered off.)

### Up to 22.8% additional battery charge

Watt hours of charge achieved in 30 minutes  
(More watt hours means more charge)



## Wait, what's a watt hour (Wh)?

Laptop batteries aren't created equal—the size and power of a battery varies with the design of the system it powers. The dictionary defines a watt hour as "a measure of electrical energy equivalent to a power consumption of one watt for one hour." Put more simply, watt hours measure how much work a battery can do.

So, what might that 22.8% extra charge mean for a user?

This can vary based on many factors, including laptop specs, screen size, and what tasks the user is performing, but here are a few examples of what that could mean:

Idle (7-10W) = extra 32-46 minutes of battery life

Light use (20-30W) = extra 10-16 minutes of battery life

Moderate use (40-50W) = extra 6-8 minutes of battery life

The extra charge the Dell docks gave the Dell Latitude 7390 2-in-1 with ExpressCharge could keep your system running through a meeting that runs longer than expected.


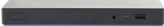












## Connect more kinds of devices with Dell docks

The list of things employees might like to connect to their laptop is seemingly endless: phones, tablets, e-readers, monitors, mouse devices, keyboards, external drives, speakers, headsets, and more. A dock that offers plenty of options can meet the needs of the widest range of users and provides flexibility when employees change monitors or other devices down the line.

Of the USB Type-C docks we looked at, the Dell Business Dock - WD15 had the greatest number of port types, providing eight different ways for workers to connect their chosen peripherals. In contrast, a dock with only five types of ports, like the Belkin USB-C Express 3.1 HD, could be limiting to your workforce. The HP Elite USB-C dock offered six types of ports, while the Lenovo ThinkPad USB-C dock offered seven.

In terms of connection flexibility, the Dell Business Thunderbolt Dock - TB16 went even further, offering a whopping 10 types of ports to give users a variety of ways to connect. Again, the Belkin Thunderbolt 3 Express Dock HD offered only five—leaving users who need to connect via Mini DisplayPort™, HDMI, or VGA out of luck. The HP Elite 90W Thunderbolt 3 dock and Lenovo ThinkPad Thunderbolt 3 dock offered seven and eight ports, respectively.

### USB-C docks

|   |  |  |  |  |
|---|---|---|---|---|
|   | Dell Business Dock - WD15   | HP Elite USB-C  | Lenovo ThinkPad USB-C   | Belkin USB-C Express Dock 3.1 HD  |
| Powered USB 3.0             | ✓   | ✗   | ✓   | ✗   |
| USB 3.0                    | ✓   | ✓   | ✓   | ✓   |
| Additional USB 3.1 Type-C  | ✗   | ✓   | ✓   | ✓   |
| DisplayPort                | ✗   | ✓   | ✓   | ✗   |
| Mini DisplayPort           | ✓   | ✗   | ✗   | ✗   |
| HDMI                       | ✓   | ✓   | ✗   | ✓   |
| VGA                        | ✓   | ✗   | ✓   | ✗   |
| RJ-45 Ethernet             | ✓   | ✓   | ✓   | ✓   |
| 3.5mm combo audio          | ✓   | ✓   | ✓   | ✓   |
| 3.5mm speaker out          | ✓   | ✗   | ✗   | ✗   |



