system76

System76
Darter Pro (darp5)
Service manual

Revision history

Author	Date	Version	Remarks
Aaron Honeycutt	2019-02-21	Initial	
Levi Portener	2019-02-21		Measurements
Aaron Honeycutt	2019-09-25		Update screw count
Thomas Zimmerman	2019-09-26		Match style to Galago Pro

Contents

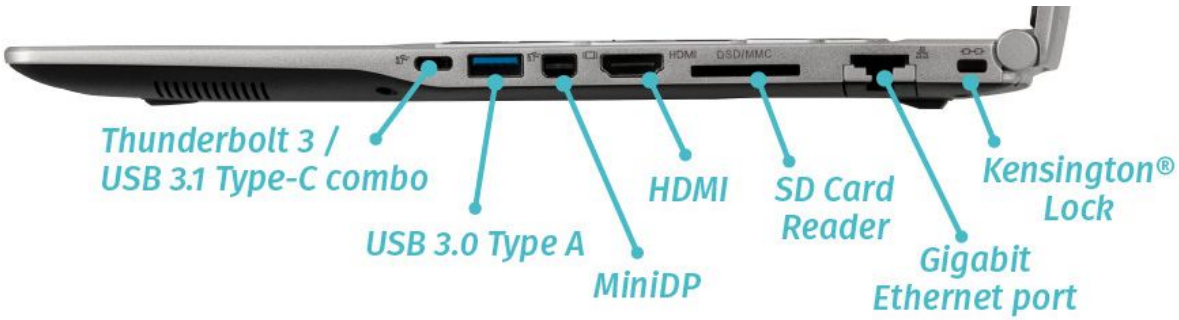
Hardware overview

External overview

Ports overview

The Darter provides multiple connectivity options.

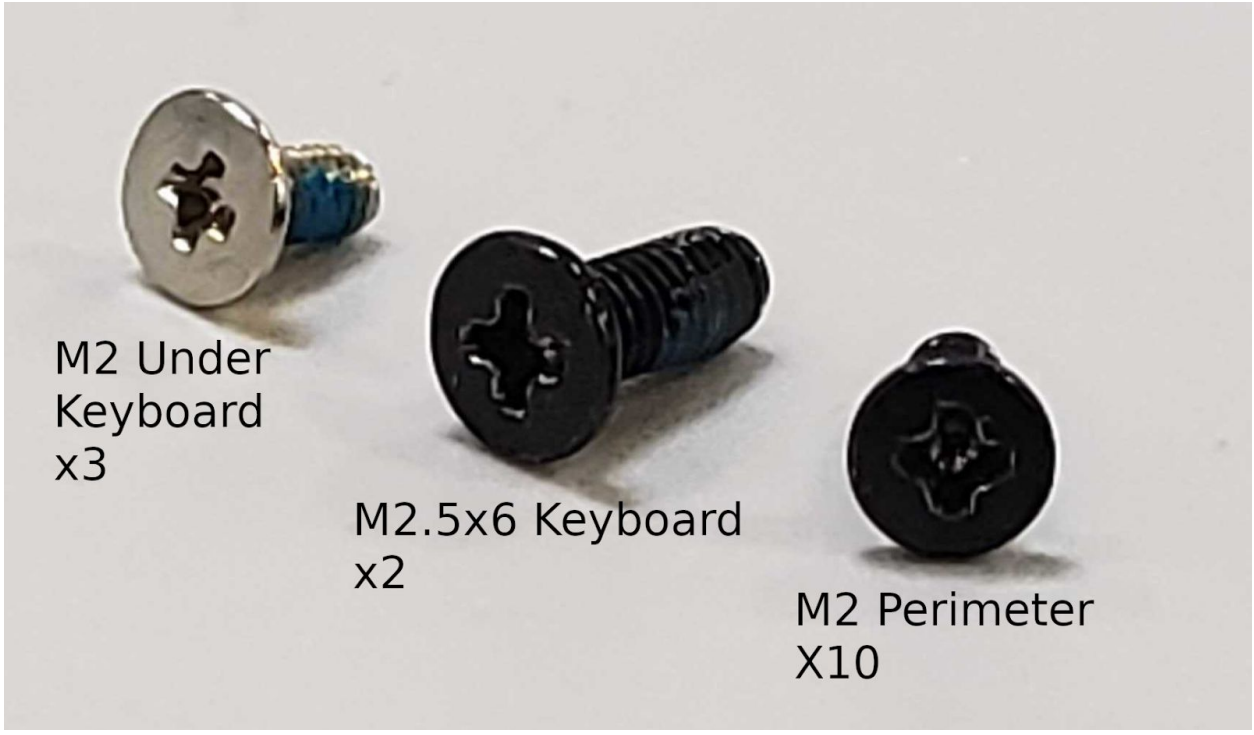
Left side overview



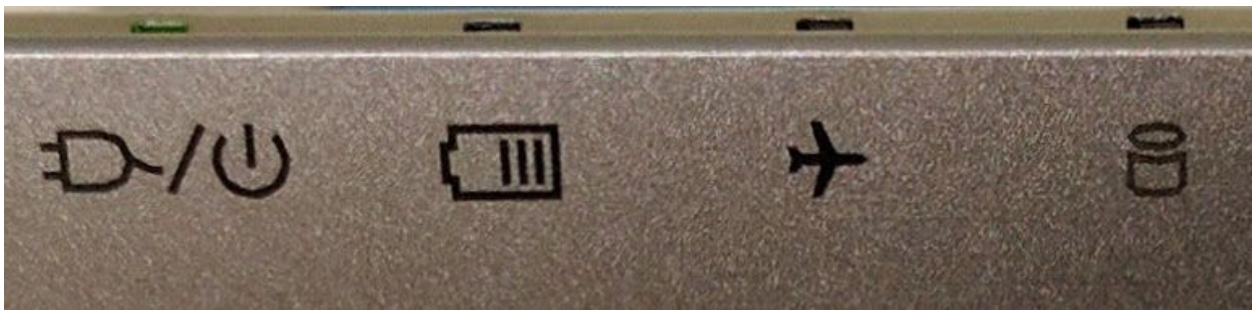
Right side overview

Bottom case screw sizes

The Darter has 3 sizes of screws for securing the bottom case.



Front LED overview



Icon	Color	Description
	Orange	DC power plugged in
	Green	Computer is on
	Blinking green	Computer is sleeping
	Orange	Battery charging
	Green	Battery fully charged
	Blinking orange	Battery critically low
	Green	Airplane mode is ON (WiFi/Bluetooth disabled)
	Green	Hard disk activity

Hardware keyboard shortcuts

Your Darter has several actions available using the Fn and Function keys.

