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Microsoft Surface

Surface Pro 9 with 5G Service Guide

SG

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Introduction

This Service Guide (Guide) provides instructions for repairing Microsoft Surface devices using genuine Microsoft parts. It is intended for technically inclined individuals with the knowledge, experience, and specialized tools required to repair Microsoft devices.

IMPORTANT: Read this Guide in its entirety before starting any repairs. If at any point you are unsure or uncomfortable about performing the repairs, as detailed in this Guide, **DO NOT** proceed. Contact Microsoft for additional support options.

WARNING: Failure to follow the instructions in this Guide; use of non-Microsoft (non-genuine), incompatible, or modified replacement parts; and/or failure to use proper tools could result in serious personal injury, death, and/or damage to the product or other property.

Device Identity Information

Surface Pro Models

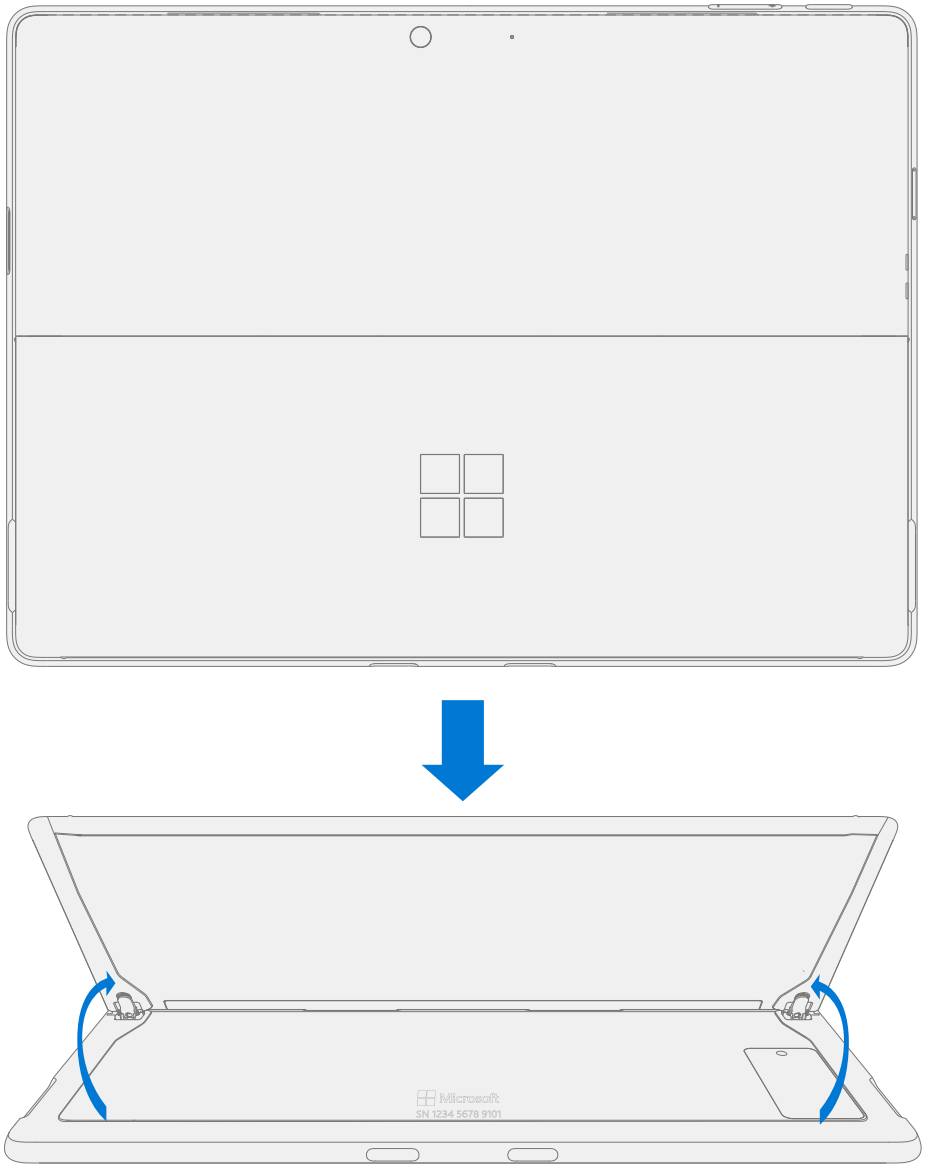
1996 –Surface Pro 9 with 5G (Sub6)

1997 – Surface Pro 9 with 5G (mmWave)

Surface Support – Pro: Link

Surface Technical Specifications: Surface Pro 9 with 5G

The rSSD drive size, model number, and serial number for Surface Pro 9 with 5G are located under the kickstand.



Glossary of Terms

The following terms are used throughout this guide.

- **ASP** – Authorized Service Provider. Companies that have received clearance to repair or maintain a product that is still under warranty by Microsoft.
- **BMR** – Bare Metal Recovery refers to the clean imaging process
- **Chassis or IBC** – Tablet Back Cover
- **CPU** – Central Processing Unit
- **CRU or Commercial Spares** – Customer Replaceable Units. Service parts that can be removed and replaced by the customer.
- **Display or TDM** – The Touch Display Module, the complete screen with all layers
- **ESD** – Electro-Static Discharge
- **FPC** – Flexible Printed Circuit Connections
- **FRU** – Field Replaceable Units. FRUs are available only to ASPs. Some replaceable units will only be available as FRUs and therefore are only supported at an ASP.
- **IPA** – Isopropyl alcohol which should be used to clean adhesive from device as detailed within process steps. Use 70% IPA in all cases.
- **Motherboard or PCBA** – Primary circuit board assembly
- **OS** – Operating System
- **PSA** – Pressure Sensitive Adhesive
- **rSSD** – Removable Solid-State Drive
- **SDT** – Surface Diagnostic Toolkit
- **SoC** – System-on-a-chip, a microchip with several electronic circuits and parts in a single integrated circuit.
- **Spudger** – A tool that is used to assist with opening, prying, installing, and removing components from objects such as electronics. Usually plastic.
- **THM or Thermal Module** – An assembly with heat spreaders and electric fan
- **TIM** – Thermal interface material used between the THM and PCBA

General Information, Precautions, Warnings

⚠ This symbol identifies important safety and health information in this guide.

This symbol identifies important information in this guide.

! This symbol identifies important cautions in this guide.

Service Tools

Microsoft Recommended Service Tools

- ESD-safe battery cover

Microsoft Provided Software Tools / References

- Surface Power Supply
- How To: Update Surface device firmware and OS
- How To: Surface Tools Video
- Download: Surface drivers and firmware
- Download: Surface Diagnostic Toolkit (SDT)
- Download: Surface Data Eraser
- Download: Surface Imaging Tools

Microsoft Service Tools

- Surface dock
- SIM eject tool (or equivalent 0.58 mm / 0.023 in. diameter paperclip)
- Display debonding tool (M1214770-001)
- Display bonding frame (M1260233-001)

Standard Service Tools

- Anti-static wrist strap (1 MOhm resistance)
- ESD-safe benchtop
- Gloves
- Safety Glasses
- Spudger tool
- Plastic Opening Pick (example iFixit Opening Picks)
- Bucket of Sand (1 gallon)
- Clean, dry, untreated sand (0.5 gallon)
- Exterior monitor (with HDMI connection)
- USB-C to HDMI adapter
- Non-metallic ruler
- Isopropyl alcohol Dispenser bottle (use 70% IPA)
- Goo Gone
- Cleaning swabs
- ESD-safe tweezers
- USB keyboard
- USB Thumb drive

Standard Service Tools (continued)

- Two 2-in. spring clamps
- Display Bonding weight
  - Weight Requirement: minimum 32 kg (70 lbs.) / maximum 35 kg (77 lbs.)
  - Minimum Dimensions: 280 mm x 200 mm (11 in x 8 in)
  - Geometry must be symmetrical, to allow for even weight distribution.
  - Weight used must be a flat plate, with consistent flatness and not protrude from contact plane with Bonding Frame
  - Weight must contact the full perimeter of the frame when placed above it.
  - Weight must be in place for 2 minutes.
  - Recommended weights: Ruck Plates of 9 kg + 9 kg + 14 kg (20 lbs. + 20 lbs. + 30 lbs.)
  - Alternate weights: Steel Shot Bags of 9 kg + 9 kg + 14 kg (20 lbs. + 20 lbs. + 30 lbs.)
- Foam Pad (comes with bonding frame, recommended McMaster PN: 86095K43)
- 3IP (Torx-plus) driver
- 4IP (Torx-plus) driver
- Loctite 649
- Loctite 243
- Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
- Cotton swab
- USB drive
- Wired Ethernet connection to the Internet
- USB keyboard
- Microfiber / lint free cloth

The tools identified on this list can be purchased from many different commercial sources, including but not limited to Amazon.com, iFixit, Chemdex, and other vendors.

ASPs refer to the ASP Guidebook for Microsoft tools.

General Safety Precaution

⚠ Always observe the following, general safety precautions:

- Opening and/or repairing any electronic device can present a risk of electric shock, fire, serious personal injury, death, damage to the device or other property, and/or other hazards. Exercise caution when undertaking the repair activities described in this Guide. The repair activities identified in this Guide should only be undertaken by technically inclined individuals with the knowledge, experience, and specialized tools required to repair Microsoft devices.
- Improper use or handling of devices or their batteries may result in fire or explosion. Only open the enclosure on a device as outlined in this Guide.
- Do not heat, puncture, mutilate, or dispose of devices or their batteries in fire. Do not leave or charge devices in direct sunlight or expose devices or their batteries to temperatures outside the recommended operating range of 0°C to 60°C/32°F to 140°F for an extended period. Doing so can result in battery failure, electric shock, fire, serious personal injury, death, and/or damage to the device or other property.
- We recommend wearing protective eyewear and gloves when disassembling/re-assembling a device.

For additional product safety information relevant to Microsoft Surface devices, see aka.ms/surface-safety or the Surface app. To open the Surface app, select the Start button, enter Surface into the search box, then select the Surface app.

Repair-Specific Precautions and Warnings

- For Autopilot managed Surface Products refer to the following guidelines posted here.

> ⚠ **WARNING:** Before opening a device, ensure it is powered off and disconnected from its power source. Disconnect the device charger or power cord from mains power.

- For devices with rechargeable lithium-ion batteries that power on, fully discharge the battery before beginning repair. To expedite the battery discharge process:
  - Disconnect the charger from the device.
  - Increase display brightness to the highest level.
  - Turn on wi-fi and Bluetooth.
  - Open the Camera app in Windows.
  - Play music or video files from a local drive or streaming service.

Operate the device in this mode until the battery is fully discharged and the device powers off.

> ⚠ **WARNING:** For Surface devices where the battery is affixed to the back cover, place the back cover with the battery in a location where it will be protected from possible punctures, impacts, crushing, or drops during the repair process. Refer to the Battery Safety section in this guide for more information.

- Ensure your work surface is level/flat and covered with ESD-safe, soft, non-marring material.
- We recommend wearing protective eyewear as a safety precaution when disassembling/re-assembling a device.
- Clean your work surface regularly to remove debris and abrasive particles.
- Review and follow the general guidelines and ESD compliance steps in this Guide prior to beginning work. Refer to the Prior to Device Disassembly section in this Guide for more information.
- Before opening a device, always wear an anti-static wrist strap and confirm your work area is properly grounded to protect vulnerable electronics from electrostatic discharge (ESD).
- Parts removed from a device during the repair process should be stored in ESD-safe bags and packaged for return or recycling in the same packaging that the new replacement part came in.
- If battery damage (e.g., leaking, expansion, folds or other) is discovered during device repair or if the battery is impacted or damaged during replacement, DO NOT proceed. Refer to the ASP Guidebook or contact Microsoft directly for proper device disposition.
- As you remove each subassembly from the device, place the subassembly (and all accompanying screws) away from the work area to prevent damage to the device or to the subassembly.
- During all activities (excluding feet-only replacement) check to ensure that no loose articles are on the back cover or remain inside the device before reassembling it.

> **IMPORTANT:** Remove rSSD (removable Solid-State Drive) whenever C-cover is removed from device. rSSD removal disconnects the battery from all device logical components for safety purposes. Refer to Procedure-Removal (rSSD) section for details.

> **IMPORTANT:**Whenever the rSSD has been removed, powering on the device requires that the rSSD and C-cover are installed. Refer to Procedure - Installation (rSSD) section for details.

- Review the General Safety Precautions and Battery Safety Sections of this Guide before beginning work. Refer to the "Prior to Device Disassembly" section of the Guide for additional details.
- Check to make sure that general guidelines and ESD compliance steps are followed prior to starting activities. Refer to Prior to Device Disassembly section on (page 18) for details.

- Device Serial Number Notation – The Surface device serial number for this model is located on the bottom of the chassis. When the chassis is replaced during service/repair, the device serial number becomes physically disconnected from the customer's device. To ensure the customer has the best experience if any future Microsoft support is required, it is recommended to create a notation of the device serial number and provide it to the customer upon completion of the repair.

Battery Safety

- This device contains a built-in, lithium-ion rechargeable battery. Battery safety is a significant concern when repairing a device.
- For optimum compatibility, performance, and product safety, we recommend using genuine Microsoft replacement parts. Use of non-Microsoft (non-genuine), incompatible, reused, or modified batteries; improper battery installation; improper handling or storage of batteries; and/or failure to follow the instructions in this Guide could cause battery overheating, expansion, venting, leaking, or a thermal event which could result in fire, serious personal injury, death, data loss, or damage to the device or other property damage.
- Before beginning device repair, ensure your workspace is free of flammable debris or materials, has adequate ventilation, and that you have a fire suppressant device (example: fire blanket, container of sand, Class B fire extinguisher) within easy reach or you are within 20 feet of a fireproof enclosure. Fireproof enclosures should be kept free of combustible or flammable materials.
- Use personal protective equipment (PPE) when handling damaged, venting, or hot battery packs.
- Use the following best practices when handling batteries:
    - Always fully discharge batteries by running an application such as video playback with the device unplugged. If the device does not function while unplugged, you may leave out this step.
    - Do not puncture, impact, strike, bend, or crush the battery or a device containing a battery.
    - Keep your workspace clear of debris, extra tools, and sharp objects.
    - Exercise caution when using sharp tools near the battery to avoid impacting or poking the battery.
    - Don't leave loose screws or small parts inside the device.
    - Avoid using tools that conduct electricity.
    - Do not drop or throw a lithium-ion battery.
    - Do not expose the battery to excessive heat, sunlight, or temperatures outside the battery's normal operating range (0°C to 60°C)/(32°F to 140°F).
    - Ensure you handle, recycle, and/or dispose of used or damaged batteries in accordance with local laws and regulations. Follow Handling Used, Damaged or Defective Li-ion Batteries below.
- If device repair cannot be completed immediately and the device needs to be stored temporarily before restarting the repair:
    - Select a storage location and process that follows the battery safety precautions in this Guide.
    - Avoid exposing the device to environmental conditions and objects that could damage the battery pack.
    - Reinspect the battery pack as outlined in this Guide prior to restarting repair and installing the new battery pack.

Lithium-Ion Battery Inspection

Upon device opening, we recommend that you visually inspect the battery for signs of damage. Factors to consider when inspecting the battery include, but are not limited to:

- Evidence of leaking or venting
- Visible signs of physical or mechanical damage, such as:
  - Expansion or swelling. In expanded or swollen batteries, the soft pouch encasing the cell pulls away from the inner material and appears baggy, loose, or puffy.
  - Discoloration of the battery casing.
  - Odor, smell, or visible corrosion. Leaked battery electrolyte smells like nail polish remover (acetone).
  - Dents along the battery cell edges or on the top surface.
  - Surface scratches that have exposed the aluminum beneath the black coating layer on the battery.
  - Loose or damaged wires.
  - Known misuse or abuse.

Any battery exhibiting the signs listed above must be replaced. Consult the Battery Replacement section of this document for battery replacement instructions.

Handling Used, Damaged, or Defective Lithium-Ion Batteries:

- DO NOT dispose of used lithium-ion batteries, whether damaged or not, in household or commercial garbage or recycling bins.

  ⚠ **WARNING:** DO NOT SHIP DAMAGED OR DEFECTIVE BATTERIES ALONE OR INSIDE DEVICES. Damaged or defective batteries and devices containing damaged or defective batteries require special packaging and handling. Prior to transport:

  - Follow all instructions provided by your local e-waste recycling or household hazardous waste collection provider.
  - Place the device or battery in an individual, non-metallic inner packaging, such as a zip-to-close plastic bag, that completely encloses the device or battery.
  - Surround the inner packaging with non-combustible, electrically non-conductive, absorbent cushioning material.
  - Each damaged battery or device containing a damaged battery should be packed individually in its own carton and that carton should be clearly marked as containing a damaged battery.

For more information on industry practices concerning damaged, defective, or recalled batteries, please see PHMSA Lithium-Battery-Recycling-Safety-Advisory.

Undamaged, used lithium batteries can be sent to e-waste recycling or household hazardous waste collection points for processing. Please see https://www.microsoft.com/en-us/legal/compliance/recycling for more information.

Report Battery Thermal Events to Microsoft

A thermal event is a rapid chemical chain reaction that can occur inside a battery cell. During a thermal event, the energy stored inside the battery is released suddenly, resulting in heating and/or smoke and, in some instances, fire or flame. A battery thermal event can be triggered by physical damage to the battery (including during replacement/repair), improper storage, or exposure to temperatures outside of the battery's operating range.

Act immediately if you see any of the following symptoms of a battery thermal event:

- Smoke, soot, sparks, or flame emitted by the battery or from a device containing a battery.
- The battery pouch suddenly expands in size.
- A popping or hissing noise from the battery or a device containing a battery.

Actions to take:

- **DO NOT use water. Immediately smother** the battery or device with clean, dry sand, a fire blanket, or an appropriate (Class B) fire extinguisher. If using sand, dump the sand all at once until the device is completely covered.
- **Contact** local fire authorities if further assistance is needed.
- **Exit** the work area and ventilate it until it is clear of smoke.
- **Wait** at least 2 hours before attempting to touch the device.
- **Dispose** of the damaged battery or device in accordance with local environmental or e-waste laws and guidelines.