# Thunderbolt 3 docks



Dell Business Thunderbolt Dock - TB16



HP Elite 90W Thunderbolt 3



Lenovo ThinkPad Thunderbolt 3



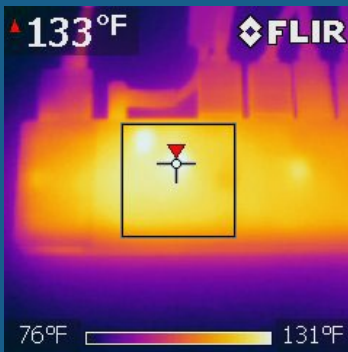
Belkin Thunderbolt 3 Express Dock HD

| Feature                  | Dell Business Thunderbolt Dock - TB16 | HP Elite 90W Thunderbolt 3 | Lenovo ThinkPad Thunderbolt 3 | Belkin Thunderbolt 3 Express Dock HD |
|--------------------------|---------------------------------------|----------------------------|-------------------------------|--------------------------------------|
| Powered USB 3.0          | ✓                                     | ✓                          | ✓                             | ✗                                    |
| USB 3.0                  | ✓                                     | ✓                          | ✓                             | ✓                                    |
| Additional Thunderbolt 3 | ✓                                     | ✓                          | ✓                             | ✓                                    |
| DisplayPort              | ✓                                     | ✓                          | ✓                             | ✓                                    |
| Mini DisplayPort         | ✓                                     | ✗                          | ✗                             | ✗                                    |
| HDMI                     | ✓                                     | ✗                          | ✓                             | ✗                                    |
| VGA                      | ✓                                     | ✓                          | ✓                             | ✗                                    |
| RJ-45 Ethernet           | ✓                                     | ✓                          | ✓                             | ✓                                    |
| 3.5mm combo audio        | ✓                                     | ✓                          | ✓                             | ✓                                    |
| 3.5mm speaker out        | ✓                                     | ✗                          | ✗                             | ✗                                    |



## How hot is that dock, exactly?

To find out, we used a thermal camera to take heat measurements. We aimed our thermal camera at the top of each dock while performing several common user tasks on the attached system, and it reported the temperature of the hottest spot on each dock after 10, 20, and 30 minutes of running the workload. Cool, right?



The thermal image recorded for the HP Elite 90W Thunderbolt dock, which reached the hottest temperatures in our tests. (133°F/56.1°C)

## Get lower running temperatures with Dell docks

High heat can cause serious damage—we see it in our cars, our own bodies, and of course, in our technological devices. A dock that runs at a lower temperature when under stress could potentially be less susceptible to heat-related failures. One whitepaper asserts the importance of thermal barriers in ventilation for electronic equipment: "...the failure rate of some components will double for [each] 10 degrees Celsius [18 degrees Fahrenheit] increase in temperature."<sup>1</sup>

We found that the two Dell docks had the lowest running temperatures for their connection type after 30 minutes of user tasks—up to 39.8°F/22.1°C cooler than competitors. This could mean a longer lifespan for the Dell docks. Note: The Belkin USB-C Express Dock 3.1 supported only a single display, so the Dell Business Dock - WD15 did more work while running at the same temperature. The Belkin Thunderbolt 3 Express Dock HD couldn't charge the system, so the Dell Business Thunderbolt Dock - TB16 ran cooler while doing more work.

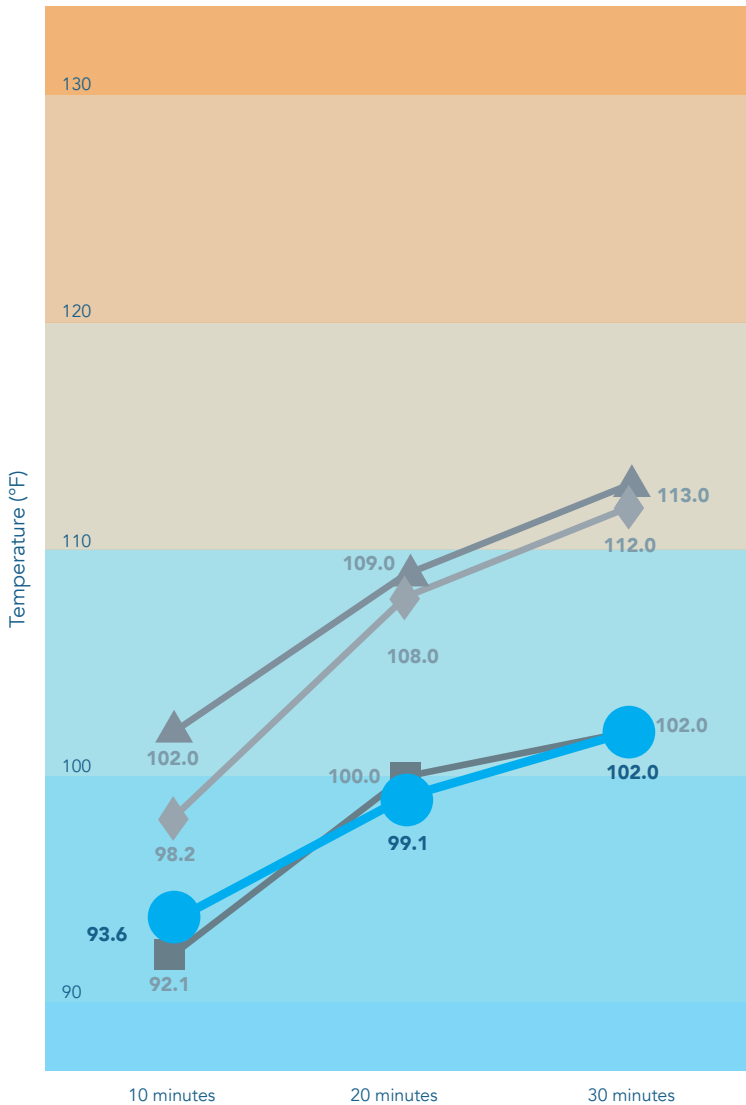
And what if an employee brushes against their dock or must hold onto it to remove their phone charger? The Dell Business Thunderbolt Dock - TB16 clocked in under human body temperature at 93.2°F/34°C, so that user probably wouldn't notice. According to one study, "the average person can touch a 140°F/60°C surface for up to five seconds without sustaining irreversible burn damage."<sup>2</sup> The HP Elite 90W Thunderbolt dock registered 133°F/56.1°C—39.8°F/22.1°C hotter than the Dell dock—which approaches that 140°F/60°C pain threshold, so users may find handling it uncomfortable.