Key	Shortcut	Action
	Fn+F1	Toggle trackpad
	Fn+F2	Toggle built-in LCD
	Fn+F3	Mute
	Fn+*	Toggle keyboard backlight
	Fn+F5	Volume down
	Fn+F6	Volume up
	Fn+F7	Toggle displays
	Fn+F8	Brightness down
	Fn+F9	Brightness up
	Fn+F10	Toggle webcam
	Fn+F11	Toggle airplane mode
	Fn+F12	Suspend
	Fn+`	Play/Pause
	Fn+1	Toggle fan between max/automatic
	Fn+Ins	Num Lock
	Fn+Del	Scroll Lock
	Fn+/	Cycle Keyboard Color
	Fn+-	Decrease Keyboard Brightness

	Fn++	Increase Keyboard Brightness

External displays

Aside from the standard Mini DisplayPort (MiniDP) and HDMI, the Darter also supports MiniDP over USB-C and external GPU (eGPU) support over Thunderbolt 3.

You can switch between MiniDP or USB-C, but you cannot use both simultaneously.
To switch between MiniDP and USB-C display modes:

1. Reboot the Darter and hold the F2 key
2. At the Setup Utility, select the Advanced tab
3. Select Advanced Chipset Control
4. Change the DDI setting according to the table below
5. Press F4 to save changes and reboot

Mode	DDI Setting	Max resolution
MiniDP	DDI to MiniDP	UHD-1 (4K, 2160P) 3840x2160 @60Hz
HDMI	None	UHD-1 (4K, 2160P) 3840x2160 @30Hz
USB-C to DisplayPort	DDI to TBT	UHD-1 (4K, 2160P) 3840x2160 @60Hz
USB-C to HDMI	DDI to TBT	UHD-1 (4K, 2160P) 3840x2160 @30Hz
eGPU over Thunderbolt 3	DDI to TBT	(Dependent on GPU)

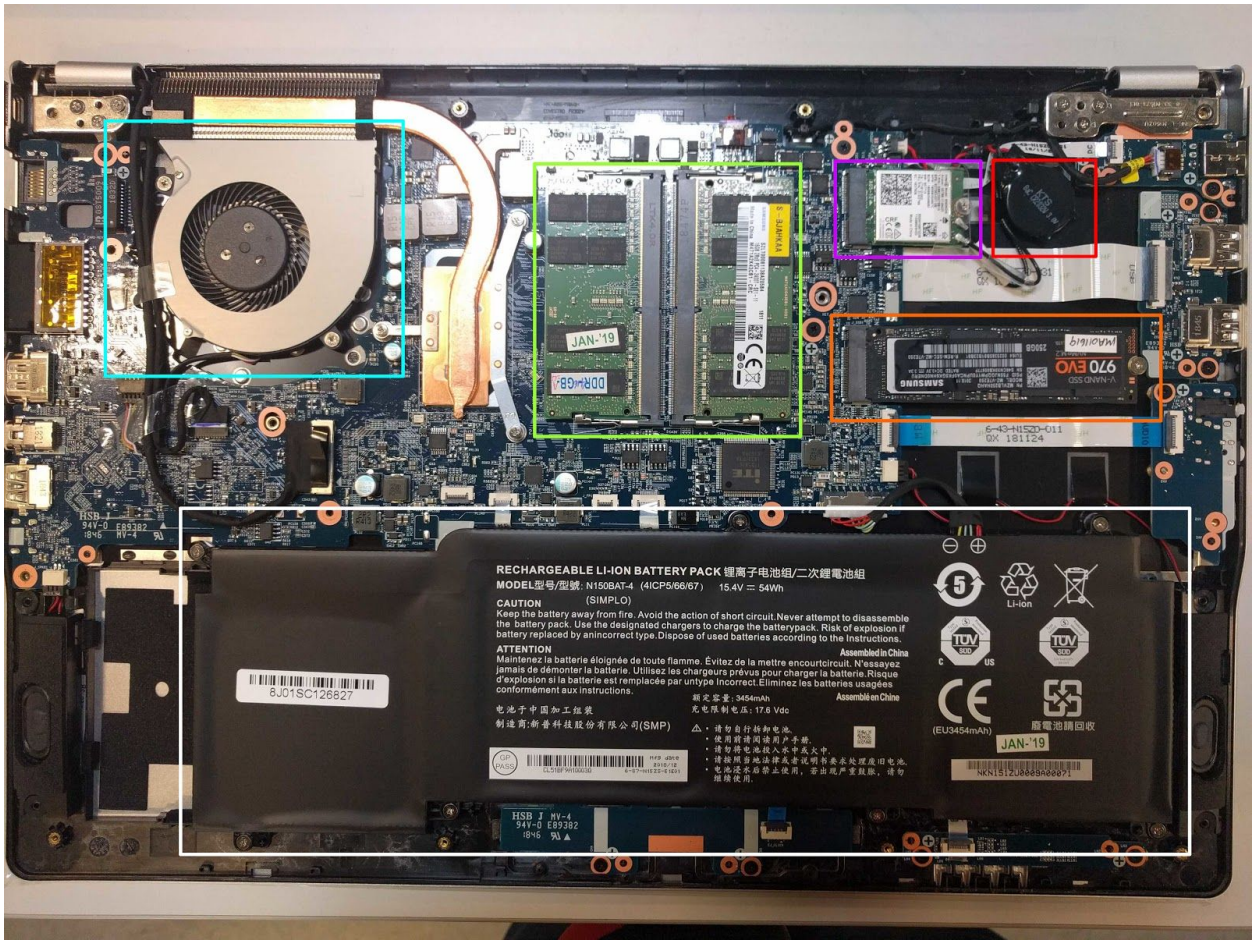
Thunderbolt 3 and eGPU

Intel Thunderbolt 3 provides a direct link to the processor over PCIe 3.0 x4 at 40Gbps, making it ideal for external GPU (eGPU) support. **To use an eGPU, Thunderbolt Security Option must be set to Legacy Mode in the BIOS.**

When using an eGPU, the device must be connected prior to powering on and only disconnected after fully powering down. eGPU devices are currently NOT hot-plug capable. Unplugging the device will not damage the Darter or the eGPU, but the system will not work properly until a reboot.

Internal component overview

Below is a color-coded diagram of the Darter's internal components.



CPU fan is highlighted in cyan
CMOS battery is highlighted in red
RAM is highlighted in green
M.2 SSD is highlighted in orange
Wireless/Bluetooth module is highlighted in purple
Battery is highlighted in white

User-serviceable parts and repairs

Many components on your Darter can be upgraded or replaced as necessary. Follow these step-by-step guides for instructions.