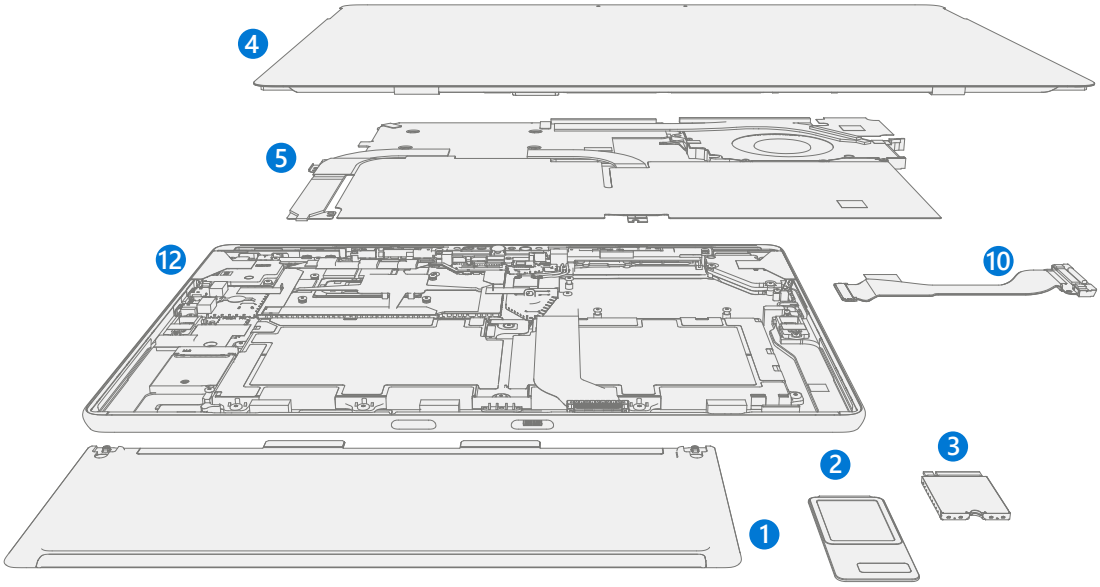
> ⚠ **WARNING:** DO NOT SHIP DAMAGED OR DEFECTIVE BATTERIES ALONE OR INSIDE DEVICES. Damaged batteries and devices containing damaged batteries require special packaging and handling. See Handling Used, Damaged, or Defective Lithium-Ion Batteries in this Guide for additional information.

Stop Repair and Contact Microsoft

If any Microsoft device visually exhibits any of the following symptoms, cease all further repair efforts and contact Microsoft Surface Customer Support to report and obtain next steps:

- Any burned or melted components, traces, or plastic parts on the outside of the device, or which otherwise exhibits heat damage, including charring seen in charging and other ports.
- Any burned or melted components, traces, or plastic parts on the inside of the device, or which otherwise exhibits heat damage.
- Any accessories exhibiting melting or heat damage that are included with the Microsoft device, such as power supplies, keyboards, mice, cables, charging connectors, etc.
- Any devices that exhibit a case that has separated apart or opened for reasons other than impact damage from dropping, evidence of tampering, or separation caused by a malfunctioning battery.
- Any other finding that may constitute a safety hazard to the user, such as sharp edges on plastics. Microsoft Surface Customer Support will ask you to provide the following information:
  - The model and serial number of the affected Microsoft Surface device and/or accessory(ies).
  - A brief description of the damage found.
  - Clear photographs depicting the symptoms observed.

Illustrated Service Parts List



IMPORTANT: Device service part availability is segmented into two groups. FRUs are parts available for repair activity through an Authorized Service Provider under specific contract with Microsoft. CRUs/ Spares are parts available for repair activity by a skilled technician.

Item	Component	FRU/ASP Part No.	CRU Part No.
(1)	**Kickstand**		
	Platinum Sub6	TIU-00001	TLB-00001
	Platinum mmWave	TIU-00002	TLB-00002
(2)	**SSD Door**		
	Platinum	TIY-00001	TM8-00001
(3)	**Removable Solid-State Drive (NOTE: rSSD size must be same as original**		
	rSSD 128 GB	TIV-00001	TLI-00001
	rSSD 256 GB	TIW-00001	TM1-00001
	rSSD 512 GB	TIX-00001	TM6-00001
(4)	**Touch Display Module**		
	TDM	TIP-00001	TK8-00001
(5)	**Thermal Module + Fan**		
	THM	TG1-00001	TL8-00001
(6)	**Speakers**		
	Left & Right	TJB-00001	TN1-00001
(7)	**Power Button + Volume Buttons**		
	Platinum	TJI-00001	TN8-00001
(8)	**Cameras**		
	Rear Camera	TJ1-00001	TMI-00001
	Front Camera	TIZ-00001	TMB-00001

Item	Component	FRU/ASP Part No.	CRU Part No.
(9)	**Camera Deck**		
	Camera Deck Worldwide	TJ8-00001	TMM-00001
(10)	**Surflink**		
	Surflink Worldwide	TIQ-00001	TKB-00001
(11)	**Battery**		
	Battery	WFP-00001	WIA-00001
(12)	**Back Cover / Chassis**		
	Platinum	WFR-00001	WID-00001
(13)	**Motherboard (PCBA)**		
	SQ3, 16GB RAM, mmWave	WFQ-00001	WIC-00001
	SQ3, 8GB RAM, mmWave	WFQ-00002	WIC-00002
	SQ3, 16GB RAM, Sub6	WFQ-00003	WIC-00003
	SQ3, 8GB RAM, Sub6	WFQ-00004	WIC-00004

Service Diagnostics/Troubleshooting Overview

- For general Surface support, visit www.support.microsoft.com
- To troubleshoot device feature/function problems or learn more about Surface Pro visit www.aka.ms/SurfaceProHelp
- If you'd like to learn more about Windows, visit aka.ms/WindowsHelp
- To learn more about the accessibility features of the Surface Pro, go to the online user guide at aka.ms/Windows-Accessibility

Software Tools

- How To: Update Surface device firmware and OS
- How To: Surface Tools Video
- Download: Surface drivers and firmware
- Download: Surface Diagnostic Toolkit (SDT)
- Download: Surface Data Eraser
- Download: Surface Imaging Tools

Hardware Troubleshooting Approach

The following approach should be taken when troubleshooting Surface devices:

1. Update device to latest OS/FW versions using the SDT tool – Refer to Software Tools section above for details on SDT.

   IMPORTANT: Device updates are required as a prerequisite to all hardware repairs.

2. Verify any suspected hardware failures by setting the device in a known OS/FW version state and running SDT to verify fault:
   a. Replace the device's internal rSSD with a BMR imaged rSSD containing latest OS and FW updates (not supplied – must be created as a fault verification jig/tool) – Refer to Software Tools section above for details on imaging.
   b. Run SDT and verify if condition persists or if resolved with use of BMR imaged drive – Refer to Software Tools section above for details on SDT.
      i. If problem is resolved, then re-image original rSSD or replace original rSSD and image.
      ii. If problem persists, then replace suspected hardware FRU related to the problem by following the detailed replacement procedures covered within this service guide.
3. SDT must be run following all hardware repairs where a FRU was replaced to further verify that problem was resolved by the repair action taken.

Component Removal and Replacement Procedures

Prior to Device Disassembly

- Read this Guide in its entirety before starting any repairs. Pay special attention to the Repair-Specific Precautions and Warnings and the Battery Safety sections of the Guide.

Battery Warning

⚠ **WARNING:** Please note that the battery bears the following warning label. Please heed the information provided on the label.

Battery is replaceable by trained personnel; replacement must follow Microsoft procedure
See http://aka.ms/surface-safety for important information.

- Risk of fire or burning – contact Microsoft for assistance
- Do not modify battery, its wiring, or connectors
- Do not short circuit, bend, dent, crush, or puncture battery
- Do not dispose of battery in fire or expose to high temperatures (+140°F/60°C)

Kickstand Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

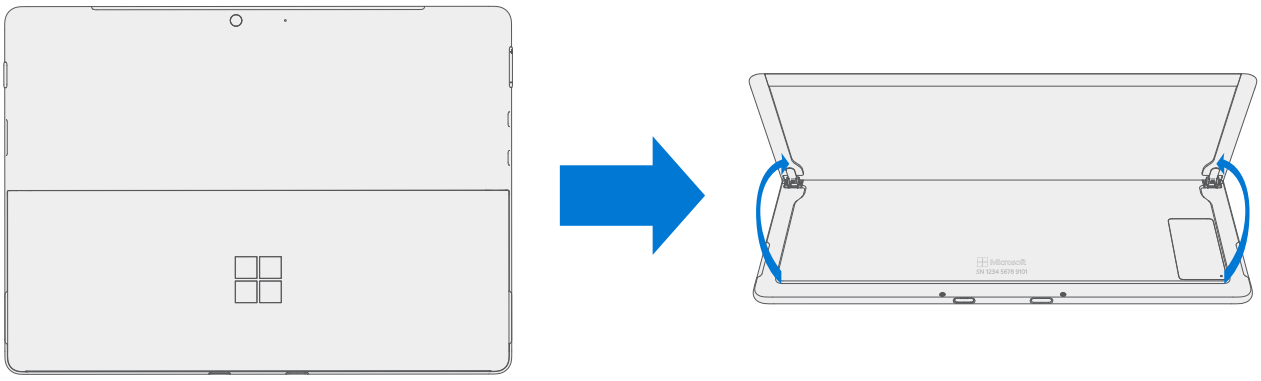
- **Tools:**
  - 3IP (Torx-plus) driver
  - Loctite 649
  - Loctite 243
  - Soft ESD safe mat
  - Microfiber cloth
- **Components:**
  - Kickstand (Refer to Illustrated Service Parts List)
  - Kickstand Screws (M1183405) Qty. 2

Prerequisite Steps

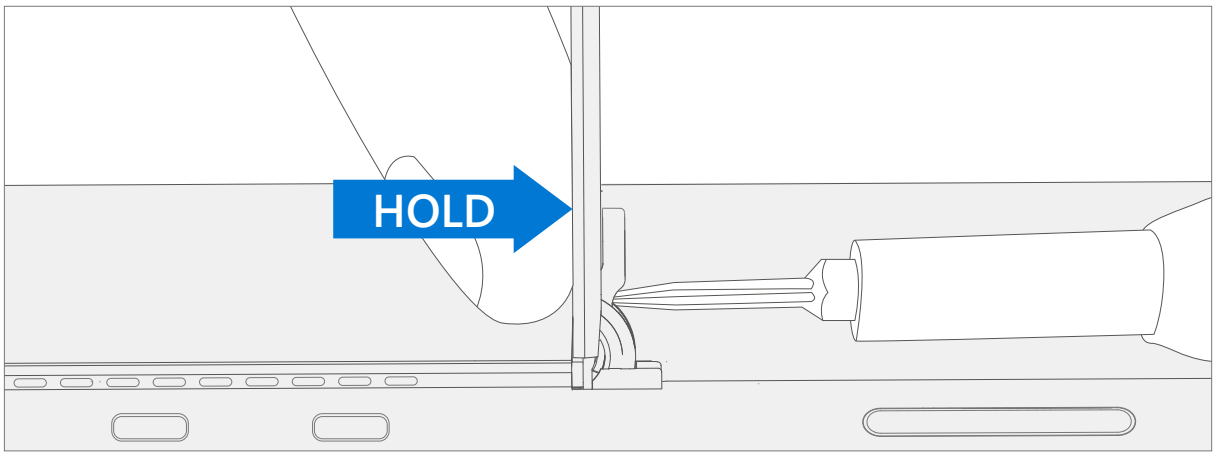
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.

Procedure – Removal (Kickstand)

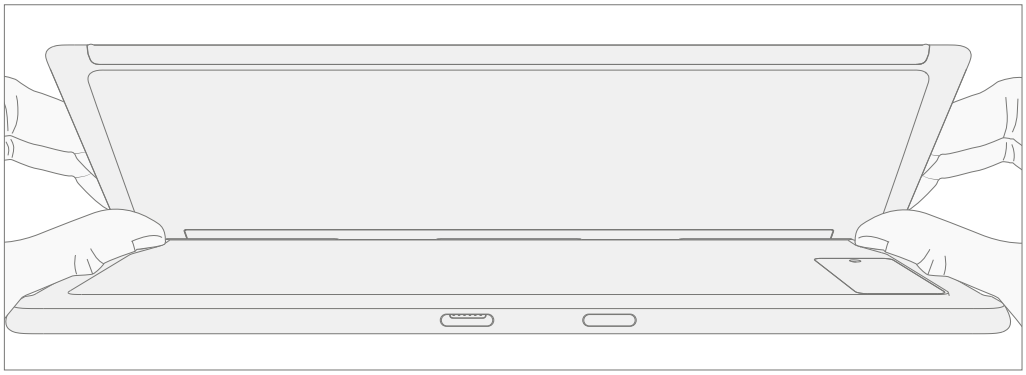
1. **Place device screen-down on soft ESD-safe mat** – Ensure mat is clear of any abrasive material that may scratch the Touch Display Module (display) glass.
2. **Extend the kickstand to approximately 90-degrees.**



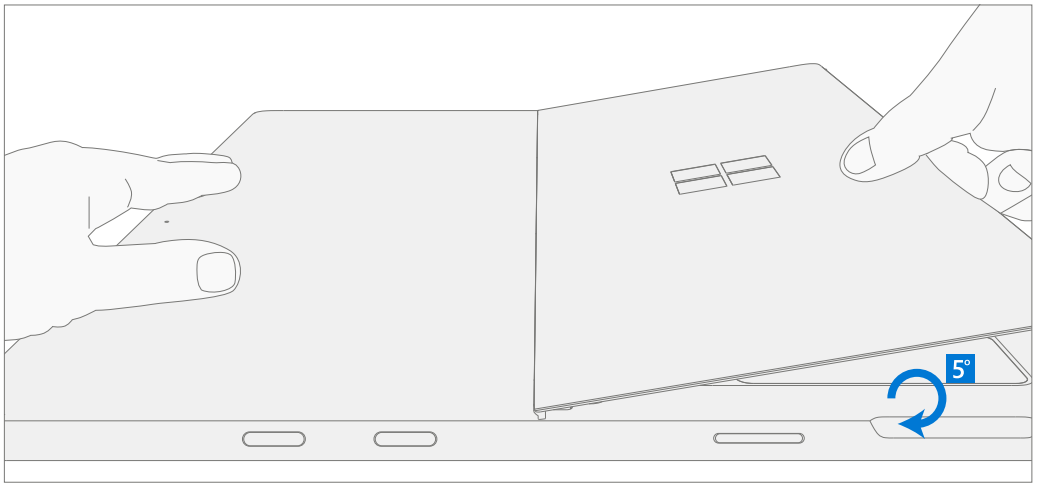
3. **Remove hinge screws** – Use your finger to hold the back of the kickstand behind the hinge while removing the hinge screws. One screw for each hinge. Ensure screws do not fall into the hinge opening.



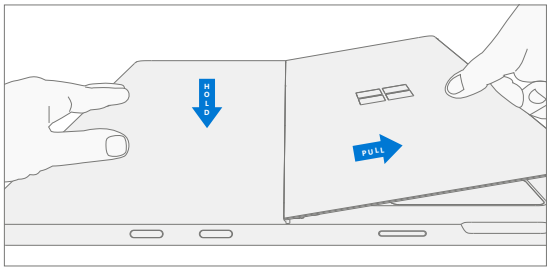
4. **Angle Kickstand Down** – Firmly grip the hinges and the kickstand between thumb and index fingers. Rotate the kickstand from 90 degrees to approximately 45 degrees.

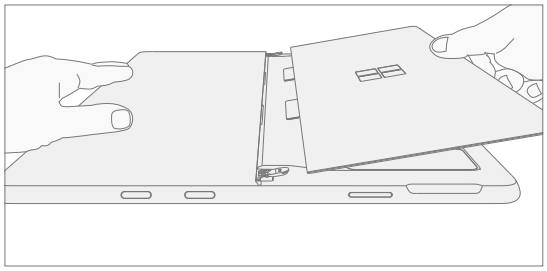


5. **Release Kickstand Threaded Bosses** – Using fingers on the underside of the kickstand and thumb on the topside, slightly rotate the kickstand about the axis as shown below. The kickstand should rotate ~5 degrees to free the two threaded bosses of the kickstand from the recesses of the hinges.

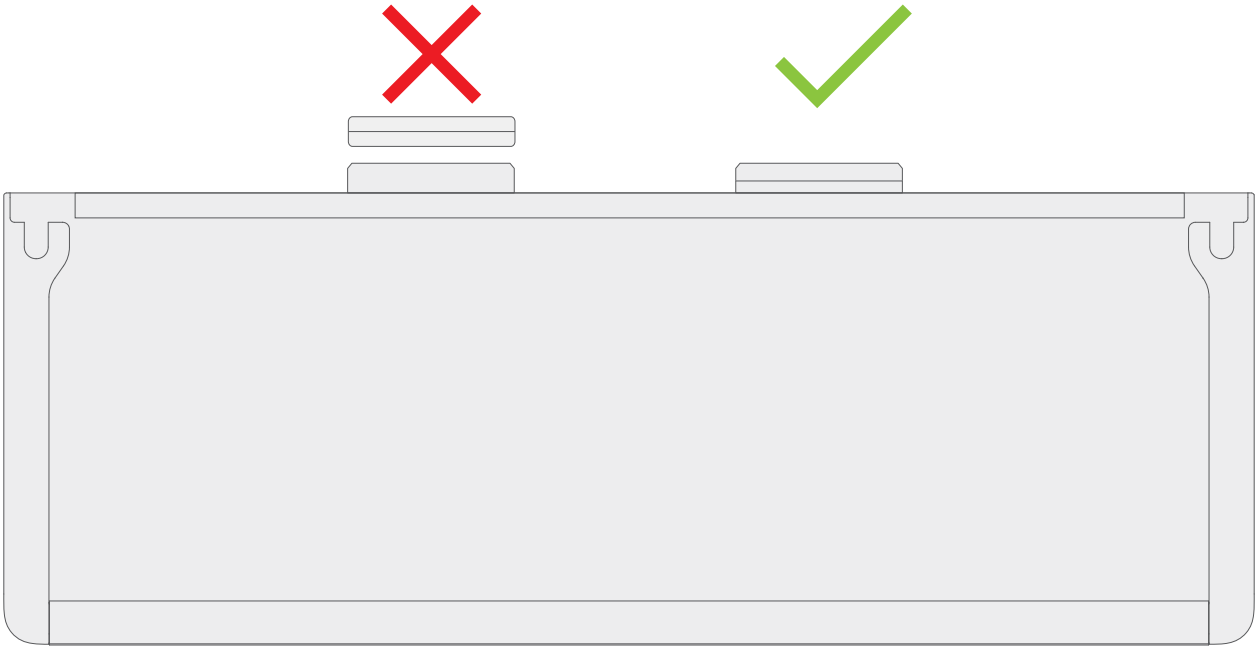


6. **Remove Kickstand** – Using the palm of your hand, firmly hold the device down from the center of the chassis. Simultaneously, grip the kickstand off-center between your thumb and index finger and firmly pull. Pull with a moderate amount of force until the foam inserts slide out of the device. If the kickstand is stuck, ensure the threaded bosses has not slipped back into the recess on the hinges.





⚠ **WARNING:** Inspect Removed Kickstand Foam Tabs – Damaged foam or tabs cannot be safely removed. Attempts to do so can damage internal components. Do not insert anything other than the tabs into the slots. Ensure both tabs are complete and show no signs of tearing. Do not attempt to remove it from the interior of the device, instead proceed to Procedure – Removal (Chassis) to replace the old chassis.