A dock that runs at a lower temperature when under stress could potentially be less susceptible to heat-related failures.



USB-C dock temperatures

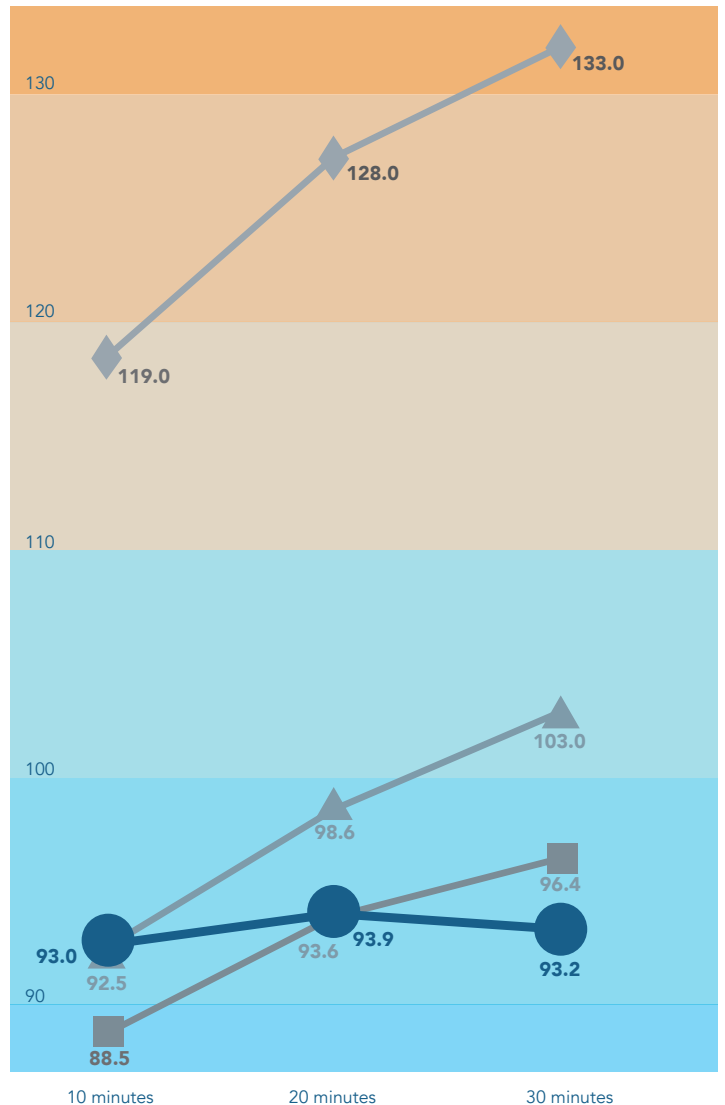


- Dell Business Dock - WD15
- ▲ Lenovo ThinkPad USB-C
- ◆ HP Elite USB-C
- Belkin USB-C Express Dock 3.1HD