Replacing the keyboard

Keyboard replacement is simple and requires only a cross-head screwdriver.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 10 minutes
Difficulty: Low
Screws: 3 total

- 3 large M2, black (Keyboard M2)

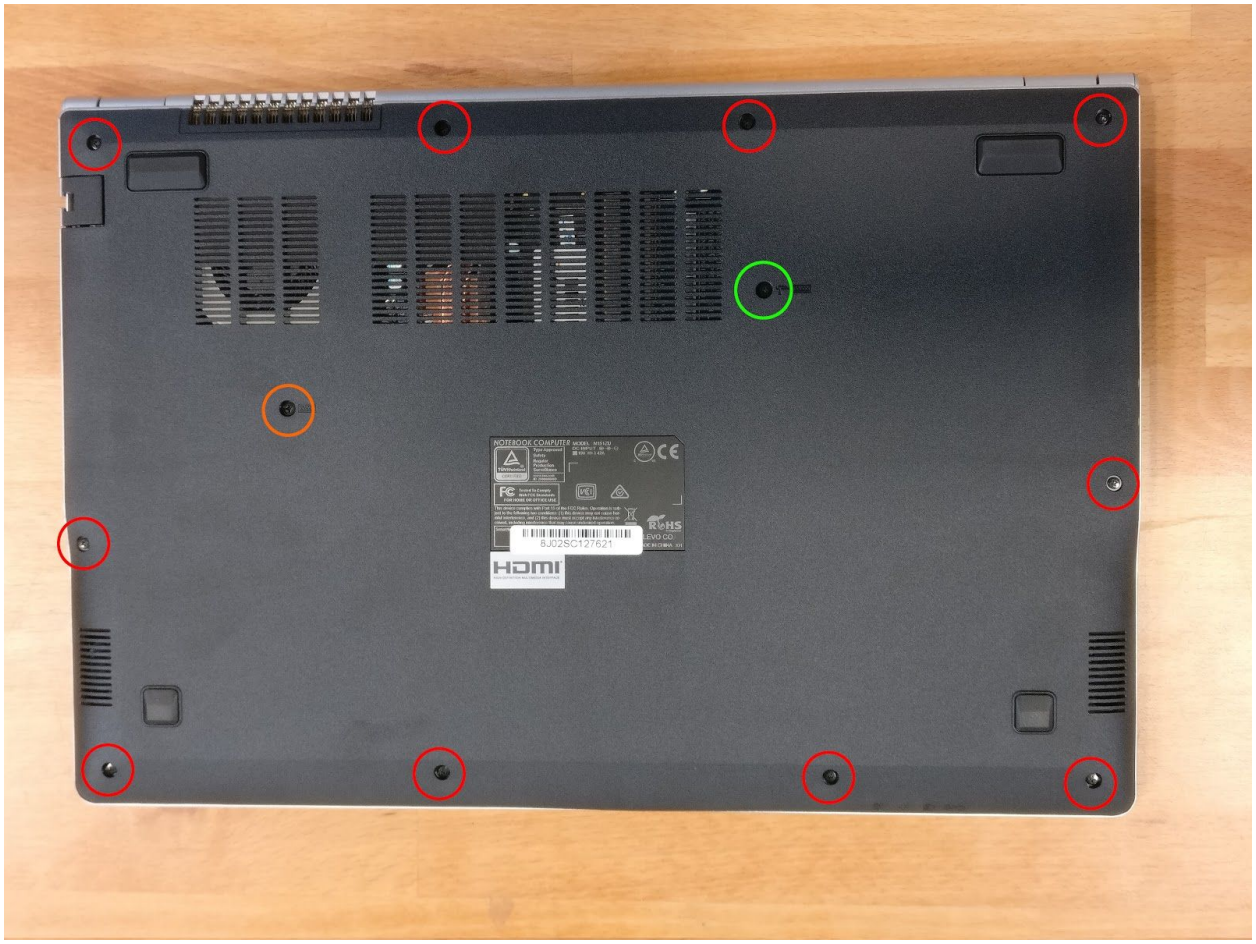
Steps to replace the keyboard

Photos are provided in order below these steps.