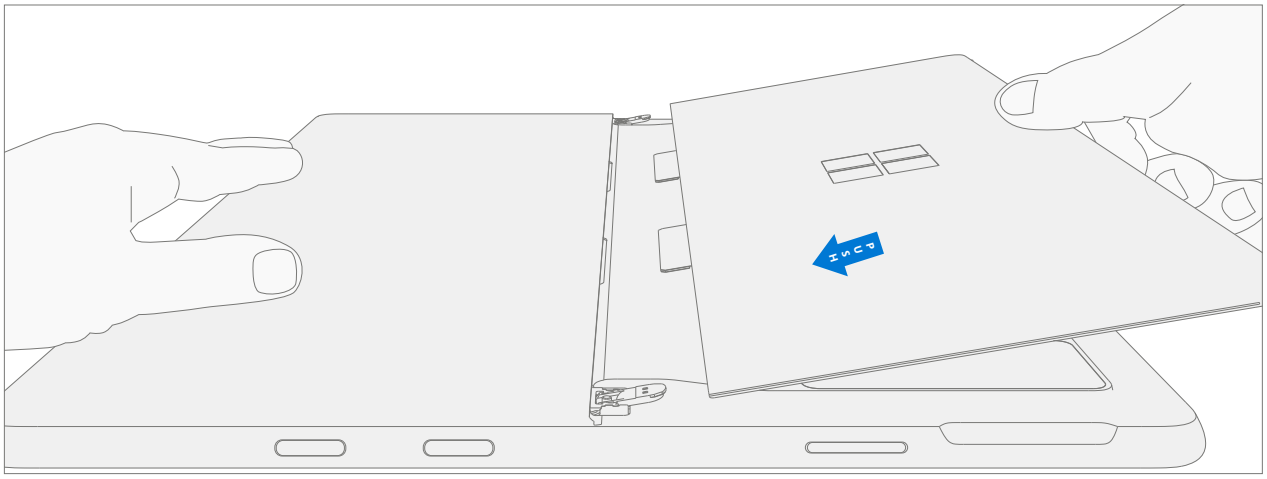


Procedure – Installation (Kickstand)

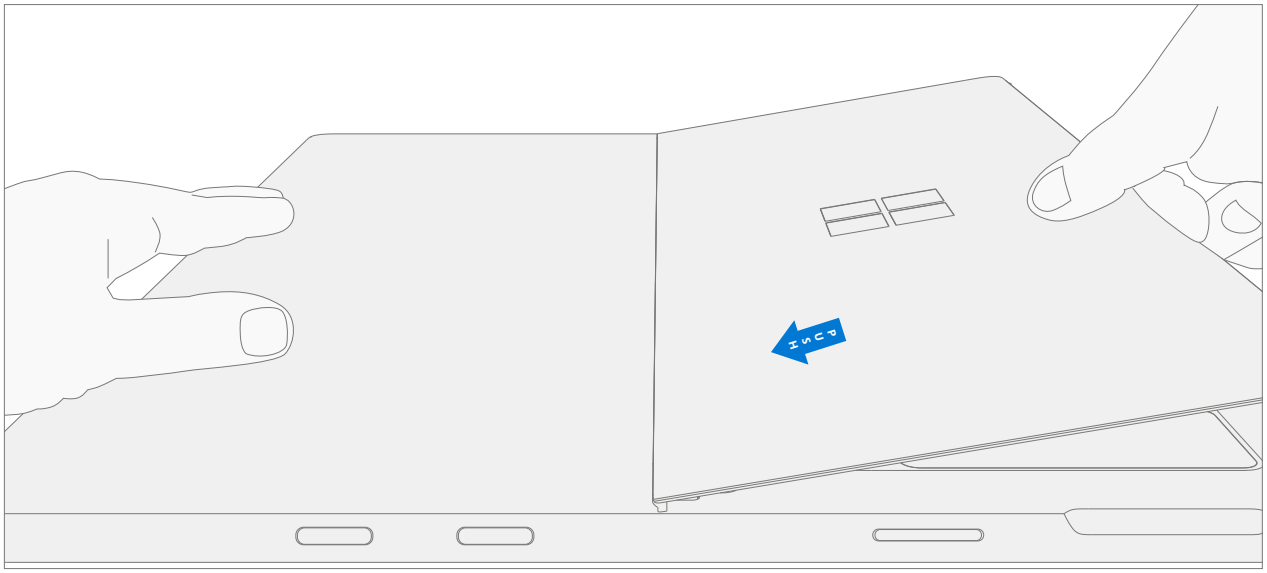
IMPORTANT: Use caution when handling new kickstand assembly to avoid cosmetic damage of the kickstand and the device.

1. **Insert Foam Tabs** – With the hinges still at ~ 45-degrees start to slide the new kickstand's foam tabs into the slots on the back of the chassis. Foam should slide in with minimal force – do not crumple the foam by using excess force. Do not slide the foam completely into the device – insert the foam tabs until ~3/4 of the foam tabs are inside the device.

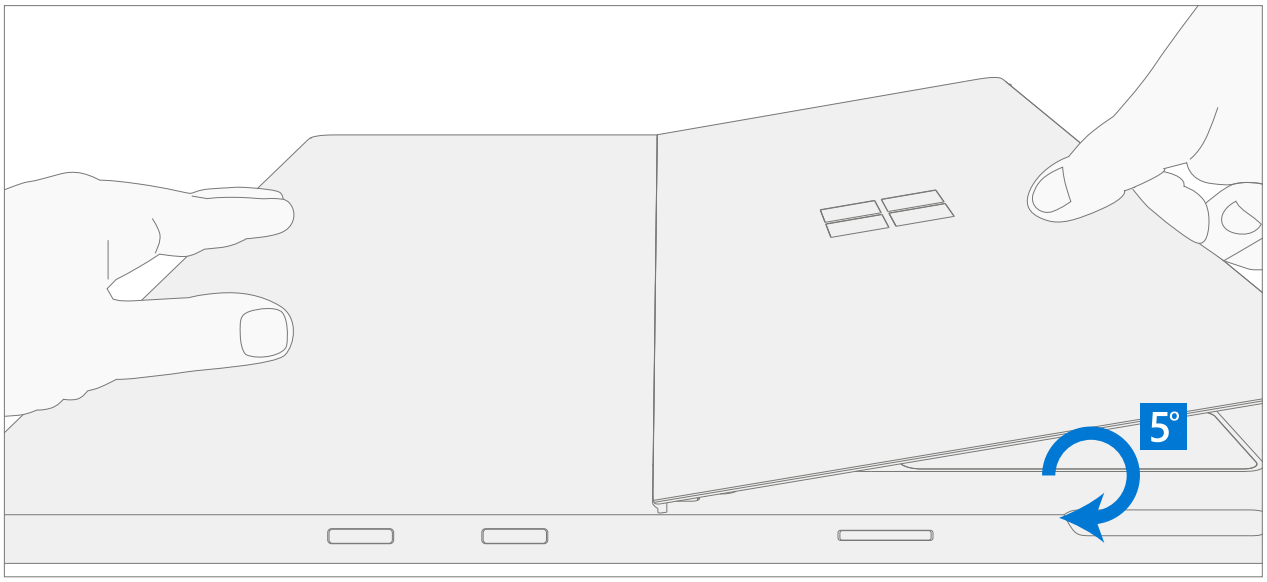
   CAUTION: Do not use any tool or sharp object to assist inserting the tabs into the slots. Only the tabs should be inserted. Doing so could damage internal components.



2. **Slot Outer Lip of Hinge into Kickstand** – Using fingers on the underside of the kickstand and thumb on the topside, slightly rotate the kickstand about the axis as shown below. The kickstand should rotate ~5-degrees to catch the outer lip of the hinge. Push the kickstand toward the device.

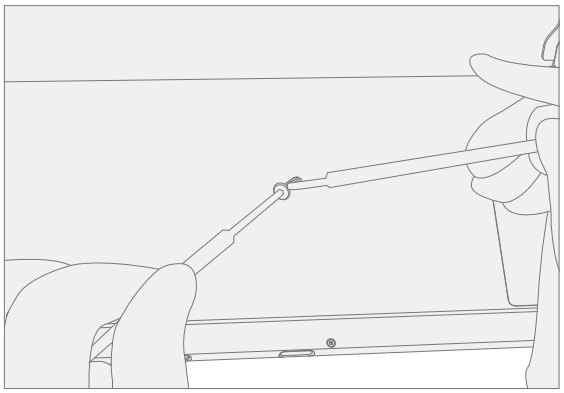


3. **Slip Kickstand Threaded Bosses into Hinge Recesses** – Maintaining pressure on the kickstand to prevent it from backing out, rotate the kickstand down into place (Figure 7-9). The threaded bosses of the kickstand should slip into the recesses of the hinges.

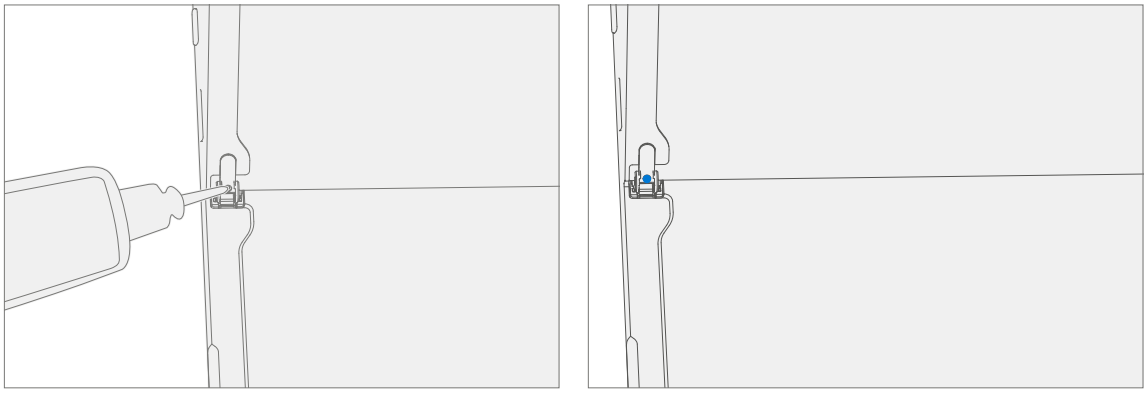


4. **Rotate the Kickstand Up** – Firmly grip the hinges and the kickstand between thumb and index fingers as shown below. Rotate the kickstand from 45-degrees to approximately 90-degrees.

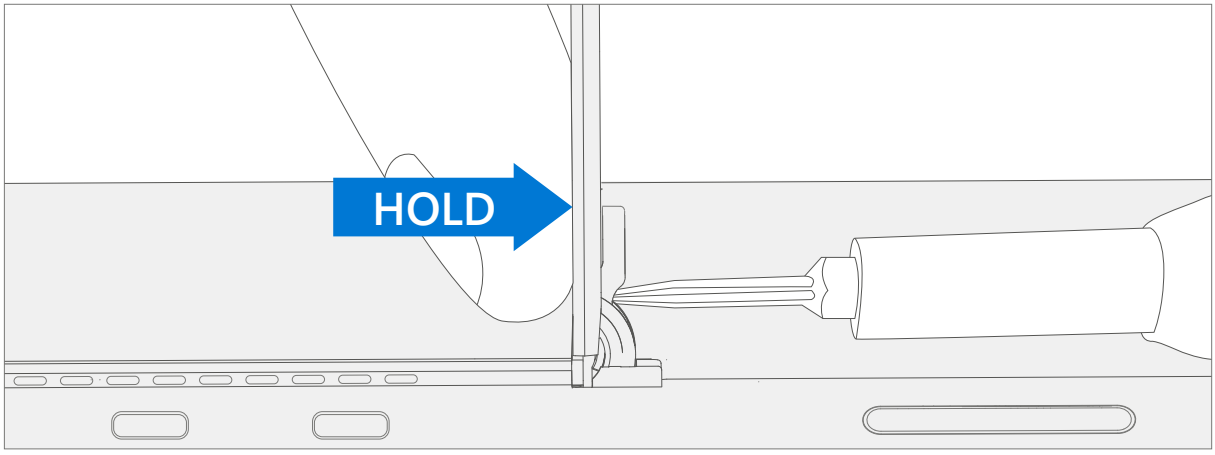
5. **Apply thread locker to screws** – Brush new screws with Loctite 649 Activator. Let screws sit for 2 minutes after activator is applied before assembling to device.



6. **Apply thread locker to screws bosses** – Apply one drop of Loctite 243 thread locker to each screw boss.



7. **Install hinge screws** – Use your finger to hold the back of the kickstand behind the hinge while installing the screws until they are fully seated. Ensure the kickstand is properly aligned and seated in the hinges, then tighten the screws an additional ~quarter turn (~ 90-degrees). Be careful to tighten the screws only until snug and not to strip the kickstand threads. Ensure screws do not fall into hinge opening.



8. **Final inspection Kickstand installation** – Fold the kickstand down and peel off protective plastic from the kickstand and logo if present. Verify the side edges of the kickstand are aligned with the midframe walls and that there are no obvious steps/gaps between the kickstand and the chassis. Wipe the device thoroughly (including under the kickstand) with the microfiber cloth to remove all fingerprints.

rSSD Door Replacement Process

Preliminary Requirements

Required Tools and Components

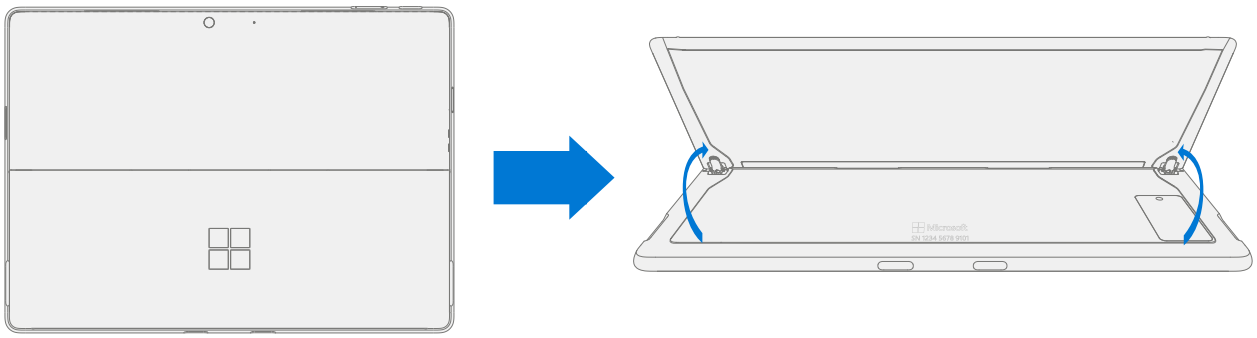
- **Tools:**
  - SIM eject tool (or equivalent 0.58 mm / 0.023 in. diameter paperclip)
  - Soft ESD safe mat
  - Microfiber cloth
- **Components**:
  - rSSD Door (Refer to Illustrated Service Parts List)

Prerequisite Steps

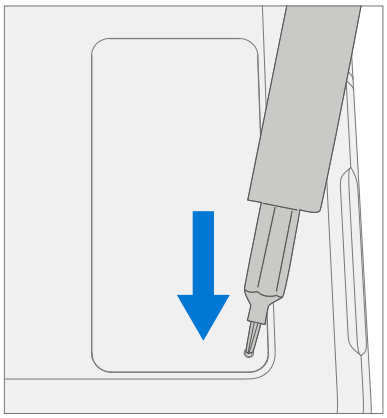
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.

Procedure – Removal (rSSD Door)

1. **Place device screen-down on soft ESD-safe mat** – Ensure mat is clear of any abrasive material that may scratch the Touch Display Module (display) glass.
2. **Extend the kickstand to approximately 90-degrees.**

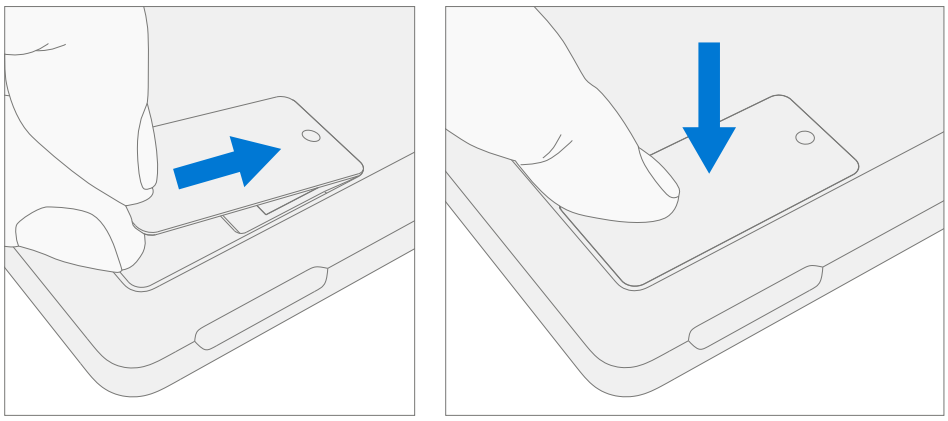


3. **Remove rSSD door** – Using a SIM eject tool (or equivalent paperclip) press down into slot on door till it pops open and lift out.



Procedure – Installation (rSSD Door)

1. **Install rSSD door** – Slot in replacement door and press down.



rSSD Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes of caution within each process section.