Lower temperatures are better

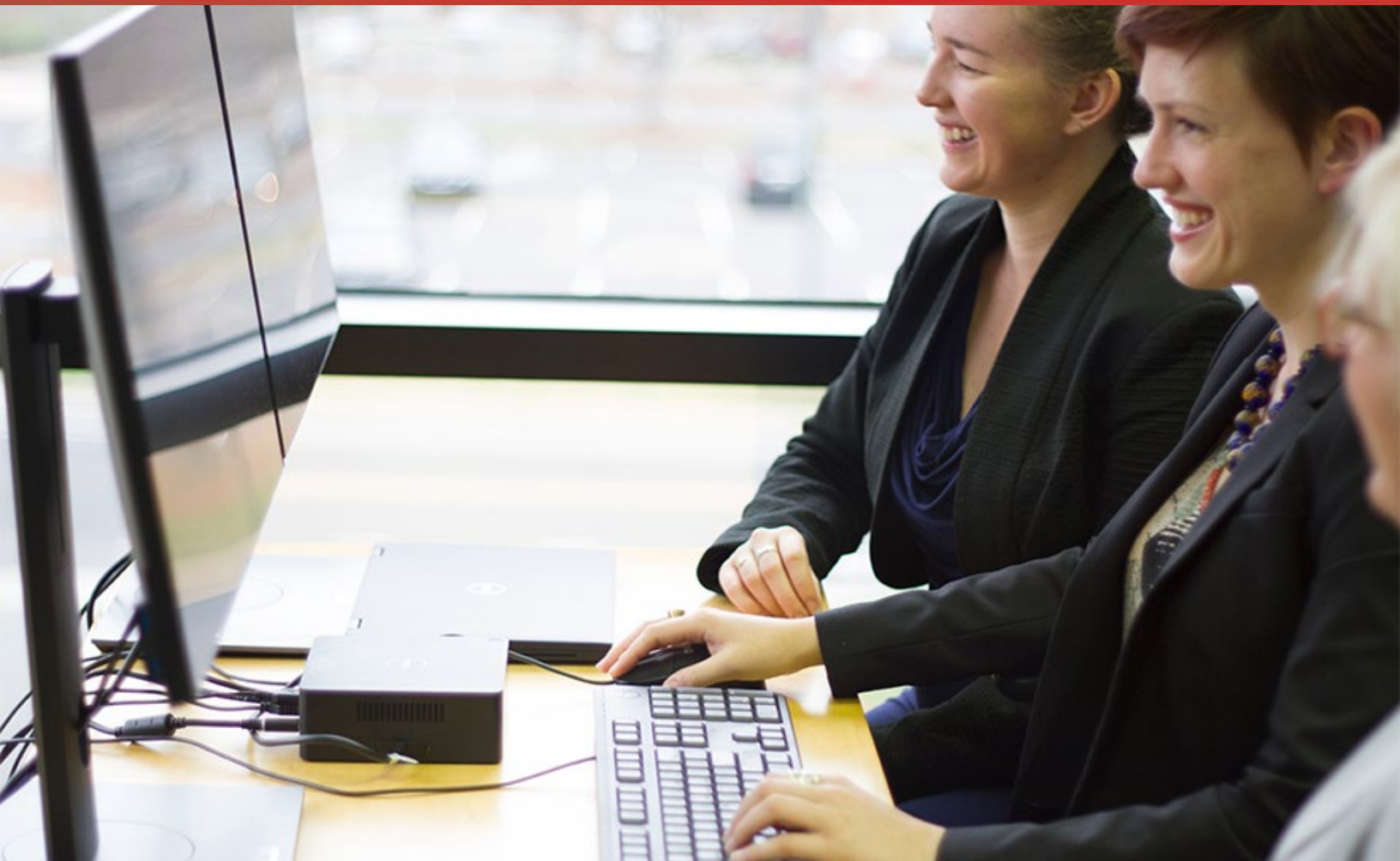


Thunderbolt 3 dock temperatures



- Dell Business Thunderbolt Dock - TB16
- ▲ Lenovo ThinkPad Thunderbolt 3
- ◆ HP Elite 90W Thunderbolt 3
- Belkin Thunderbolt 3 Express Dock HD

Lower temperatures are better



## Charge faster, run cooler, and get more connection options with the Dell Business Dock - WD15 and Dell Business Thunderbolt Dock - TB16

When you invest in technology to make your employees' workdays easier, the last thing you want is to inconvenience them. And that's just what the wrong dock can do—by taking too long to charge a battery or offering too few port options. Our tests found compelling evidence that the Dell Business Dock - WD15 and Dell Business Thunderbolt Dock - TB16 can help meet the wide range of needs your team has by providing faster charge rates, offering more port options, and running at lower surface temperatures to improve reliability compared to the docks from HP, Lenovo, and Belkin that we tested.

- 1 "Reliability in Electronics", accessed March 3, 2018, <https://www.xppower.com/Portals/0/pdfs/Reliability.pdf>.
- 2 "Too Hot to Handle?" accessed February 28, 2018, <http://news.jm.com/blog/too-hot-handle>.

Read the science behind this report at <http://facts.pt/68FGVk> ►



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