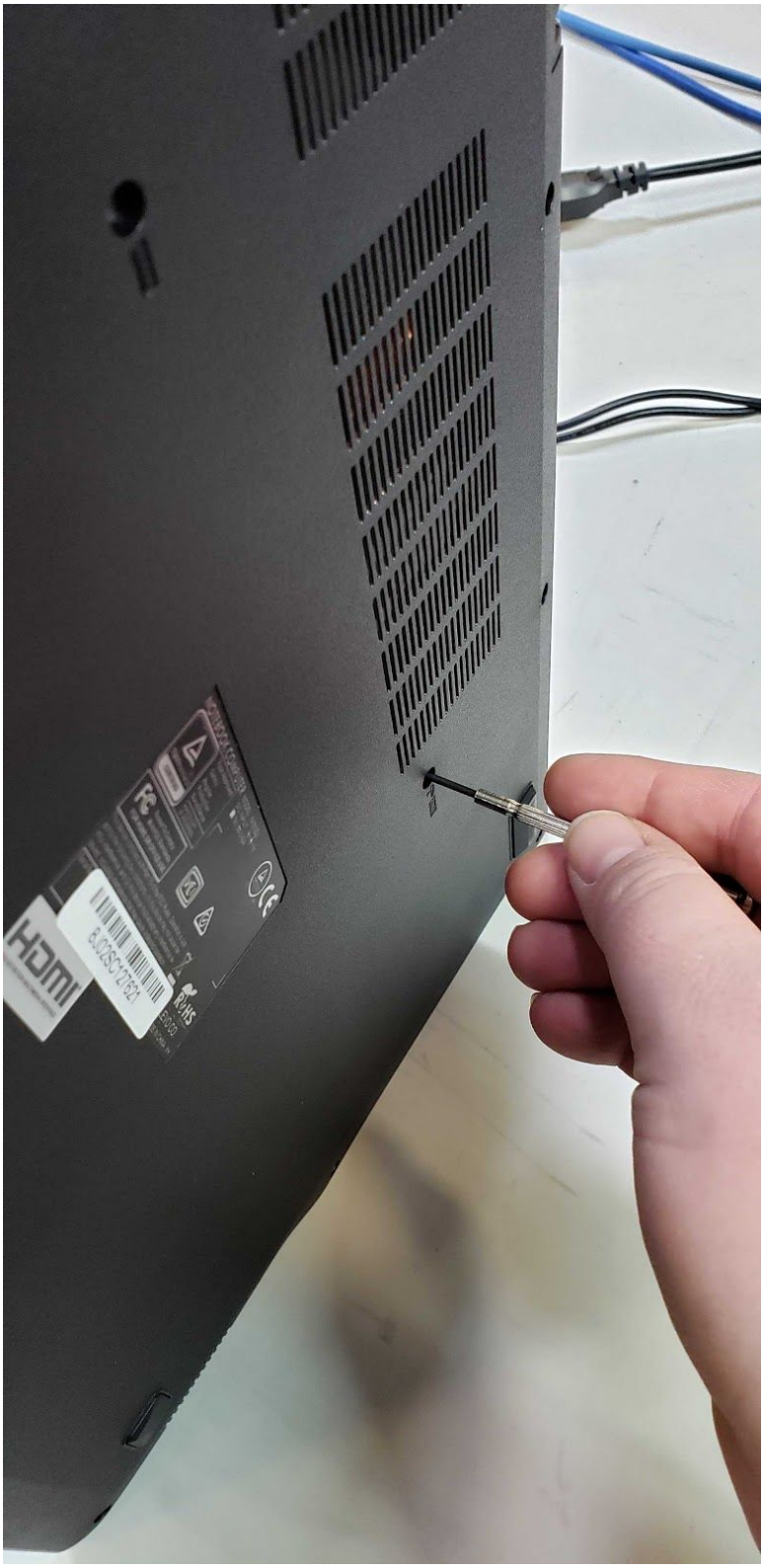
1. Find a surface suitable for work. A desk or table works well.
2. Place something soft on the table, like a towel or anti-static mat.
3. Place the Darter lid-side-down.
4. Remove the 3 keyboard screws, indicated by the small keyboard icon.
5. Open the Darter and place it on its side.
6. Push the screwdriver into the keyboard push point until the keyboard pops out.
7. Set the Darter down, then starting from the top side, pull the keyboard loose.
8. Flip the keyboard over onto the trackpad.
9. Pull the large ribbon cable out of the connector.
10. The small ribbon cable has a latch. Gently pull the latch from both sides and remove the ribbon cable.
11. Remove the keyboard and replace it with the new one.
12. Insert the large ribbon cable into the connector.
13. Seat the small ribbon cable, then apply pressure equally to both sides of the connector to secure.
14. Flip the keyboard over and press the bottom tabs of the keyboard into the case.
15. Secure the keyboard by pressing down on the edges of the keyboard.
16. Flip the Darter over.
17. Replace the 2 screws holding the keyboard in place.
18. Boot your Darter and confirm the keyboard is operational.

Photo guide for keyboard replacement

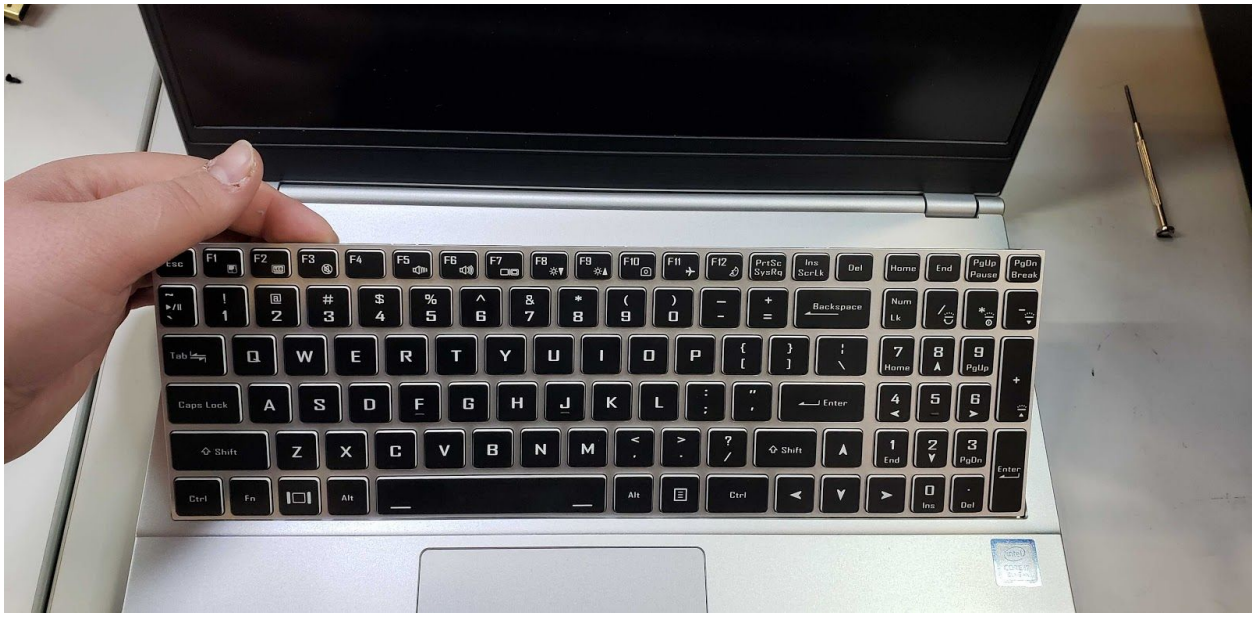
1. Darter lid-side-down. There are two keyboard screws and one is orange while the other is green indicating the keyboard push point.