Required Tools and Components

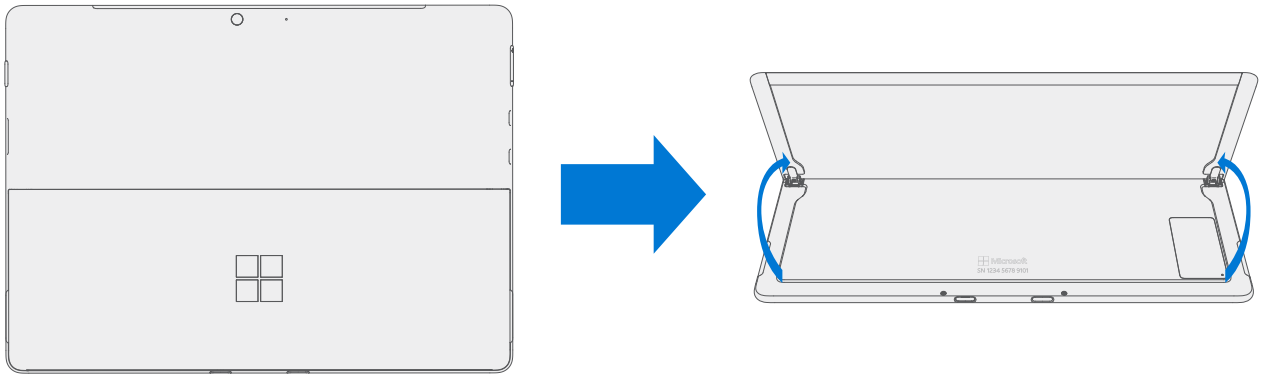
- **Tools:**
  - SIM eject tool (or equivalent 0.58 mm / 0.023 in. diameter paperclip)
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / Lint free cloth
- **Components:**
  - rSSD (Refer to Illustrated Service Parts List)
  - rSSD Screw (M1186577-001) Qty. 1

Prerequisite Steps

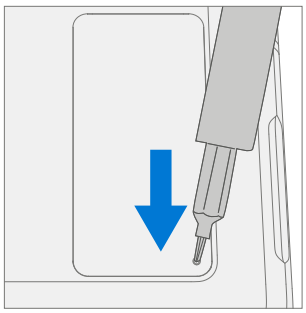
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details

Procedure – Removal (rSSD)

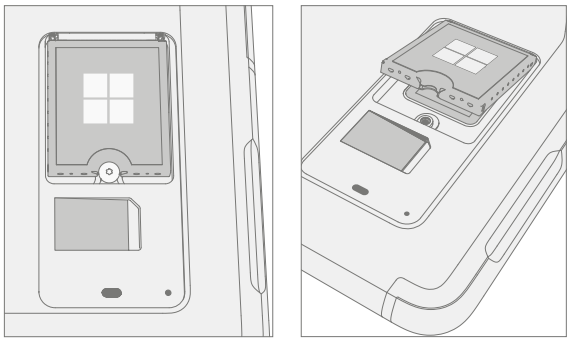
1. **Place device screen-down on soft ESD-safe mat** – Ensure mat is clear of any abrasive material that may scratch the Touch Display Module (display) glass.
2. **Extend the kickstand to approximately 90-degrees.**



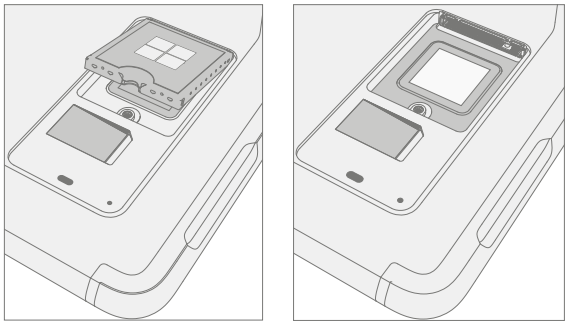
3. **Remove rSSD door** – Using a SIM eject tool (or equivalent paperclip) press down into slot on door till it pops open and lift out.



4. **Remove rSSD screw** – Use a 3IP (Torx-plus) driver to remove the screw securing the rSSD.



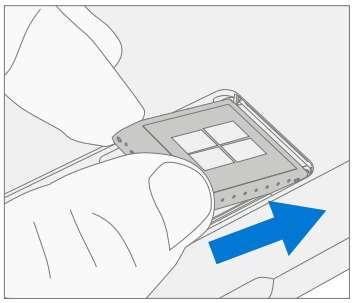
5. **Remove rSSD** – The rSSD should lift upwards to ~15-degree tilt after screw is removed. Carefully grab sides of rSSD case and pull out of main board socket at same ~15-degree angle.



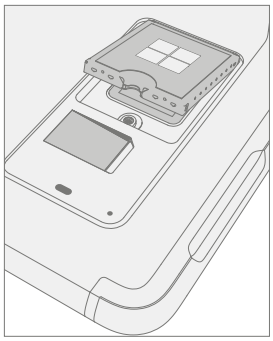
Procedure – Installation (rSSD)

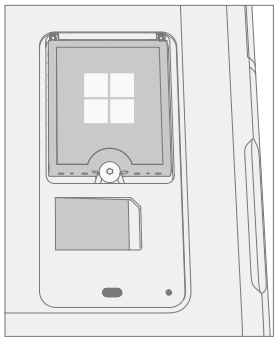
IMPORTANT: Only a rSSD of like capacity should be replaced in the device.

1. **Insert rSSD** – Insert the connector end of the rSSD into the rSSD connector on Main board at ~ 15-degree angle.

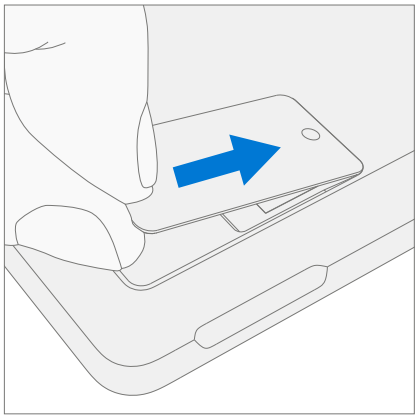


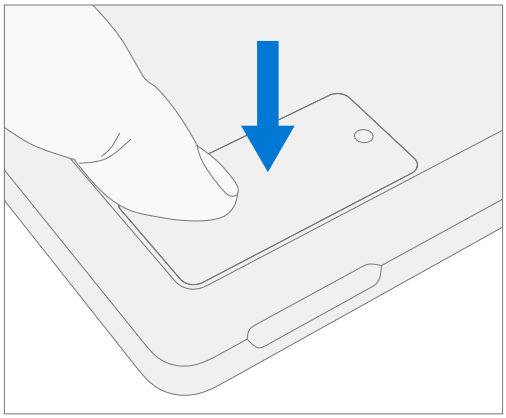
2. **Install new rSSD screw** – Use a 3IP (Torx-plus) driver to install a new rSSD screw until the screw is just snug and seated, and then turn another 45 degrees (1/8 turn) or until screw is fully fastened.





3. **Install rSSD door** – Slot in door and press down.





4. **Imaging** – Image the new rSSD by using a BMR Imaging USB drive specific to the device model.

IMPORTANT: Refer to Surface imaging process - Surface Imaging Tools

5. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

rSSD Swap to a New Device Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes, cautions, & warnings in each process section. The rSSD 3IP screw will be reused in this process. Only a Microsoft rSSD of like capacity should be replaced in the device.

Required Tools and Components

- **Tools:**
  - SIM eject tool (or equivalent 0.58 mm / 0.023 in. diameter paperclip)
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / Lint free cloth
  - USB Drive
  - Surface Dock
  - Wired Ethernet connection to the Internet
  - USB keyboard
- **Components:**
  - New rSSD Door if required. (Refer to Illustrated Service Parts List)

Prerequisite Steps

- **Using an Internet connection** install all available updates: Navigate to *Settings* -> *Update and Security* and check for Windows Update.
- **Consumer using Windows Home:**
  - The Bitlocker recovery key is automatically generated for users with an MSA and can be found by the user by searching the web for "bitlocker recovery key" and logging into their MSA. If the user does not have an MSA based account, the disk will not be encrypted.
- **Commercial using Windows Pro:**
  - This is managed via commercial policy, and each business may have their own bitlocker policy / recovery method.
  - Confirm that the customer knows the **Windows password to the device.**
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.

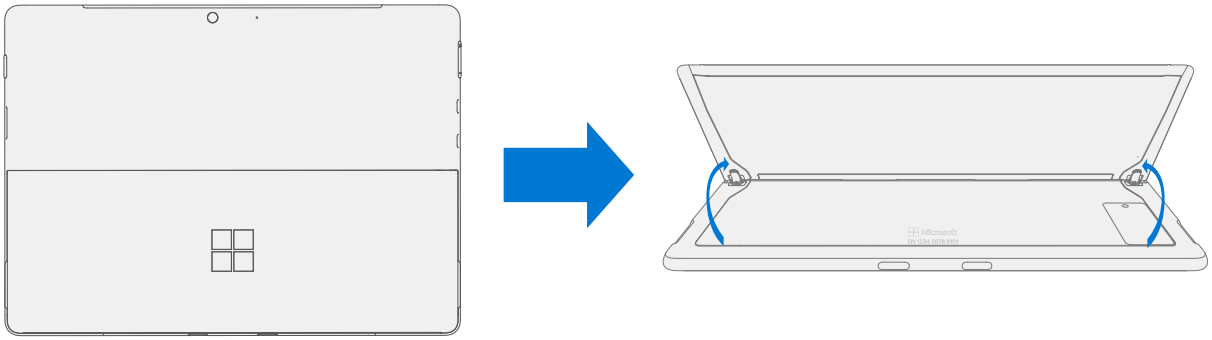
Procedure – Swap (rSSD)

1. **Manage Bitlocker**
   a. **If rSSD remains encrypted during swap**
      i. Navigate to *Bitlocker -> Manage Bitlocker -> Generate Bitlocker Recovery Key*.
      ii. Plug in USB drive.
      iii. Save the recovery key to USB storage.
      iv. Remove the USB drive.

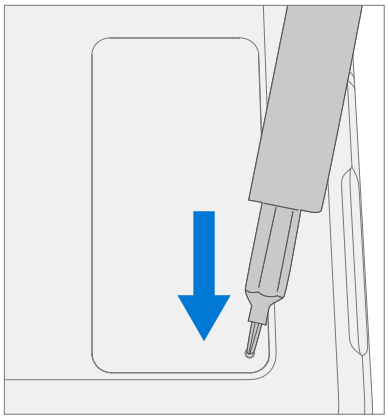
   b. **If rSSD can be unencrypted before swap**
      i. Navigate to *Bitlocker -> Manage Bitlocker*.
      ii. Select *Turn Off Bitlocker*.

2. **Place device screen-down on soft ESD-safe mat** – Ensure mat is clear of any abrasive material that may scratch the Touch Display Module (display) glass.

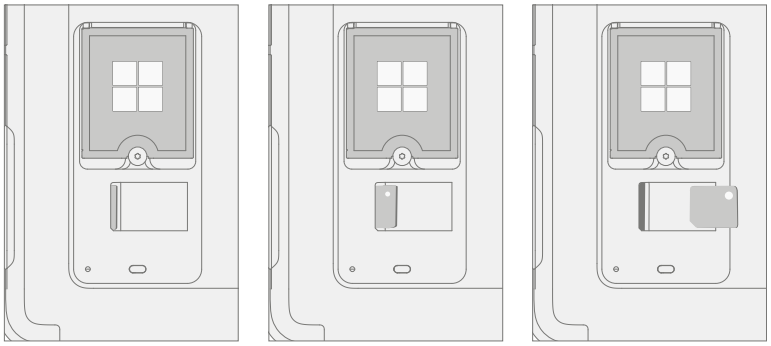
3. **Extend the kickstand to approximately 90-degrees.**



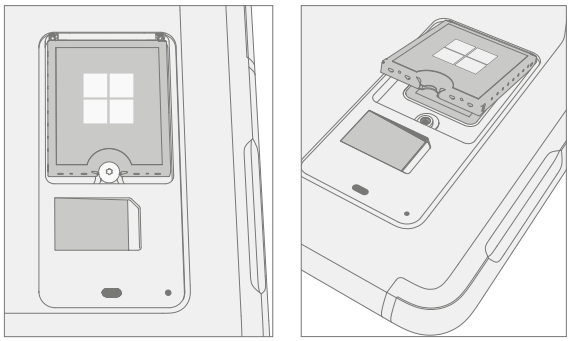
4. **Remove rSSD door** – Using a SIM eject tool (or equivalent paperclip) press down into slot on door till it pops open and lift out.



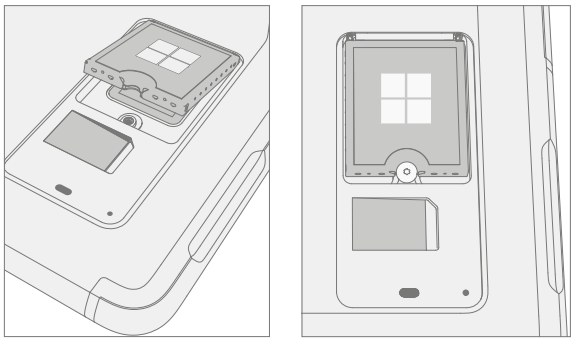
5. **Remove SIM** – If present in customer's old device, push edge of SIM card to release from device.



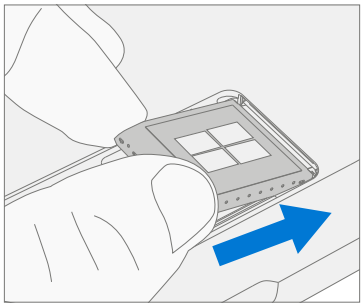
6. **Remove rSSD screw** – Use a 3IP (Torx-plus) driver to remove the screw securing the rSSD.



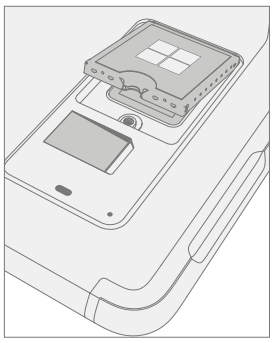
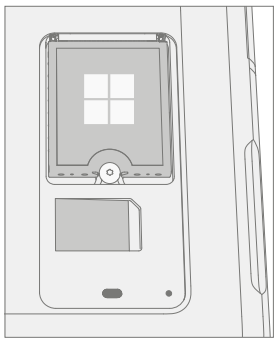
7. **Remove rSSD** – The rSSD should lift upwards to ~15-degree tilt after screw is removed. Carefully grab sides of rSSD case and pull out of main board socket at same ~15-degree angle.



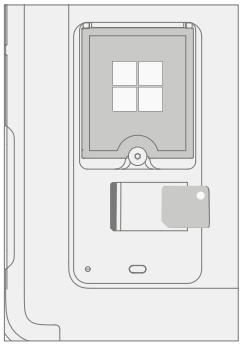
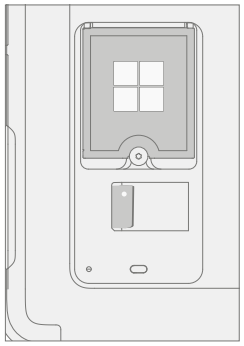
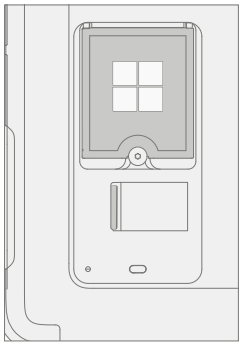
8. **rSSD Swap** – Insert rSSD removed from the new device into customer's original device, then insert customer's original rSSD into new device. Insert the connector end of the rSSD into the rSSD connector on Main board at ~15-degree angle.



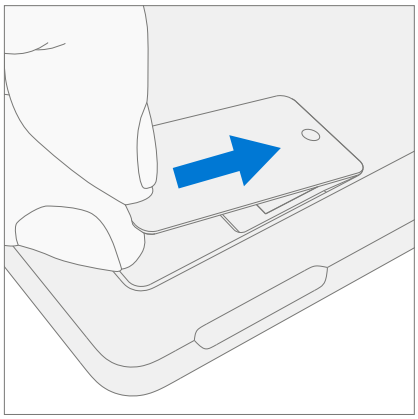
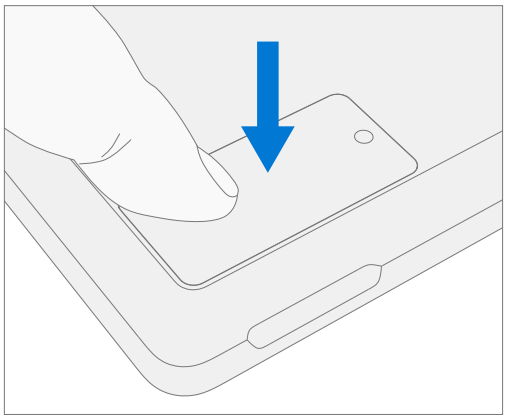
9. **Install new rSSD screw** – Use a 3IP (Torx-plus) driver to install a new rSSD screw until the screw is just snug and seated, and then turn another 45 degrees (1/8 turn) or until screw is fully fastened.

10. **Install SIM** – If present from the customer's old device, install sim card in the new device.

11. **Install rSSD door** – Slot in door and press down.

12. **Plug new device into power and wired Internet connection.**
13. **Power on new device** – The device may go through a firmware update during startup.

14. **If the SSD remained encrypted during the swap:**
    a. Plug in USB drive with Bitlocker recovery key.
    b. Open the .txt file with the Bitlocker recovery key.
    c. Manually enter the recovery key into the new device.
15. **Connect a keyboard to the new device.**
16. **Navigate to** *Sign-In Options -> Password* (key icon on the left side).
17. **Customer enters Windows password. Select** "*Sign In*".
18. **Customer may need to go through two-factor** authentication.
19. **Once fully signed in, navigate to** *Start -> Account -> Sign Out*.
20. **Customer signs in with Windows password again.**
21. **Customer prompted to setup Windows Hello and PIN.**
    a. If the device was previously **Bitlocked**, navigate to *Bitlocker ->Manage Bitlocker -> Resume Bitlocker*.
22. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.
23. **Check Windows activation** – Navigate to *Settings -> Activation*. If there is any error message, select Troubleshoot.
24. **Check Office Account** – Open Office app and then navigate to File > Account and check for any error messages.
25. **Check cellular** – If SIM card is present, unplug device from wired network and disable WiFi. Check that cellular network shows connected, and that the device can open a webpage.

Display Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes, cautions, & warnings in each process section.

Required Tools and Components

- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic opening pick
  - Two 2 in spring clamps
  - Add display
  - Add dongle
  - Surface Display Debonding Tool
  - Surface Display Bonding Frame
  - Foam Pad (comes with Display bonding frame, recommended McMaster PN: 86095K43)
  - Display bonding weights 32 kg (Recommended using three Ruck weights two 9 kg, one 14 kg) (Alternate using steel shot bags two 9 kg, one 14 kg)
- **Components:**
  - Display (Refer to Illustrated Service Parts List)

Prerequisite Steps

- **Prep Device** – Device must be set in Display Replacement Mode prior to removing a faulty display.
  a. **Connect software tools USB drive** – Use SDT to USB connector on device under repair.
  b. **Connect power supply to device.**
  c. **Power on device** – Depress the power button on the side of the device.
  d. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run:
  SDT – Select Repair setup and validation. Run the Touch Display Setup. At the end of the tool process device will power down.

  IMPORTANT: The device must first be set in Display Replacement Mode before broken/defective display is removed from the device. Software tools are provided for this purpose. Device must be functional to the point that software tools can be run on device from within the Windows OS. If display on device is non-functional, there is no display, or it is unreadable, connect an external PC monitor and keyboard to the device's USB C port or Surflink port. If this cannot be completed, then the device is not a good candidate for repair.

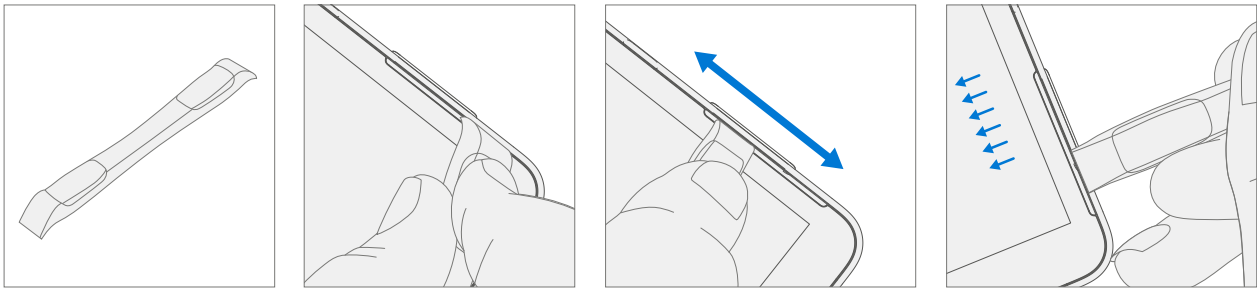
  IMPORTANT: This step must be conducted on the device successfully before removal of a faulty display. Ensure light levels in the work area remain consistent during the touch display setup process.