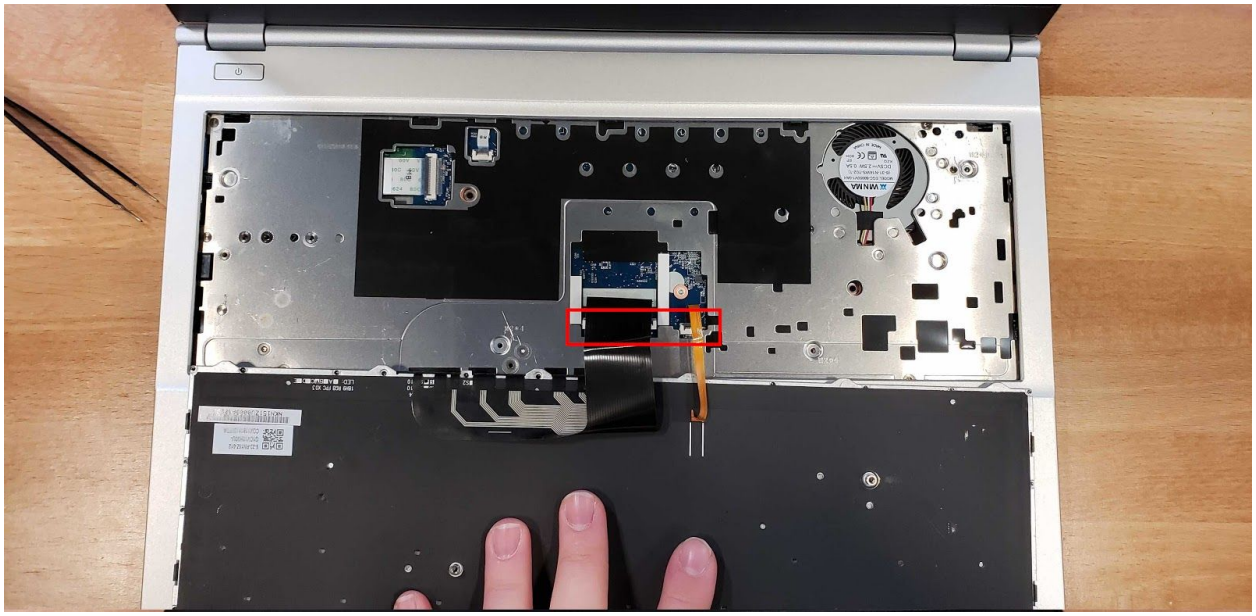
2. Darter on its side with screwdriver in keyboard push point.



3. Set the Darter down and remove the keyboard starting along the top edge.



4. Flip the keyboard over and rest it on the trackpad. Pull the large ribbon cable out of the connector. The smaller ribbon cable has a latch. Gently pull it forward to release the connector, then remove the ribbon cable.



Removing the bottom cover

Removing the cover is required to access the internal components. Prior to removing the cover, ensure the AC power is unplugged, and all peripherals (including SD cards and USB drives) are unplugged or removed from the system.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 10 minutes
Difficulty: Medium
Screws: 15 total:

- 10 small M2 perimeter, black
- 2 large M2 keyboard, black
- 3 small/short M2 under keyboard, silver

Steps to remove the cover

Photos are provided in order below these steps.

1. Find a surface suitable for work. A desk or table works well.
2. Place something soft on the table, like a towel or anti-static mat.
3. Place the Darter lid-side-down.
4. Remove the 10 ‘perimeter’ screws.
5. Remove the 2 keyboard screws, indicated by the small keyboard icon.
6. Open the Darter and place it on its side.
7. Push the screwdriver into the keyboard push point until the keyboard pops out.
8. Set the Darter down.
9. Starting from the top side, pull the keyboard loose.
10. Flip the keyboard over onto the trackpad.
11. Remove the 3 silver screws holding the bottom case in place.
12. Partially replace the keyboard, but don’t snap it into place.
13. Close the lid and flip the Darter lid-side-down again.
14. The bottom cover will lift off, starting from the front corners working to the back near the hinges.

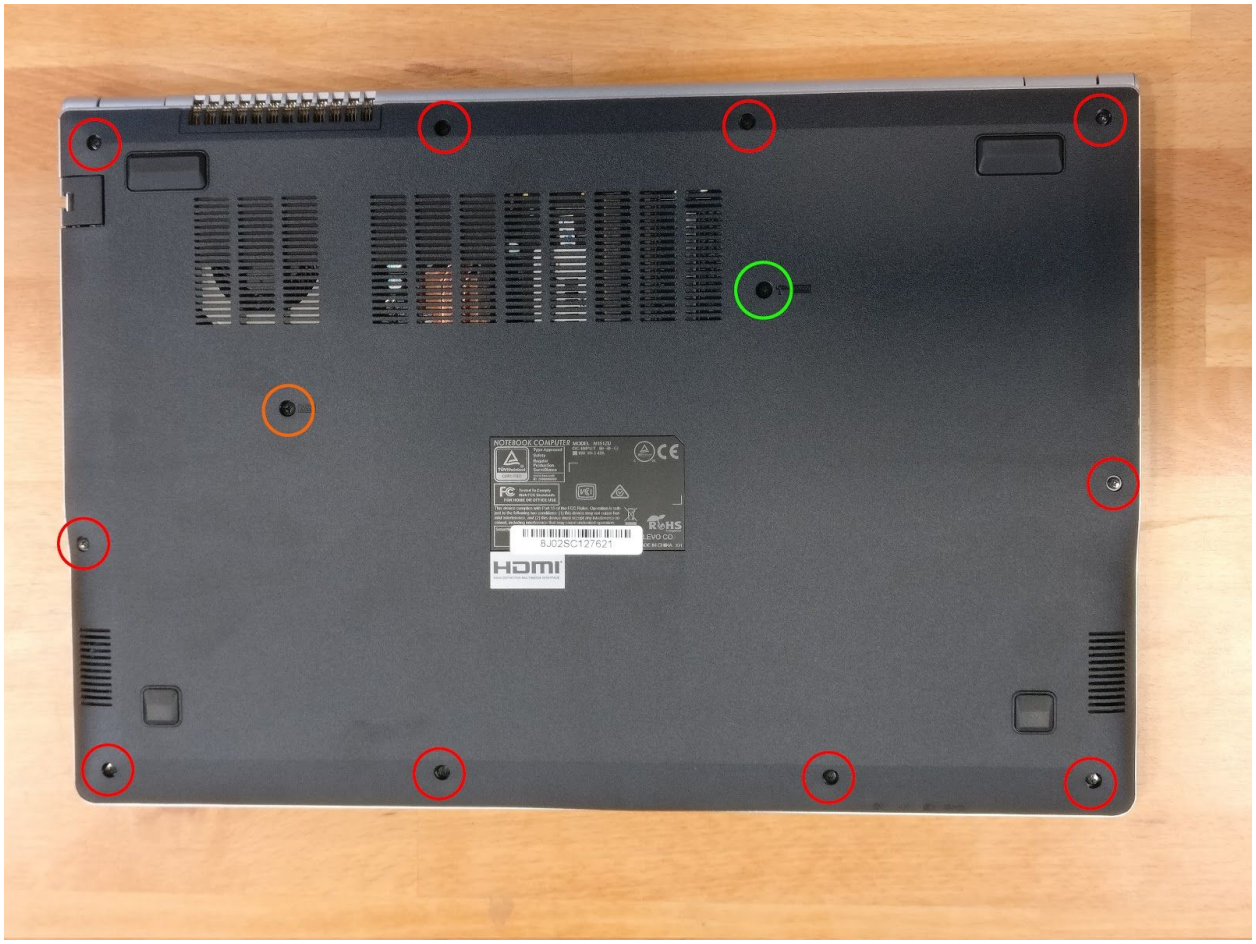
Steps to replace the cover

1. Align the bottom cover to the case towards the back and hinges.
2. Set the bottom cover along the edges and confirm the bottom cover is seated.
3. Replace the 10 perimeter screws.
4. Flip the Darter and replace the 3 silver screws from under the keyboard.

5. Replace the keyboard by inserting the tabs into the bottom edge near the trackpad and press around the edges of the keyboard to ensure it is fully snapped into place.
6. Flip the Darter and replace the 2 keyboard screws.

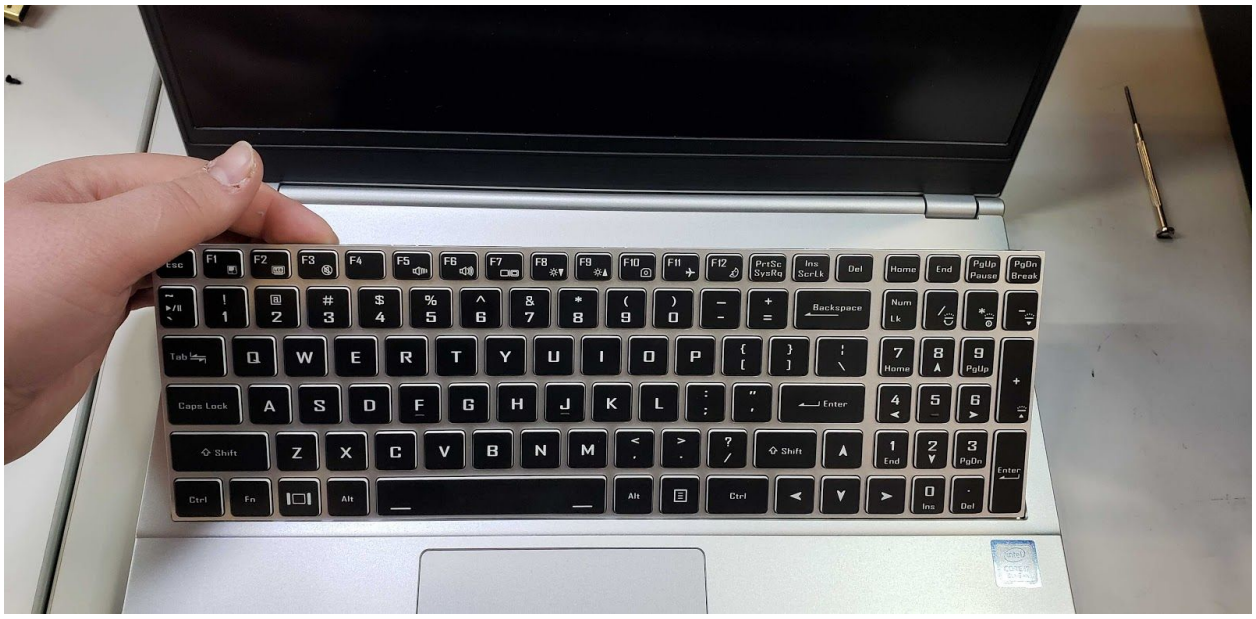
Photo guide for bottom cover removal/replacement

1. Darter lid-side-down. There are two keyboard screws and one is orange while the other is green indicating the keyboard push point.

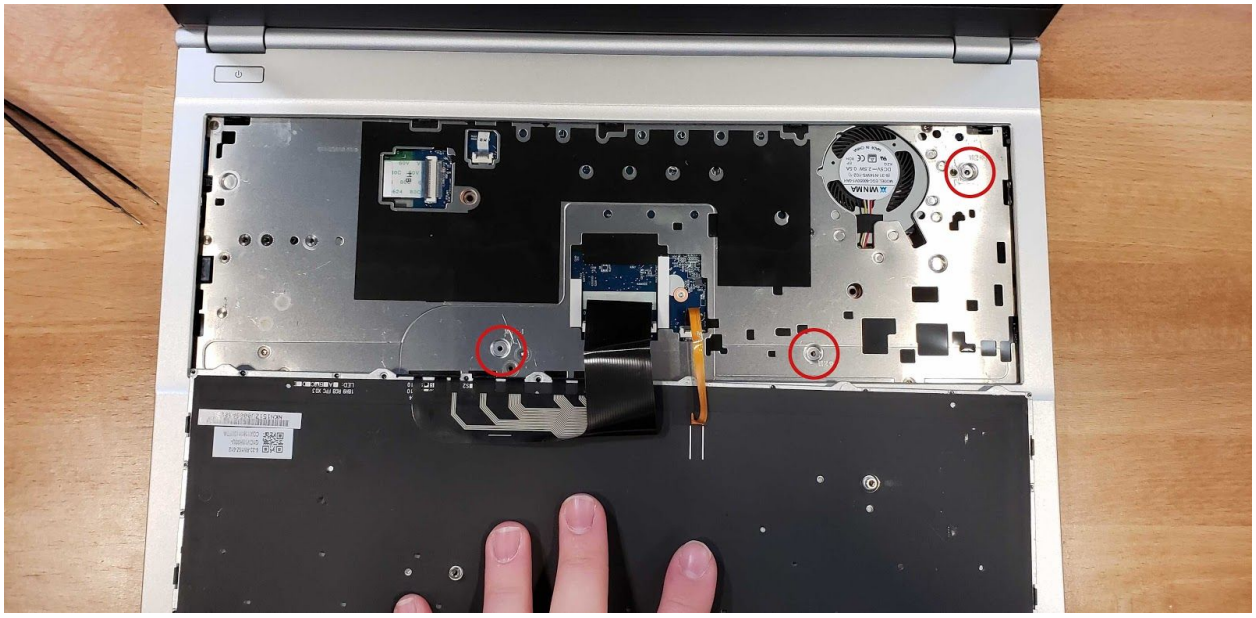


2. Darter on its side with screwdriver in keyboard push point. Push until the keyboard has popped out. This requires a solid amount of force.

3. Once the corner of the keyboard has popped, pull along the top edge of the keyboard to unseat it entirely.



4. Flip over the keyboard and remove the 3 silver screws. Their location is highlighted in blue. (Note: In this photo, the screws have already been removed.)



5. Set the keyboard mostly in place, close the lid, and flip the Darter lid-side-down.

6. Starting near the front corner, lift the bottom cover off the Darter.

Replacing the RAM

RAM acts as temporary storage for your computer. More RAM generally provides better performance. If you've purchased new RAM, need to replace your RAM, or are reseating your RAM, follow these steps.