  ⚠ **WARNING:** Do not use a heat gun or hair dryer to debond display

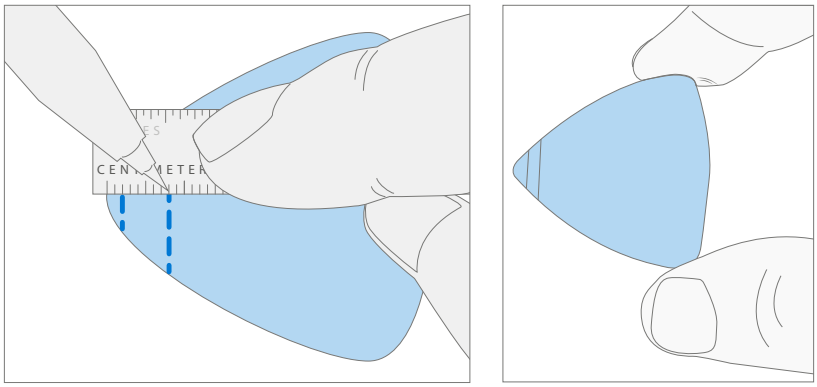
- **Power off device** – Ensure device is powered off and disconnected from a power supply. Remove all attached cables and drives.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)

Procedure – Removal (Display)

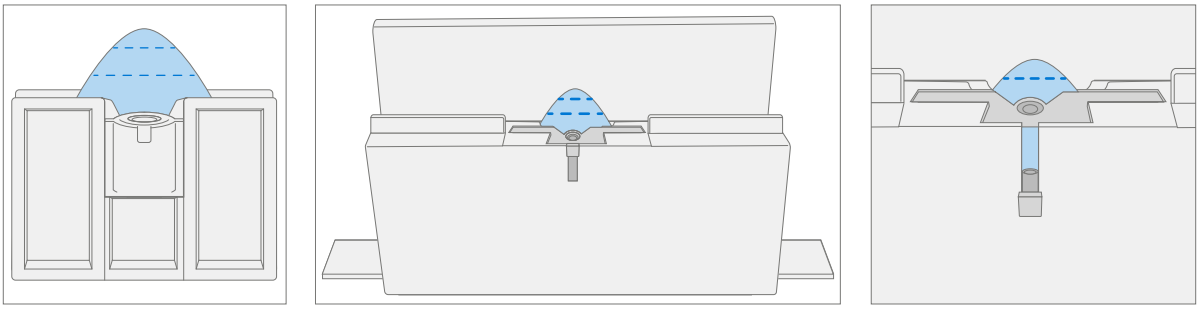
1. **Speaker mesh preparation** – Place the device face up on a Soft ESD safe mat. Use an iFixit opening tool to widen the gap between the right speaker mesh and device. Push the sharp edge into the gap and side to side along the device edge. Once the flat tip fits fully in the gap, use it to push the speaker mesh towards the device, repeating uniformly along the length of the speaker mesh. The metal mesh will either fold lengthwise or slide completely under the glass. Repeat this process for left speaker mesh.



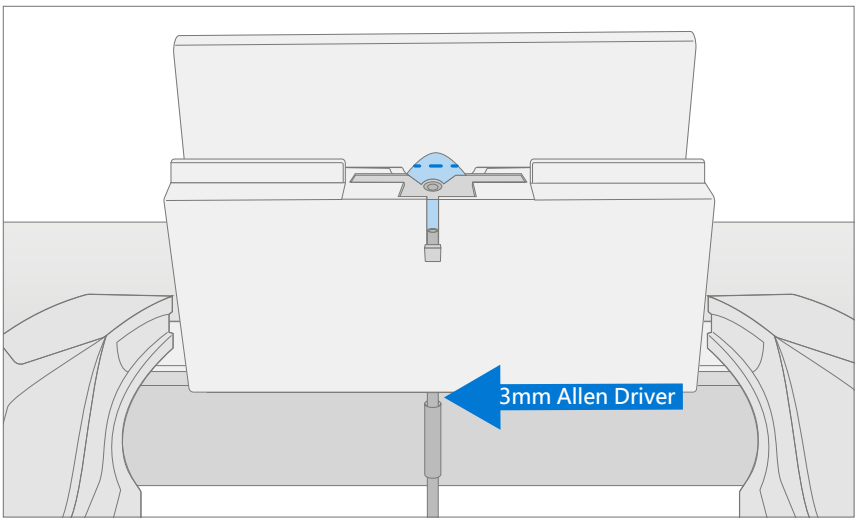
2. **Mark Display Debonding Tool pick depth** – To prevent damage to internal components use a metric ruler to draw a 2 mm mark and 8 mm mark on the plastic pick.



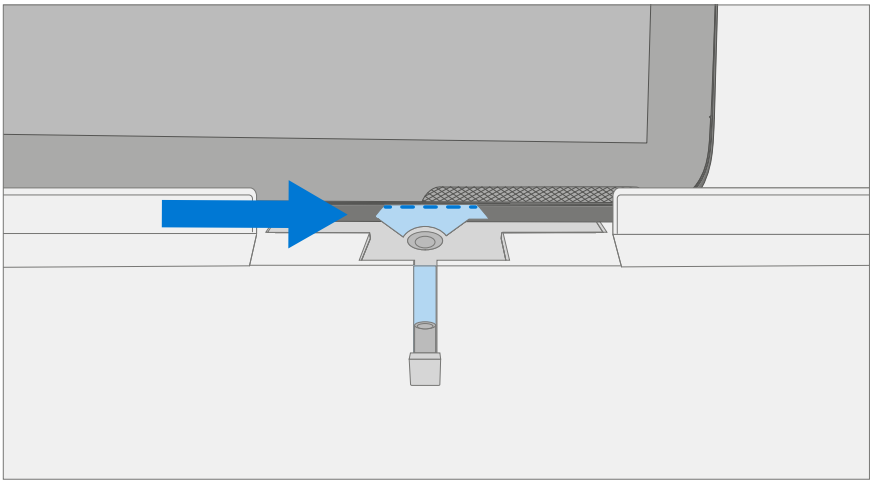
3. **Display Debonding Too**l
   a. Install marked pick in the holder with the marks in view. Use a 3 mm Allen Driver to adjust pick height to the lowest setting.



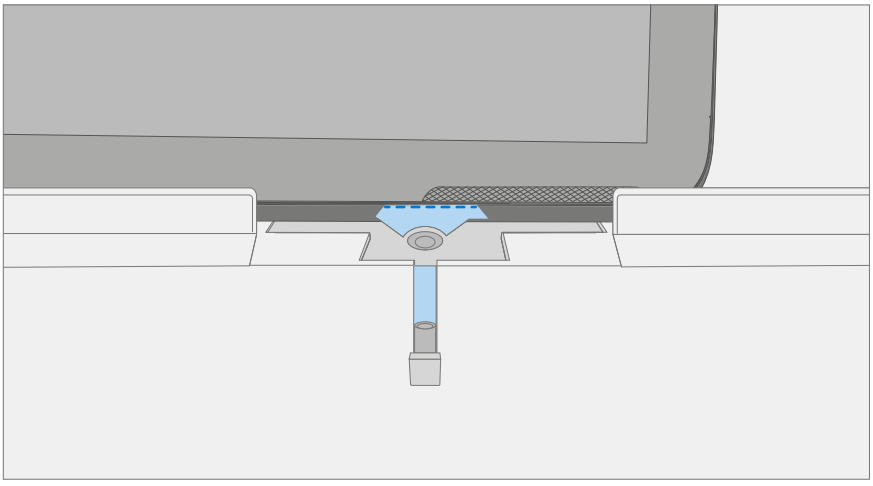
b. Clamp debonding tool to edge of workbench. Ensure the cut depth adjustment can be accessed while the tool is clamped down.



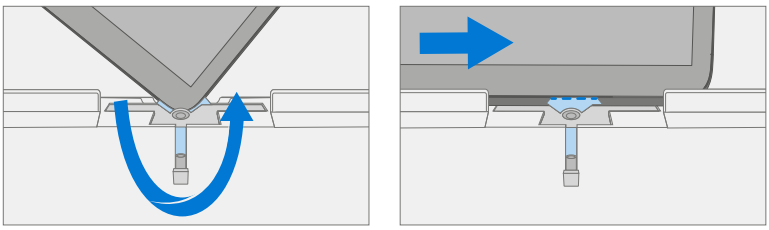
c. Place the right-side speaker edge of the device in the debonding tool above the pick. Adjust the pick height to the 2 mm mark. Ensure it enters the gap between the display and bucket edge.



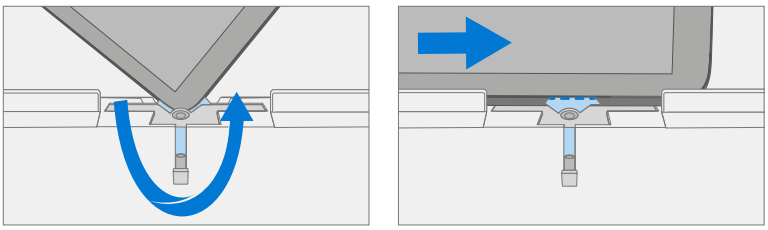
d. With both hands draw the right side of the device through the debonding tool track.



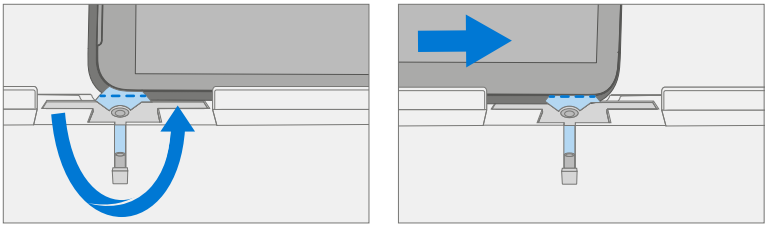
e. At the **bottom right corner** rotate the device in the debonding tool track. Draw the bottom side of the device through the debonding tool track.



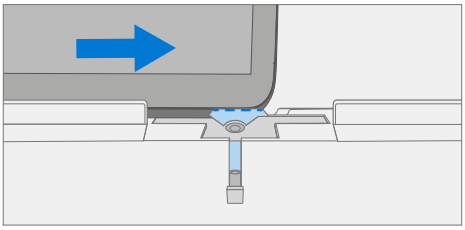
f. At the **bottom left corner** rotate the device in the debonding tool track. Draw the left side of the device through the debonding tool track.



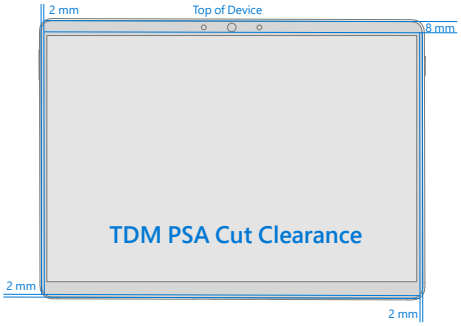
g. At the **top left corner** rotate the device in the debonding tool track. Draw the top side of the device through the debonding tool track.



h. Place the **top left edge** of the device in the debonding tool track. Adjust the pick height to the 8 mm mark. Ensure it enters the gap between the display and bucket edge. With both hands draw the top edge of the device through the debonding tool track.

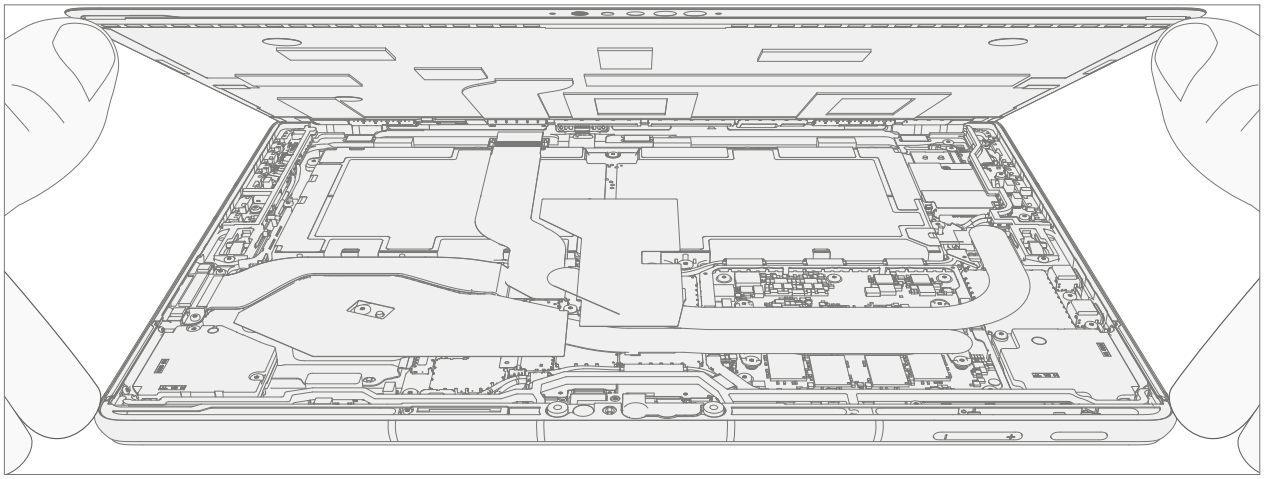


⚠ **CAUTION:** Do not insert the pick more than 2 mm along the left and right sides or bottom edge of the display. The pick depth should not exceed 8 mm along the top edge of the display.



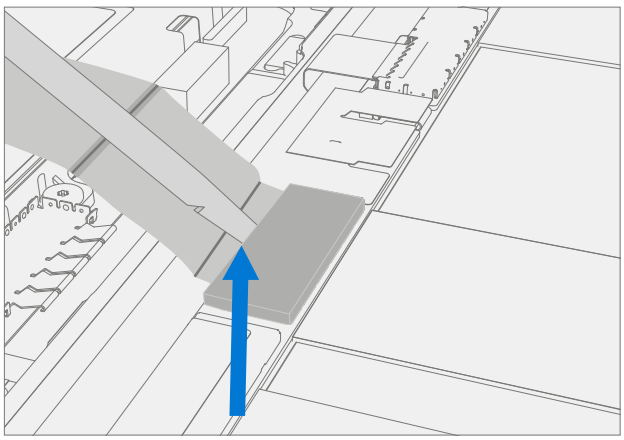
4. **Separate display from chassis** – Gently pull up vertically on the top edge of the glass while pushing down on the chassis to separate the glass. Lift the edges of the display and inspect for any remaining adhesive. Slice or remove (with an iFixit Pick) any strands still connecting the display to the chassis.

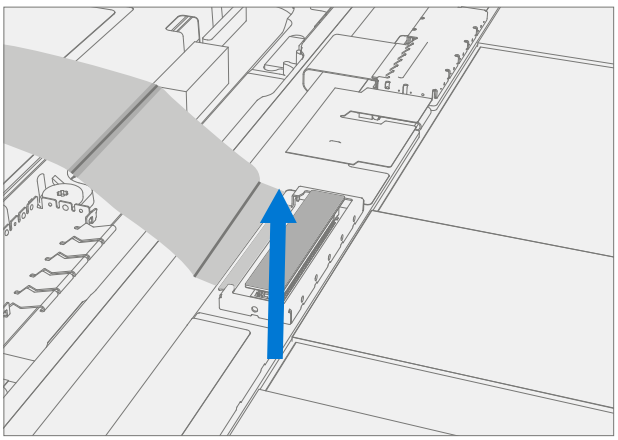
⚠ **WARNING:** It is recommended a Microsoft provided ESD-safe battery cover appropriate for size is placed across the device to protect the battery from any accidental damage during repair. Ensure corners of cover are always aligned with the corners of the device during repair. If battery cover is misaligned during the repair operation in any way, re-align before continuing repair activities.



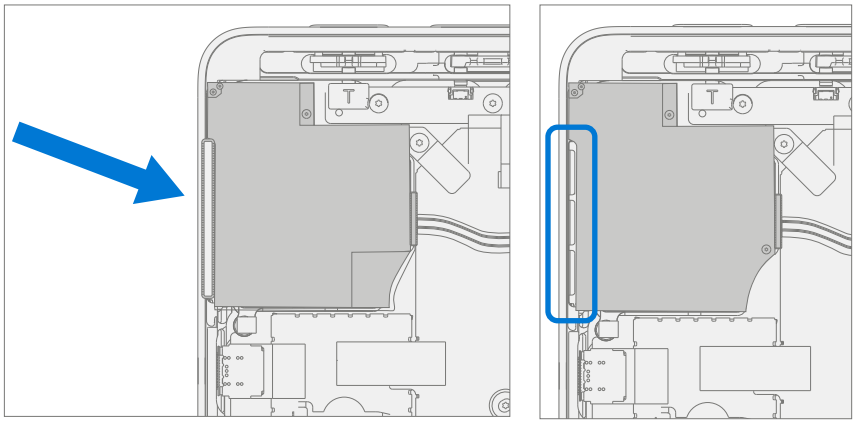
5. **Disconnect display connector** – Lay the display down gently next to the chassis on the work surface. Remove the shield lid on the display connector by inserting pointed end of a spudger or tweezers underneath the inner edge of the shield. Then gently pull upwards and the shield will come off. Disconnect the display connector using the pointed end of a spudger.

⚠ **WARNING:** Do not pull on the Display FPC to disconnect the display.

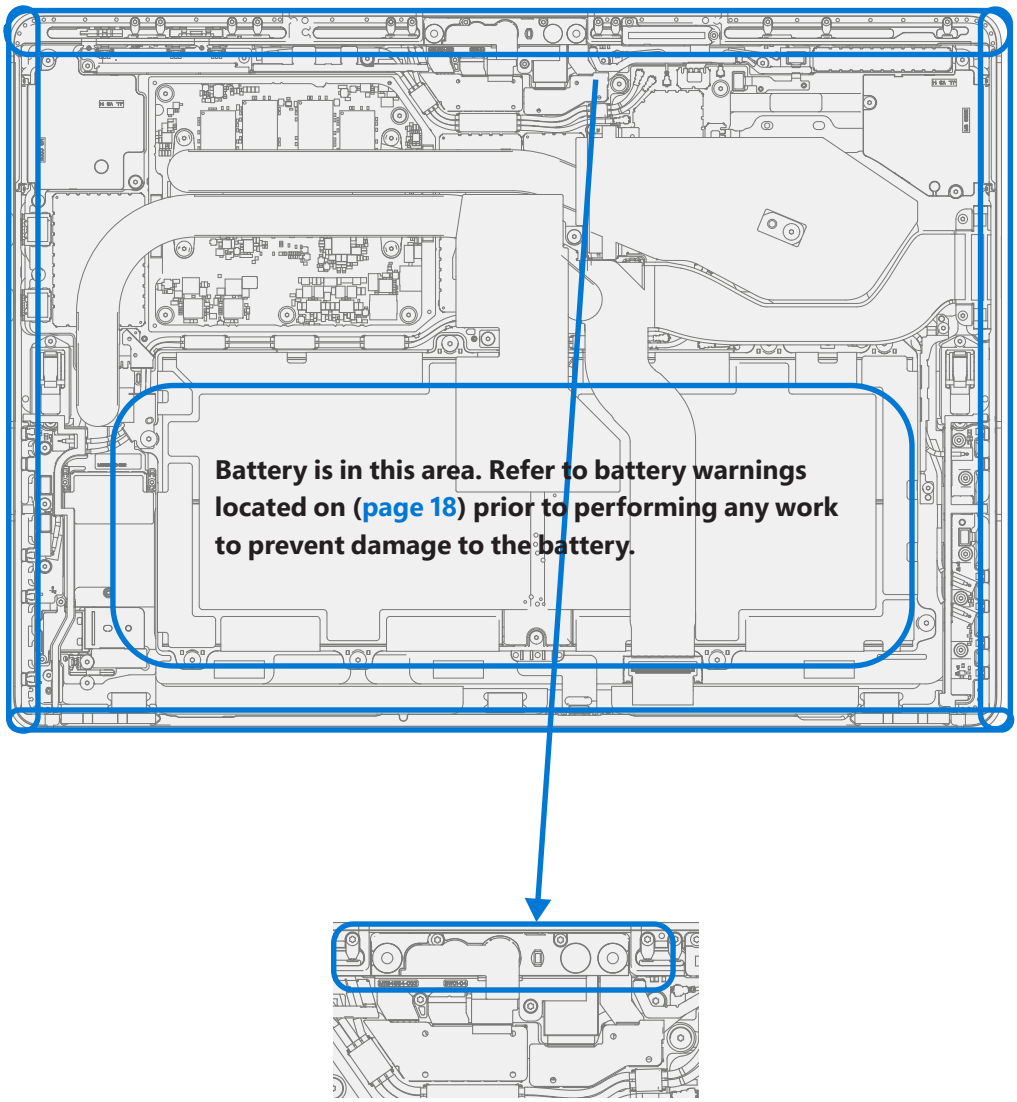




6. **Remove speaker mesh from chassis** – Remove any remaining speaker mesh from the chassis. Use a handheld pick to remove it by inserting the pick between the Speaker mesh and the enclosure. Confirm a successful removal of the speaker mesh and its adhesive by verifying the three cutouts of the chassis are exposed, as shown below.



7. **Remove residual adhesive** – Using IPA and cotton swabs clean residual PSA off the chassis. Ensure area around the Camera and IR Sensor is clean and free of any dust or other contamination. Wipe the area around the camera with a lint free cloth.



Procedure – Installation (Display)

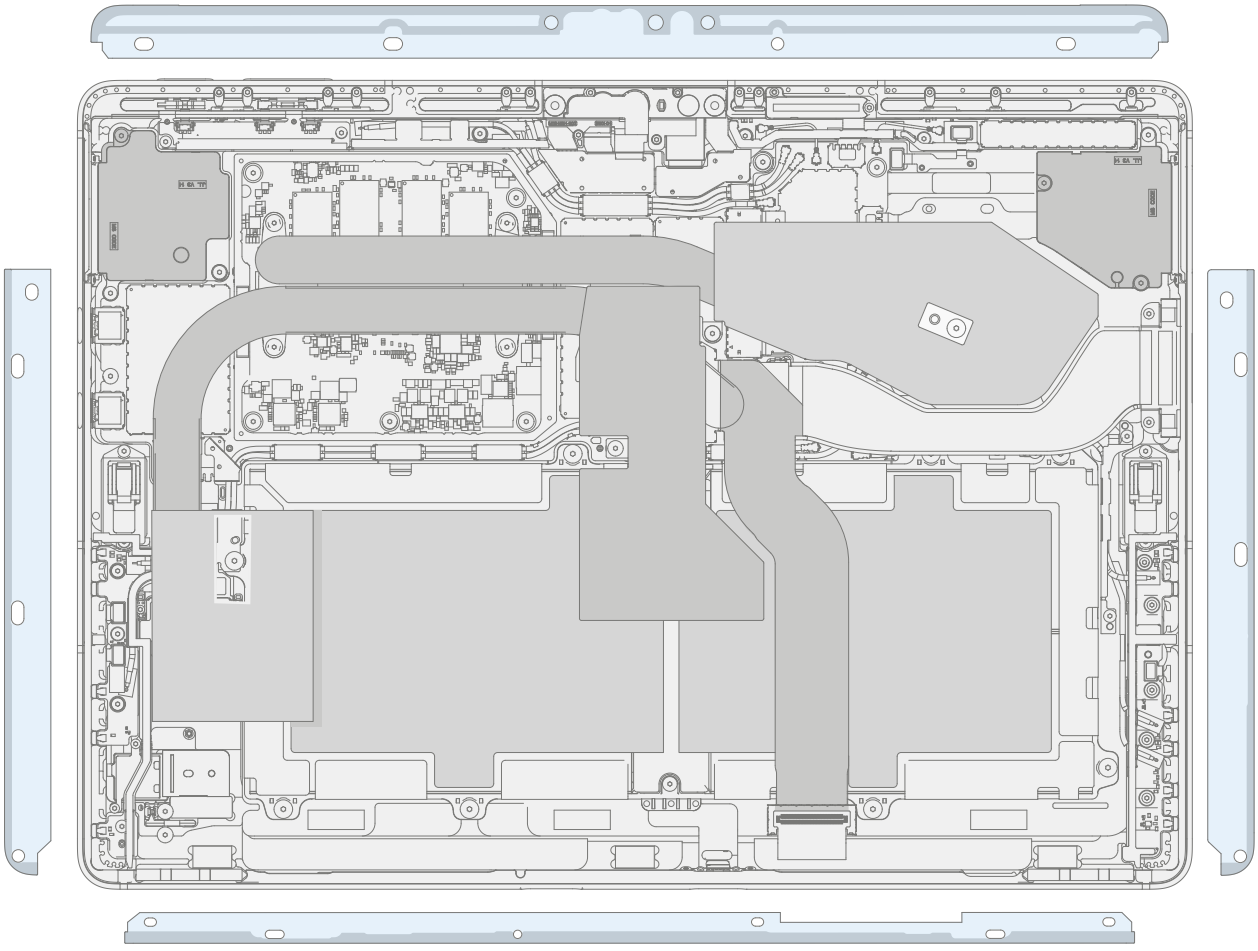
1. **Pre-installation Device Inspection**

   ⚠ **WARNING:** Verify the battery's condition. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

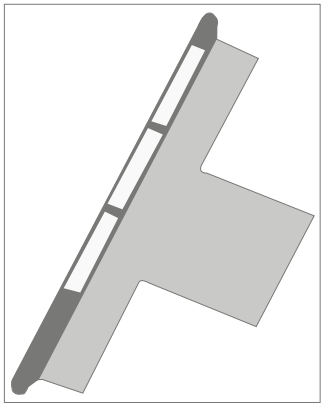
   IMPORTANT: Leave protective cling on new display during all installation steps.

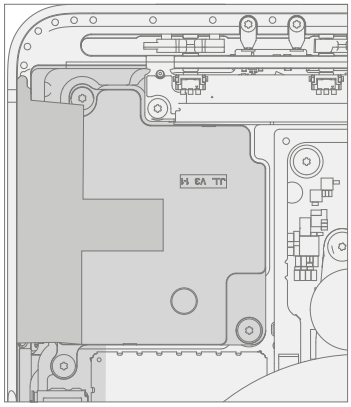
   IMPORTANT: Carefully inspect the internal areas of the bucket. Ensure the area around battery is free of any foreign objects.

2. **Display adhesive application** – Thoroughly clean the chassis along the display PSA bonding surface using IPA and a cotton swab. Wait at least 30 seconds before applying the new PSA. Apply the 4 strips of PSA to the chassis. Align the PSA following the outline on the chassis. Leave the blue liner on the PSA, it will be removed at a later step. Refer to the illustration below for PSA locations.



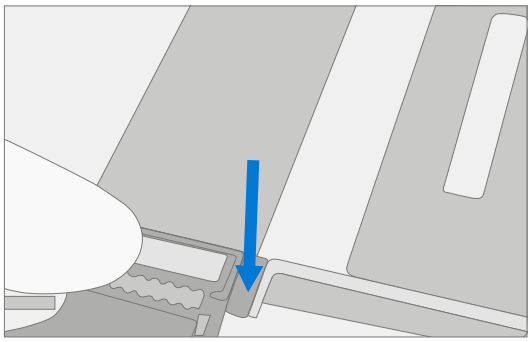
3. **Speaker mesh application** – Place the display face-down on a Soft ESD safe mat. Wipe down the outer edges of the display with a lint free cloth. When installing the **originally removed display** ensure outer edges are clean and clear of PSA residue. Remove the protective liner from the speaker mesh. Using the clear handle align the speaker mesh into the chassis speaker opening. Press onto the mesh for 10 seconds to activate the adhesive. Carefully remove the clear handle. Repeat this process for the other side of the chassis.

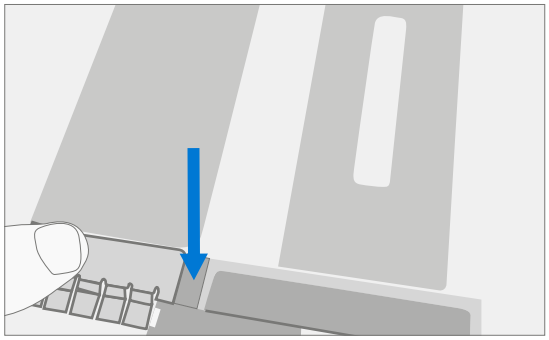




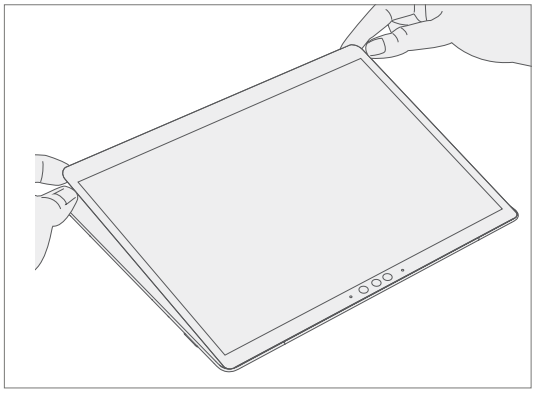
4. **Final Inspection** – Prior to continuing with the reassembly, inspect the device internals to ensure no screws, foam, tape, or other foreign material has been misplaced. If any damage is observed to the battery, contact Microsoft for a device exchange.

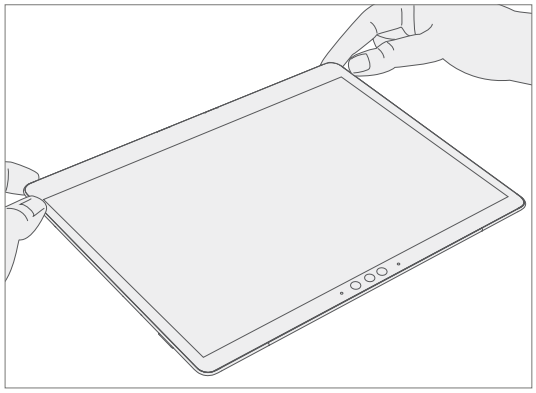
5. **Connect display connector** – While supporting the display with one hand, connect the Display FPC by pressing it into the mating connector on the display. Install a new shield over the Display FPC. Ensure all edges of the shield are snapped into place.





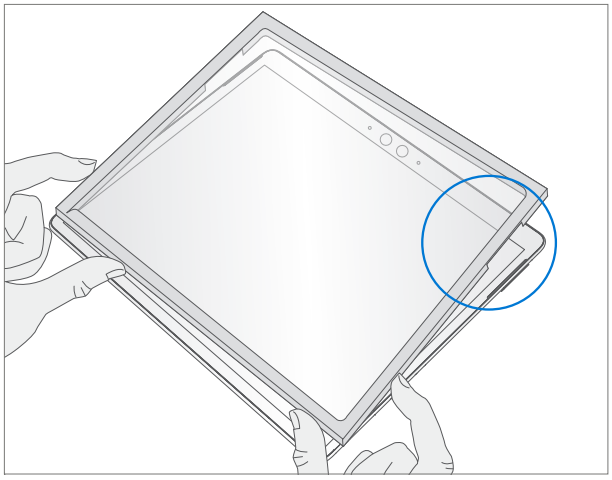
6. **Apply display to chassis** – Hold the display and remove the PSA Liners to expose adhesive. Turn the display over and place it on the chassis. Align the display along the top edge first (Toe-in) and lower after alignment is found. Ensure that the glass sits flush in the chassis and does not rest anywhere on top of the chassis lip.

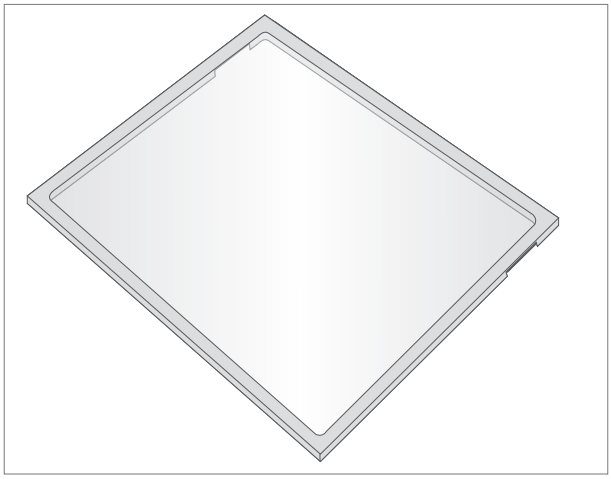


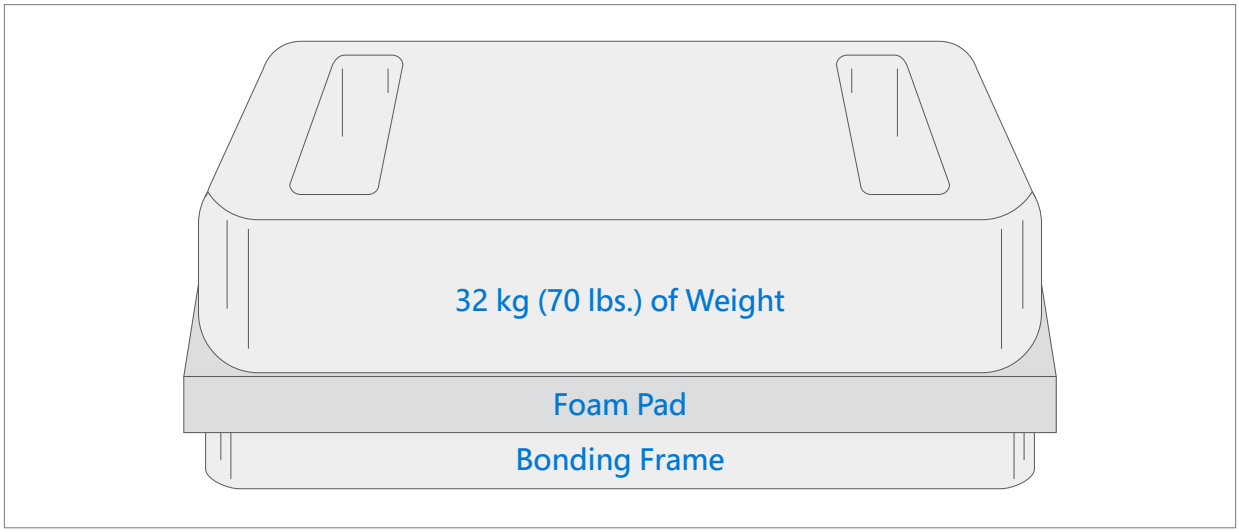


7. **Bond adhesive** – Place the bonding frame on the device, ensuring that the cutouts on the sides line up with the volume/power buttons. Place foam pad over bonding frame. Place 32 kg of weight on top of the foam pad and bonding fame. Leave weight in place for 2 minutes.

IMPORTANT: Weight Requirement:
Minimum 32 kg (70 lbs.) / Maximum 35 kg (77 lbs.)
Minimum Dimensions: 280mm x 200mm
Geometry must be symmetrical, to allow for even weight distribution. Weight used must be a flat plate, with consistent flatness and not protrude from contact plane with Bonding Frame.
Weight must contact the full perimeter of the frame when placed above it. Recommended weights (Ruck Plates of 9 kg + 9 kg + 14 kg, or 20 lbs. + 20 lbs. + 30 lbs.)
When using Ruck weights place the 14 kg weight first, then stack the 9 kg weights on top.
Ensure foam pad covers entire bonding frame.







8. **After bonding inspection** – Remove the weights, foam pad, and the frame. Lift carefully to avoid damaging the device. Inspect the display for scratches, cracks, large gaps, and its flushness with respect to the chassis.
9. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
10. **New display calibration** – On installation of a new display device final calibration relies on the successful completion of the display Replacement Mode. Display calibration is not required when installing the originally removed display.
    a. **Connect software tools USB drive** with SDT to USB connector on device under repair.
    b. **Power on device** – Depress the power button on the side of the device.
    c. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive, and run:
    SDT – Select Repair setup and validation. Run the Touch Display Calibration. Accept the restart prompt at the end of the tool process.

    IMPORTANT: This step must be conducted on the device successfully on installation of a new display. Ensure light levels in the work area remain consistent during the touch display calibration process. Any tool failures require restarting the process with a new display.
11. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.
12. **Final inspection of display installation** – Remove protective cling from the new display. Verify the side edges of the display are flush, and that there are no obvious steps/gaps between the display and the chassis. Wipe the device thoroughly (including under the kickstand) with the microfiber cloth to remove all fingerprints.