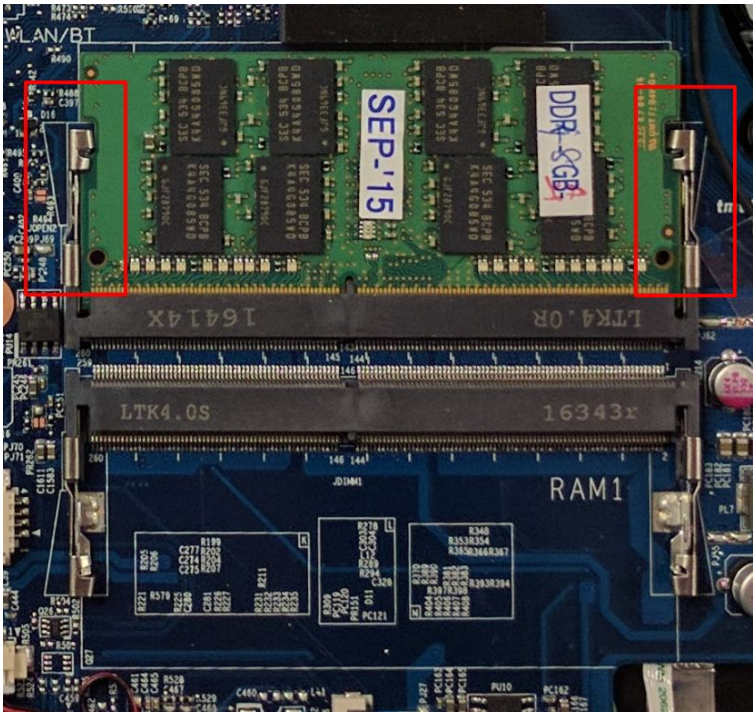
Tools required: Cross-head (Phillips) screwdriver
Time estimate: 15 minutes
Difficulty: Medium

Steps to replace the RAM

1. Follow the steps above to remove the cover.
2. Press the small tabs on both sides of the RAM simultaneously.
3. Remove the RAM from the slot.
4. Insert the new RAM (or reseat the existing RAM) by placing it in the keyed slot and pressing down on the RAM until it clicks into place.

Photo guide for replacing the RAM

1. Press the tabs indicated in red to release the RAM from the slot.



Replacing an M.2/NVMe SSD

M.2 SSDs offer, at minimum, SATA3 speeds and performance in a package about the size of a stick of gum. NVMe M.2 SSDs offer even higher performance. The Darter supports one M.2 SSD, size 2280, either M.2 SATA or NVMe M.2 PCIe Generation 4.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the M.2 drive

1. Follow the steps above to remove the cover.
2. Locate the M.2 drive (or drive slot).
3. Unscrew the retainer screw opposite the M.2 slot.
4. Remove the existing M.2 drive by pulling it out of the slot.
5. Insert the new M.2 drive into the slot and hold it in place.
6. Replace the retainer screw.

Replacing the CPU fan

If the CPU fan becomes noisy and cleaning it out doesn't fix the issue, you may need a new CPU fan. Contact Support to start a warranty claim or parts purchase.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the CPU fan

1. Follow the steps above to remove the cover.
2. Locate the CPU fan.
3. Unplug the CPU fan from the motherboard.
4. Remove the 2 screws holding the CPU fan in place.
5. Remove the CPU fan.
6. Insert the new CPU fan.
7. Replace the 2 screws.
8. Plug the new CPU fan into the motherboard.

Replacing the CPU heatsink/thermal paste

In rare cases, or after several years, it may be necessary to apply new thermal paste between the CPU and the heatsink. Thermal paste helps facilitate effective heat transfer between the CPU and the cooling equipment. These instructions can also be used in the unlikely event your heatsink needs replacing.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: High

Steps to replace the CPU heatsink/thermal paste

1. Follow the steps above to remove the cover.
2. Locate the CPU heatsink screws.
3. Remove the screws, starting with #3, then #2, and lastly #1.
4. Carefully remove the heatsink from the case.
5. Using a paper towel, remove the existing thermal paste. You may also use a small amount of rubbing alcohol to remove excess or difficult-to-remove paste.
6. After cleaning the CPU and heatsink, apply a small line of thermal paste directly onto the CPU core.
7. Carefully replace the heatsink.
8. Replace the screws, starting with #1, then #2, and lastly #3. Do not fully tighten #1 and #2 until #3 is in place, then fully tighten all screws.

Replacing the CMOS battery

The CMOS battery supplies power to the Darter's CMOS chip. Changes you make to the BIOS and the computer's hardware clock are stored on the CMOS. If your Darter doesn't boot, you can reset the CMOS to force a low-level hardware reset. If your clock is constantly resetting, it's likely your CMOS battery needs replacing.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the CMOS battery

1. Follow the steps above to remove the cover.
2. Locate the CMOS battery. There is a red and black wire connecting the battery to a white connector.
3. Unplug the white connector for 1 minute, then reseat the connector.
4. Power up the Darter. The system may power itself off and on after initial boot, this is normal.
5. Press Enter at the CMOS/BIOS reset message prompts.
6. If you are booted into the BIOS, press F4 to load defaults, then F10 to save and resume normal boot.

Replacing the internal battery

The battery provides primary power whenever the system is unplugged.

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the internal battery

1. Follow the steps above to remove the cover.
2. Unplug the white connector above the battery.
3. Remove the 7 screws holding the battery in place.
4. Remove and replace the battery.
5. Replace the 7 screws and plug in the battery.

Replacing the WiFi/Bluetooth module

Your Darter's WiFi and Bluetooth are both handled with the same module. It is a standard M.2 2230 slot with PCIe & USB Interfaces (A Key).

Tools required: Cross-head (Phillips) screwdriver
Time estimate: 5 minutes
Difficulty: Medium

Steps to replace the WiFi/Bluetooth module

1. Follow the steps above to remove the cover.
2. Locate the wireless module.
3. Gently remove the two antennas by pulling them up and away from the wireless module.
4. Remove the retaining screw opposite the M.2 slot.
5. Remove the wireless module from the slot.
6. Insert the new wireless module.
7. Replace the retaining screw.
8. Attach the two antennas by aligning the circular fitting and pressing onto the wireless card. The connector will snap into place. **Use caution when attaching the connectors, the pins can bend, break, or snap.**

BIOS utilities

When starting your Darter, it takes a few seconds to conduct a quick check of the components. As it proceeds, it will notify you if anything is wrong. Any issues that prevent the system from booting will be displayed and you will be prompted to enter the Setup. If no problems are detected, your Darter will load GRUB and then Ubuntu/Pop!_OS,.

For Setup/BIOS, hold F2 while booting.
For boot options, hold F7 while booting and choose your preferred boot device.