Procedure – Alternate Installation (Display)

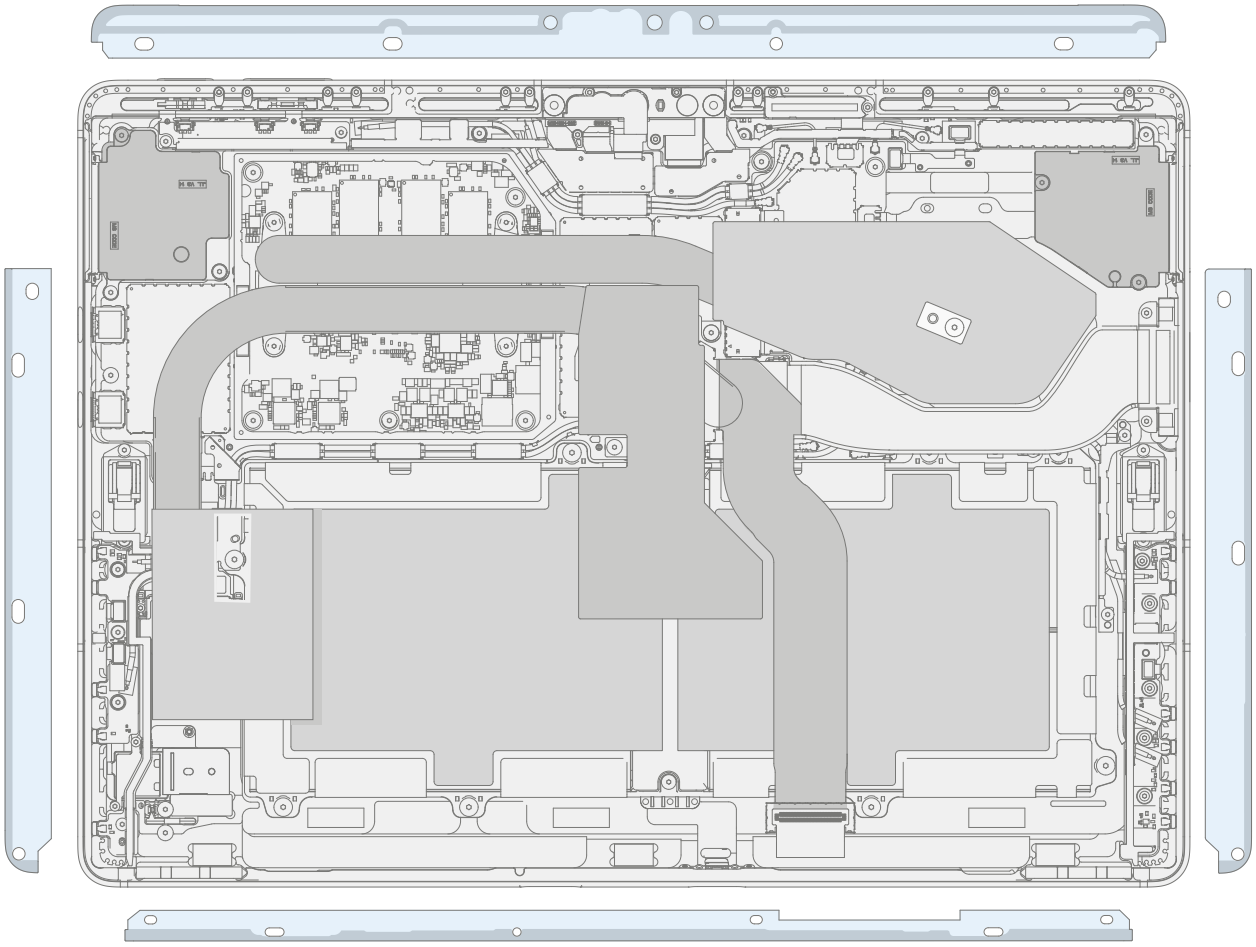
1. **Pre-installation Device Inspection**

   ⚠ **WARNING:** Verify the battery's condition. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

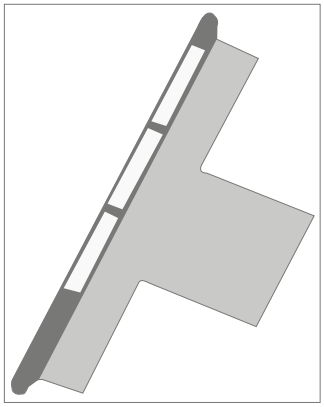
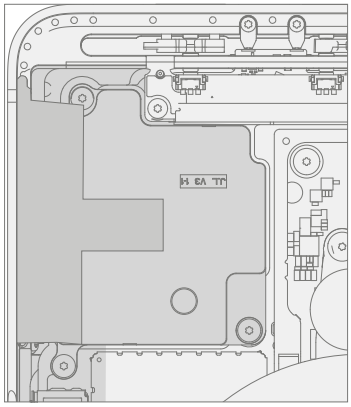
   IMPORTANT: Leave protective cling on **new Display** during all installation steps.

   IMPORTANT: Carefully inspect the internal areas of the bucket. Ensure the area around battery is free of any foreign objects.

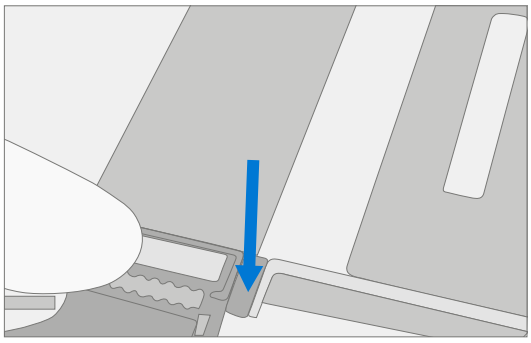
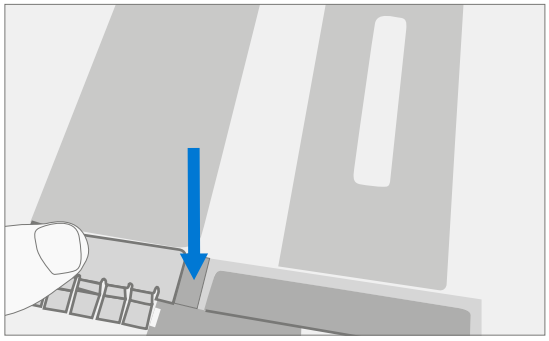
2. **Display adhesive application** – Thoroughly clean the chassis along the display PSA bonding surface using IPA and a cotton swab. Wait at least 30 seconds before applying the new PSA. Apply the 4 strips of PSA to the chassis. Align the PSA following the outline on the chassis. Leave the blue liner on the PSA, it will be removed at a later step. Refer to the illustration below for PSA locations.



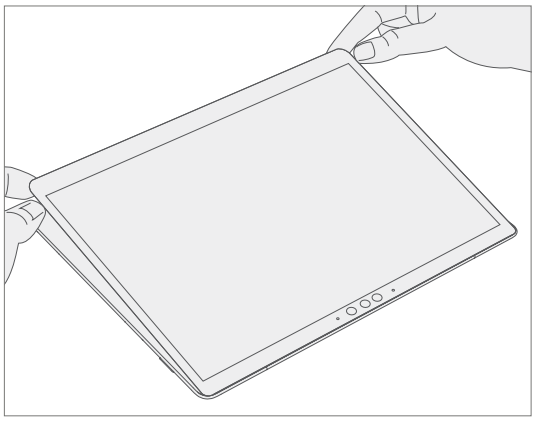
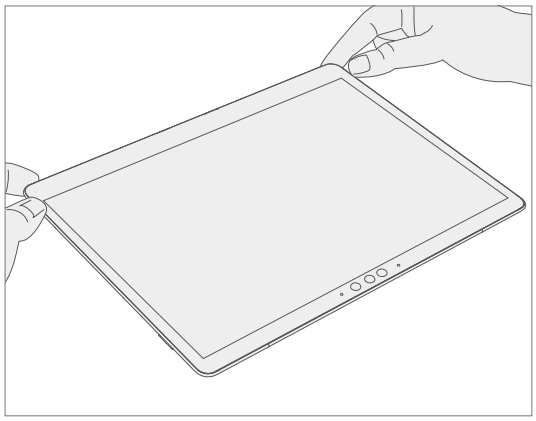
3. **Speaker mesh application** – Place the display face-down on a Soft ESD safe mat. Wipe down the outer edges of the display with a lint free cloth. When installing the **originally removed display** ensure outer edges are clean and clear of PSA residue. Remove the protective liner from the speaker mesh. Using the clear handle align the speaker mesh into the chassis speaker opening. Press onto the mesh for 10 seconds to activate the adhesive. Carefully remove the clear handle. Repeat this process for the other side of the chassis.

4. **Connect Display FPC** – While supporting the display with one hand, connect the Display FPC by pressing it into the mating connector on the reverse side of the display. Install a new shield over the Display FPC. Ensure all edges of the shield are snapped into place.

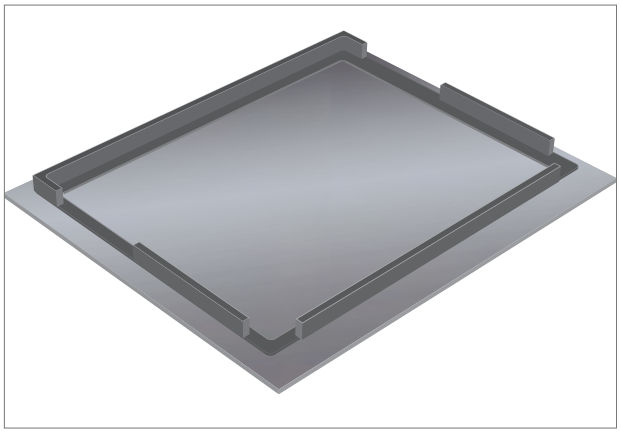



5. **Apply display to chassis** – Hold the display and remove the PSA Liners to expose adhesive. Turn the display over and place it on the chassis. Align the display along the top edge first (Toe-in) and lower after alignment is found. Ensure that the glass sits flush in the chassis and does not rest anywhere on top of the chassis lip. Lightly press on the edges of the display to create an initial bond.

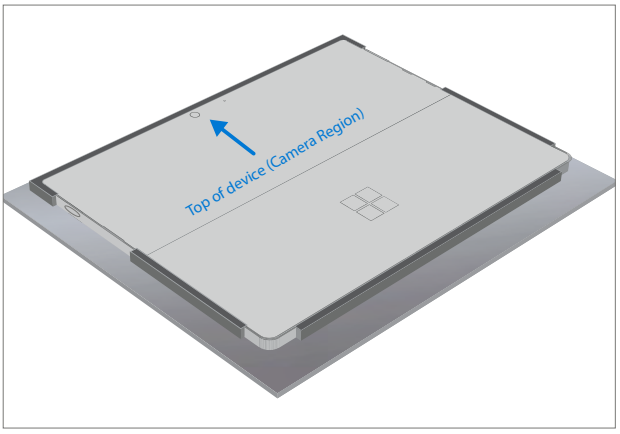



6. **Alternate bonding PSA** – Bonding is a multi-step process. Refer to the below illustrations.

IMPORTANT: Use steel shot bags, two 9 kg and one 14 kg. Apply the 1st 9 kg bag, then the 14 kg bag, and then the 2nd 9 kg bag.

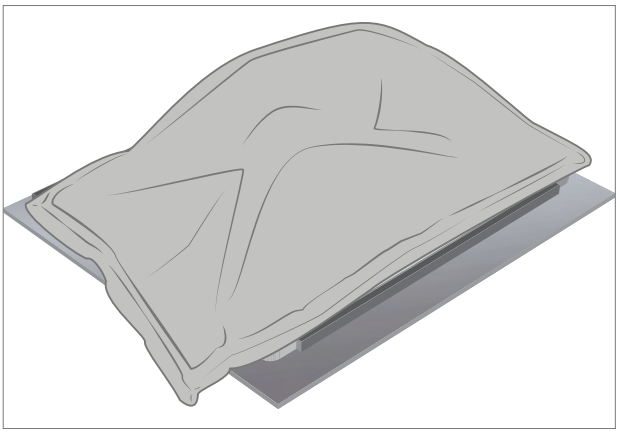


Foam pad with bonding fram face down



Place device display side down into bonding frame

Place 9 kg steel shot bag onto device



Place 14 kg steel shot bag onto 9 kg steel shot bag
Bond for 1 minute

Place second 9 kg steel shot bag onto 14kg bag
Bond for 5 minutes

Shift second 9 kg steel shot bag to top edge of the device
Bond for 3 minutes

7. **After bonding inspection** – Remove the steel shot bags and lift device out of the frame. Lift carefully to avoid damaging the device. Inspect the display for scratches, cracks, large gaps, and its flushness with respect to the chassis.
8. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
9. **New display calibration** – On installation of a **new display** device final calibration relies on the successful completion of the Display Replacement Mode. Display calibration is not required when installing the originally removed display.
   a. **Connect software tools USB drive** with SDT to USB connector on device under repair.
   b. **Power on device** – Depress the power button on the side of the device.
   c. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive, and run:
   SDT – Select Repair setup and validation. Run the Touch Display Calibration. Accept the restart prompt at the end of the tool process.

   IMPORTANT: This step must be conducted on the device successfully on installation of a **new display**. Ensure light levels in the work area remain consistent during the touch display calibration process. Any tool failures require restarting the process with a new display.
10. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.
11. **Final inspection display installation** – Remove protective cling from the display. Verify the side edges of the display are flush, and that there are no obvious steps/gaps between the display and the chassis. Wipe the device thoroughly (including under the kickstand) with the microfiber cloth to remove all fingerprints.

Surflink Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes, cautions, & warnings in each process section.

Required Tools and Components

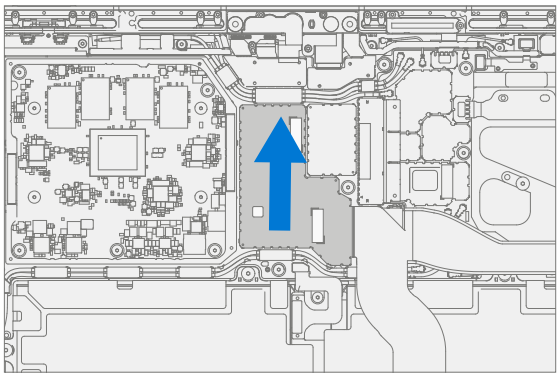
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
- **Components:**
  - Surflink (Refer to Illustrated Service Parts List)
  - Surflink Screws (M1164319-001) Qty. 2

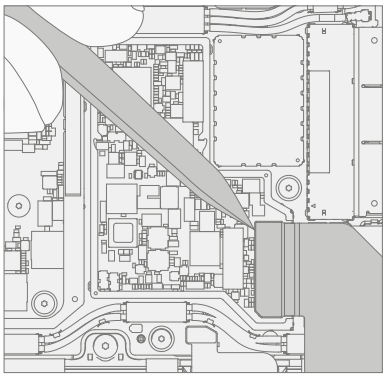
Prerequisite Steps

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)

Procedure – Removal (Surflink)

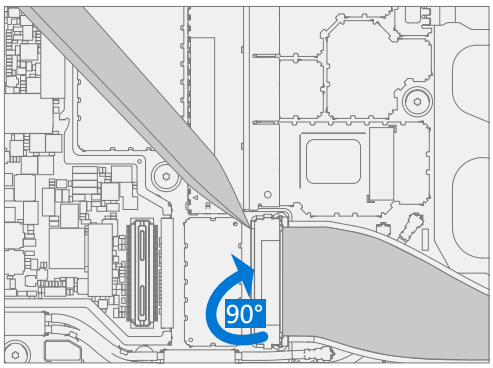
1. **Remove T2 shield** – Carefully remove the T2 shield lid to expose the board-to-board connector of the display FPC. Disconnect and remove the display FPC from the device.

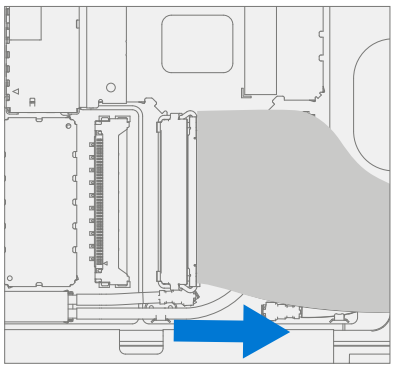




2. **Disconnect cable from motherboard** – Before disengaging connector, remove tape using a spudger. Use a spudger to release locking bar and disconnect Surflink connector from motherboard. Use a plastic spudger to disengage the cable from the connector. Gently peel the Surflink cable up to release it from the unit.

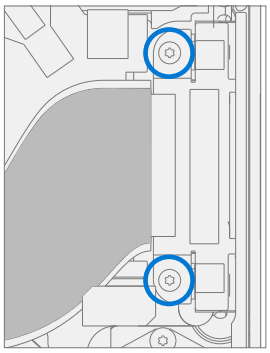
> **IMPORTANT:** When removing the cable, note there is light adhesive under the cable. Once removed, clean the surface with an IPA wipe.





3. **Screw removal** – Use a 3IP (Torx-plus) driver to remove the Surflink screws.

> **CAUTION:** The Surflink cable is magnetized, be careful to not let the screws stick to it during screw removal.

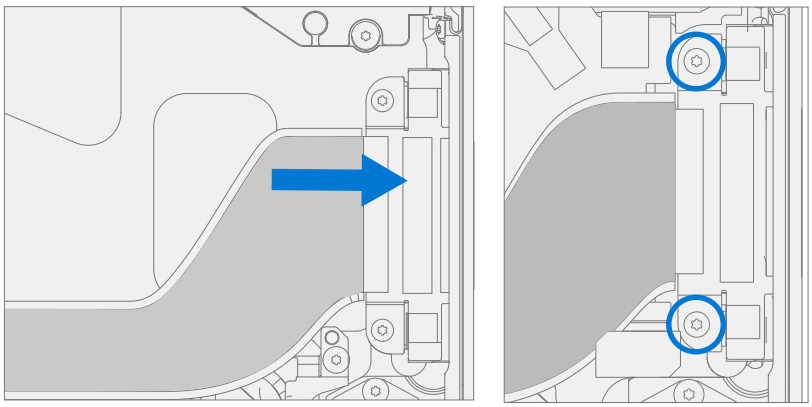


4. **Surflink removal** – Gently peel the Surflink up from the chassis. Take extra care not to damage the fan under the Surflink.

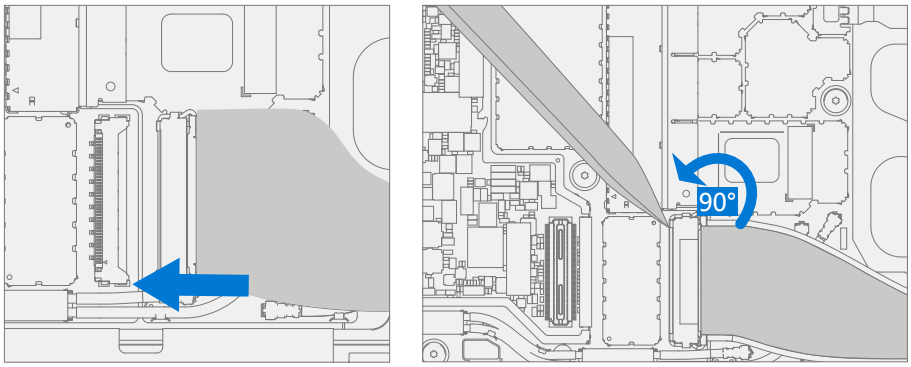
Procedure – Installation (Surflink)

1. **Install screws** – Install new Surflink into chassis. Ensure alignment by confirming the thru holes on the connector are aligned with the corresponding screw bosses in the chassis. Use a 3IP (Torx-plus) driver to install the Surflink screws until they are just snug and seated, and then turn another 45 degrees (1/8 turn) or until screws are fully fastened. Refer to the below illustration for screw locations.