Updating the BIOS

BIOS updates and instructions are sent out as needed. System76 will notify you if a BIOS update is available for your Darter.

BIOS overview

The Setup/BIOS utility allows you to make low-level changes to your Darter. It's not recommended to make changes unless the settings are provided by Support, or if you understand what you're changing.

Main menu

Option	Description
SATA Port #	Pressing Enter opens the sub-menu to show the configuration of a SATA device on the SATA ports.
OffBoard SATA/NVMe Controller Configuration	Pressing Enter opens the sub-menu to show the configuration of any devices on the offboard SATA/NVMe controller, if installed.
System Date/Time	Set the system date/time using the hardware clock.
System/Extended Memory	Information on the amount of RAM installed.
ME FW/ MB Series/ BIOS Version/ KB/EC Firmware Rev.	Information on the BIOS version(s) and network adapter address.

Advanced

Option	Description
Advanced Chipset Control	Options for VT-d, FlexiCharger, SGX, Fast Boot, DDI Control
> VT-d	Enable/disable Intel Virtualization Technology for Directed I/O. Extends Intel Virtualization Technology (VT) by providing hardware assets for virtual hypervisors.
> FlexiCharger	The sub-menu here allows you to enable/disable the FlexiCharger. The FlexiCharger can be set to automatically start charging your battery when the battery reaches a certain capacity level (e.g. you could start the battery charge level at 40%). You can then set the level to stop charging (e.g. 100%), but the stop charge level must be higher than the start charge level. **It is not recommended to enable FlexiCharger for extended periods of time.**
> SW Guard Extensions	Enable or disable Intel SGX (Software Guard Extensions.)
> Fast Boot	Enables or disables boot with initialization of a minimal set of devices required to launch the active boot option. This has no effect for BBS boot options.
Intel(R) Thunderbolt	Options for the Thunderbolt 3 bus.
> Thunderbolt Support	Enable or disable support for Thunderbolt 3.
> Security Level	Determines if the Thunderbolt port is allowed to send data or only video. Options are Legacy Mode (allow all data transfer), Unique ID or One Time Saved Key, and DisplayPort++ Only.
> DDI Control	Determines the Digital Display Interface (DDI) output mode. Can be set to MiniDP (mDP) or Thunderbolt (TBT).
SATA Mode	The SATA (Serial ATA) controller is designed to operate in AHCI (Advanced Host Controller Interface) mode only.
Power on boot beep	Enable/disable a beep as the computer starts up.
Battery low alarm beep	Enable/disable a beep when the battery is critically low.

Security

Option	Description
Set Supervisor Password	Sets a password for the Setup Utility. This does not affect access to the computer or Ubuntu/Pop!_OS,/Pop!_OS, only the BIOS.
Secure Boot	Enables support for Secure Boot. This is not recommended or required for Ubuntu/Pop!_OS.

Administer Secure Boot

Option	Description
Secure Boot	Enables support for Secure Boot. This is not recommended or required for Ubuntu/Pop!_OS.

Boot

Option	Description
Network Stack	Enable or disable support for Intel PXE network boot.
> Ipv4 PXE Support	Allow PXE booting using IPv4.
> Ipv6 PXE Support	Allow PXE booting using IPv6.

Boot Manager

Option	Description
Boot Option Priorities	Determine the boot order for system devices. Boot option #1 will be tried first. It's recommended to set your boot drive as the 1st option and use the F7 key when temporarily booting from an external device or PXE booting

Specifications

Component	Specification
Processors	**Intel® CoreTM i7-8565U (4.60GHz)** 1.8 up to 4.60 GHz - 8MB Cache – 4 Cores – 8 Threads **Intel® CoreTM i5-8265U (3.90GHz)** 1.6 up to 3.90 GHz - 6MB Cache – 4 Cores – 8 Threads
Display	15.6 1920x1080 Full HD Backlit display
Memory	Dual Channel **DDR4** Two 260 Pin SO-DIMM Sockets Supporting **DDR4 2400 MHz** Memory Modules (real operational frequency depends on the FSB of the processor) **Memory Expandable up to 32GB** Compatible with 8GB or 16GB Modules
Graphics	**Intel® UHD Graphics 620** Dynamic Frequency Intel Dynamic Video Memory Technology
Storage	One M.2 SSD 2280, SATA/PCIe Gen 3 x4 Interface
Audio	High Definition Audio Interface

	Built-In Stereo Microphone 2 Stereo Built-In Speakers

Component	Specification
Touchpad & Keyboard	ClickPad with Multi- Gesture and Scrolling Functionality A4 Size Isolated Keyboard
Webcam	720p HD Video Camera Module with USB interface
Interfaces	Two USB 3.0 (USB 3.1 Gen 1) Port (Type-A) One USB 3.0 (USB 3.1 Gen 1/Thunderbolt 3) Port (Type-C) One USB 2.0 Port (Type-A) One HDMI-Out (High-Definition Multimedia Interface) Port (with HDCP) One Mini DisplayPort One Microphone-In Jack One RJ-45 LAN Jack One DC-In Jack One Combo Jack
Card reader	Embedded Multi-In-1 Card Reader - MMC/ RS MMC - SD/ Mini SD / SDHC/ SDXC
M.2 Slots	**Two** M.2 Card Slots: **Slot 1** for M.2 2230 WLAN Combo Module with PCIe & USB Interfaces (A Key) **Slot 2** for SSD M.2 2280 Card with SATA / PCIe Gen 3 x4 Interface (M Key)
Network	Built-In 10/100/1000Mb Base-TX Ethernet LAN

	Intel® Dual Band Wireless-AC 8265 (2*2 802.11 a/c) WLAN + Bluetooth M.2 2230 Combo Module (867Mbps)

Component	Specification
Power and battery	Full Range AC/DC Adapter AC input 100 - 240V, 50 - 60Hz, DC Output 19V, 3.42A (65 Watts) Embedded Smart Lithium Ion Battery Pack 54.5WH
Security	Security (Kensington® Type) Lock Slot BIOS Password Trusted Platform Module 2.0 (disabled by default)
Operating System	Ubuntu/Pop!_OS,/Pop!_OS
Indicators	LED Indicators - Power/Suspend, Battery, HDD, Airplane Mode, Camera
Environmental	Temperature Operating: 5°C - 35°C Non-operating: -20°C - 60°C Relative humidity Operating: 20% - 80% Non-operating: 10% - 90%
Dimensions & Weight	Height x Width x Depth 0.78” x 14.19” x 9.63” 3.6lbs, 1.6kg base weight, varies with configuration.