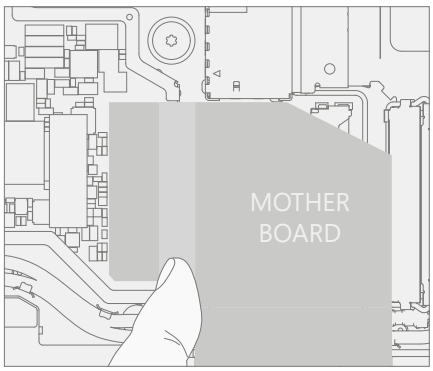
   ⚠ **CAUTION:** The Surflink cable is magnetized, be careful to not let the screws stick to it during screw installation.



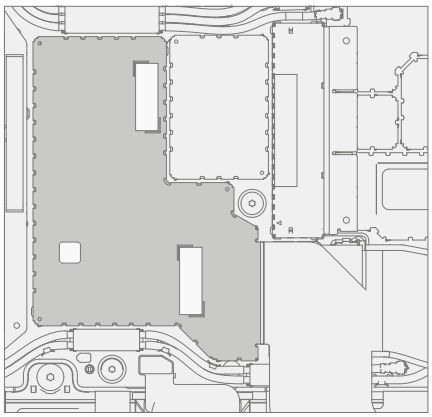
2. **Connect cable to motherboard** – Connect Surflink cable to the motherboard. Press down on the locking buckle to secure the connector. Apply tape over the retention latch after connecting and securing cable.



3. **Reassemble display FPC** – Connect the display FPC to the motherboard. Use the printed text to identify the side that will connect to the motherboard.



4. **Install new display FPC Shield** – Use a new display FPC shield lid and install it over the motherboard shield fence. Press down along the perimeter to ensure it is secured in place.



5. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42).
6. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
7. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Thermal Module Replacement Process

Preliminary Requirements

IMPORTANT: Be sure to follow all special (bolded) notes, cautions, & warnings in each process section.

Required Tools and Components

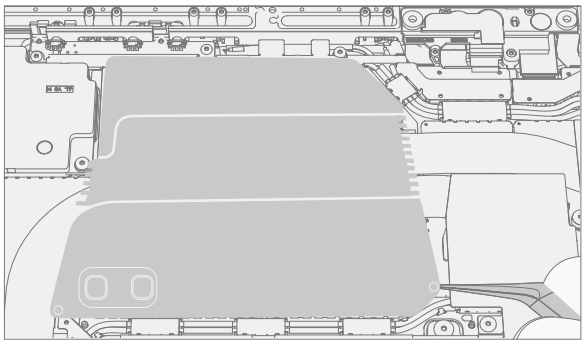
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swabs
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Thermal Module (Refer to Illustrated Service Parts List)
  - SOC Screws (M1196939-001) Qty. 4
  - Heat Spreader Screws (M1182860) Qty. 2
  - Center Screws (MM1182877-001) Qty. 2
  - Thermal Putty (M1019757-006) Qty. 1

Prerequisite Steps

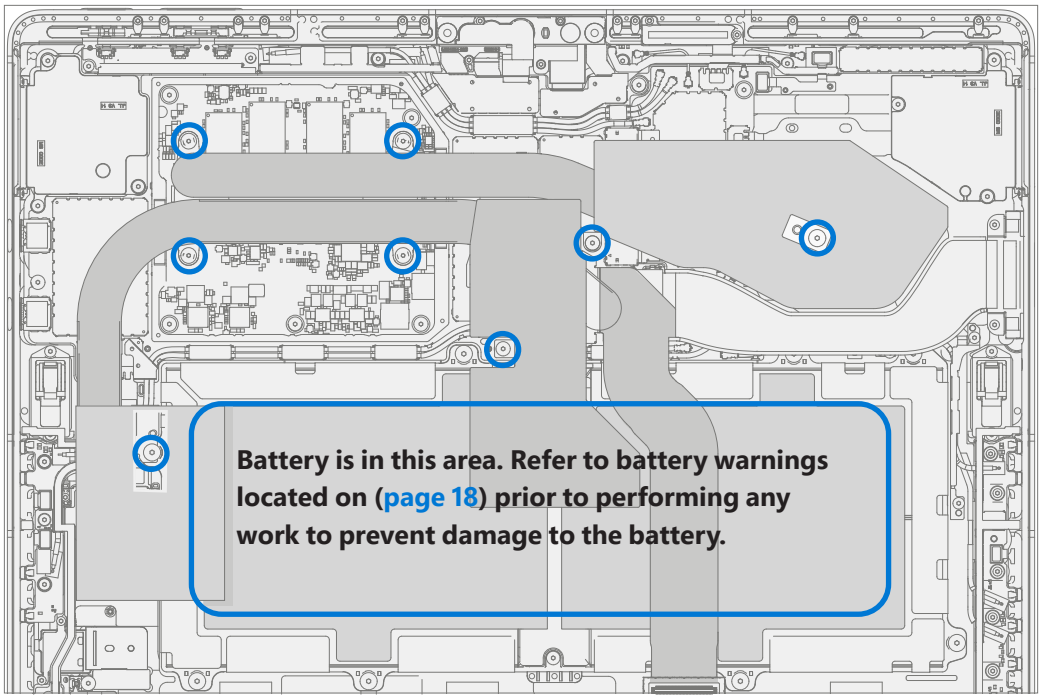
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)

Procedure – Removal (Thermal Module)

1. **Remove T1 Shield Lid** – Insert a plastic tweezer or spudger near the bottom right corner of the shield to lift the lid and remove.

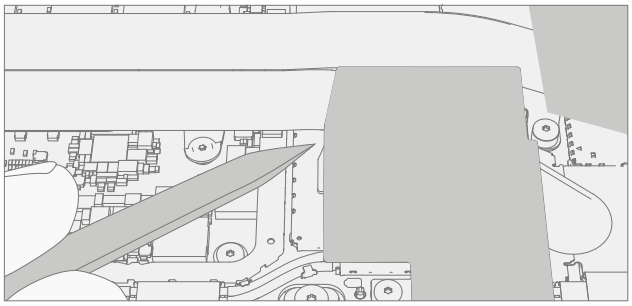


2. **Screw removal** – Use a 3IP (Torx-plus) driver to remove the 8 screws securing the thermal module to the motherboard.

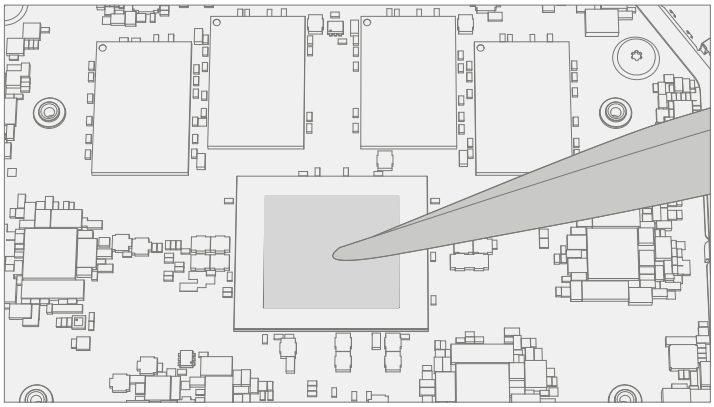


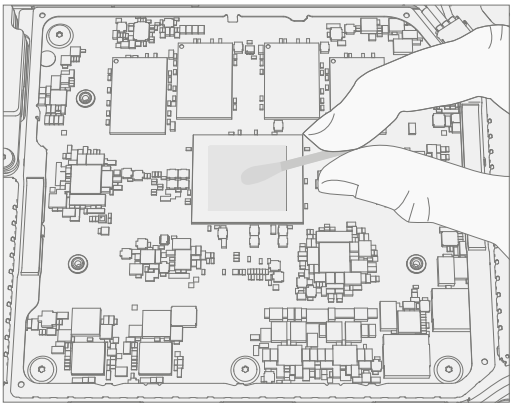
3. **Release the TIM from the motherboard and remove** – Using a plastic spudger apply light pressure to the edges of the THM copper shield on the motherboard as pictured below. Carefully lift thermal module from the chassis. Note that shield spring gasket may also come off with the thermal module.

> ⚠ **CAUTION:** Place spudger between the heat pipe and shield to not cause damage to the motherboard.



4. **Clean TIM from processor** – Using a plastic spudger, scrape TIM from SoC area. Use IPA and cotton swab to clean residual TIM from SoC.

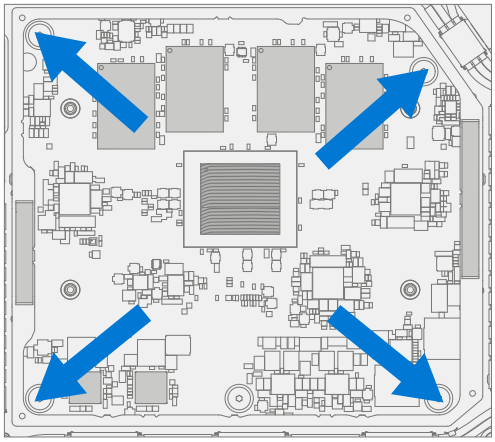




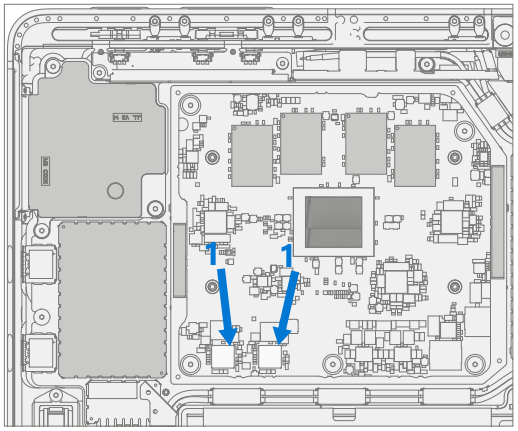
Procedure – Installation (Thermal Module)

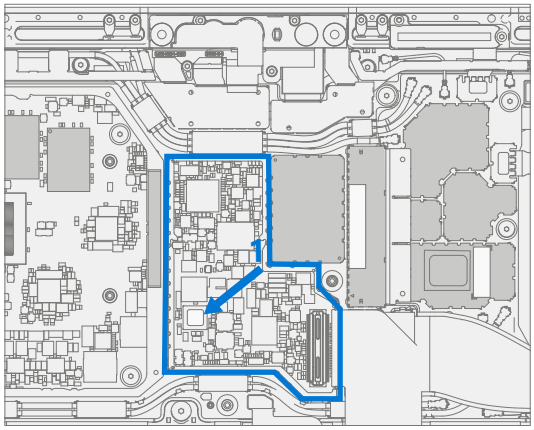
> ⚠ **WARNING:** Do not reuse the old thermal module when carrying out any repairs. A new thermal module must be used for each repair.

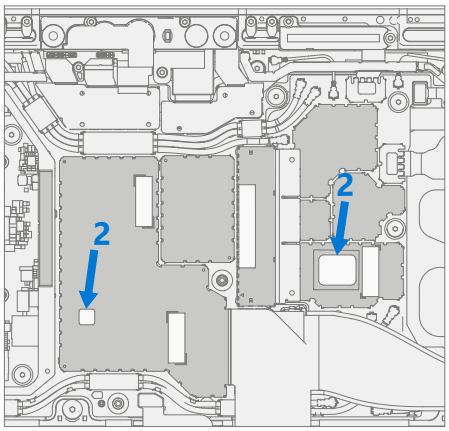
1. **Spring gasket placement** – If the original gasket appears damaged replace it with a new spring gasket. Ensure the spring gasket is correctly placed over the motherboard then center and align the thermal module to the spring gasket.



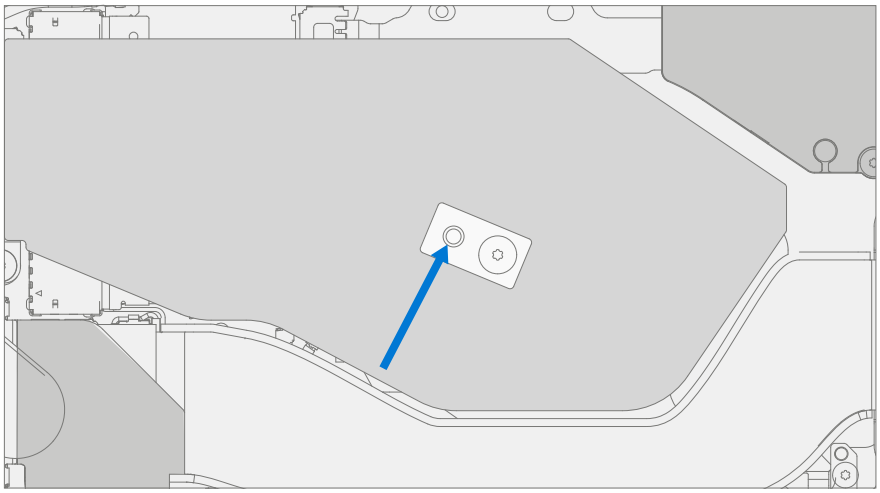
2. **Apply thermal putty** – Using the provided syringe, dispense the equivalent of one tick marking of the syringe onto the locations marked 1 below. Install shield over blue highlighted area. Dispense the equivalent of two tick markings on the syringe to the locations marked 2.

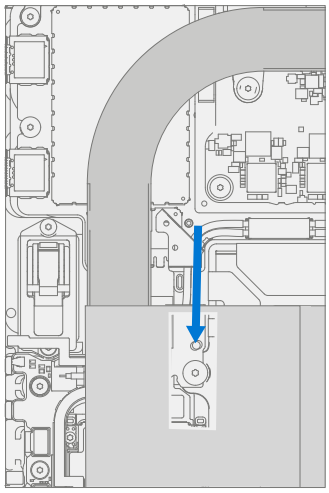






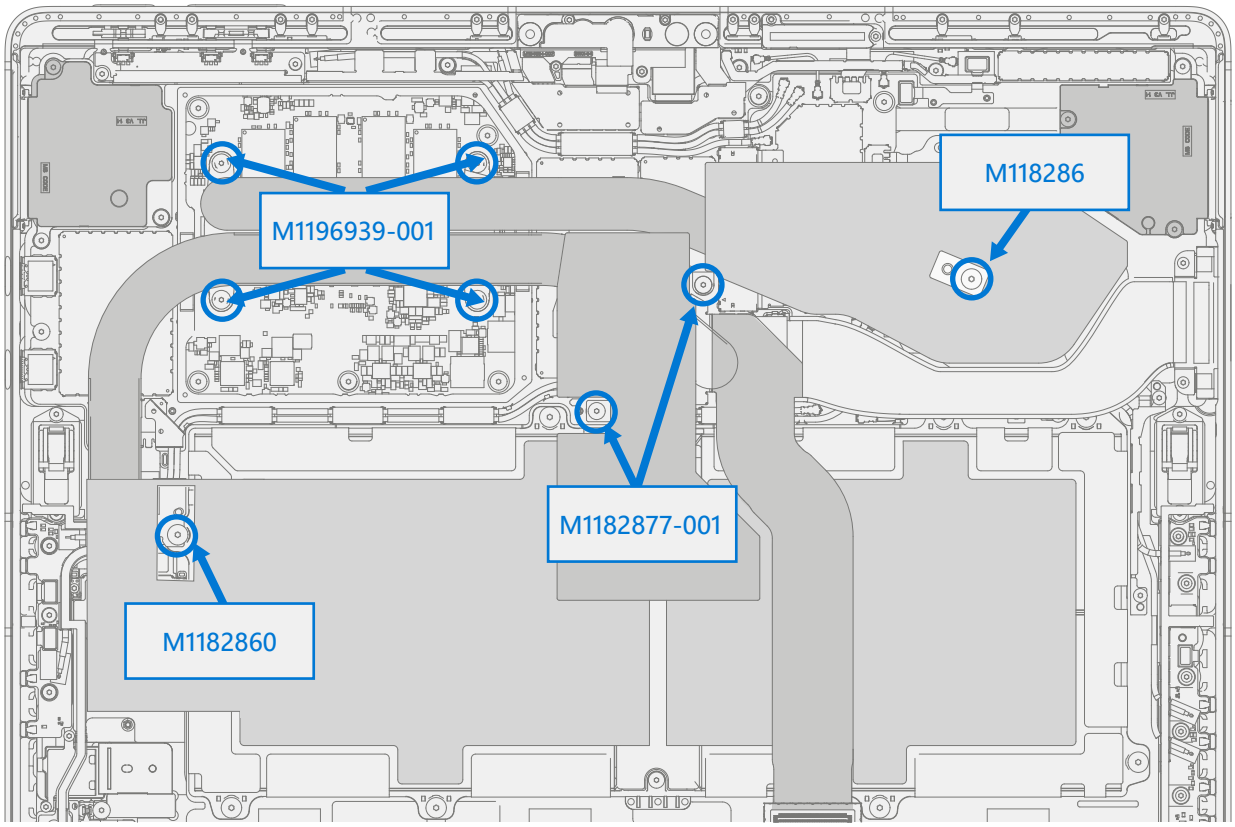
3. **Align thermal module with chassis** – Locate the right heat pipe onto the corresponding alignment pin on the bucket. The left alignment feature can also be found on the bucket and must be aligned with the alignment slot on the left heat pipe.





4. **Install thermal module** – Use a 3IP (Torx-plus) driver to install the 8 screws until just snug and seated, and then turn another 45 degrees (1/8 turn) or until fully fastened. Refer to the below illustration for screw locations and part numbers.

> ⚠ **WARNING:** The thermal module is very fragile. Take extra care to not bend or twist the thermal module. If any part of the thermal module or its heat pipes are bent, then the whole module must be replaced.



5. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
6. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
7. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
8. **Run SDT** – Run SDT to ensure all device features and functions operate as expected.

Battery Replacement Process

Preliminary Requirements

Required Tools and Components

- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Gloves
  - Safety Glasses
  - Bucket of Sand (1 gallon)
  - Clean, dry, untreated sand (0.5 gallon)
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Battery (Refer to Illustrated Service Parts List)
  - Frame Screws (M118260-001) Qty. 7
  - Center PCM Screws (M1182861-002) Qty. 2

Prerequisite Steps

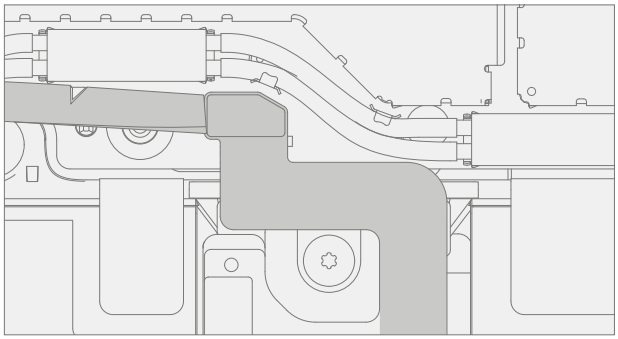
- **Run SDT** – Insert the SDT USB drive and execute the Battery Repair (Setup) workflow to have the device enter repair mode.
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)

Procedure – Removal (Battery)

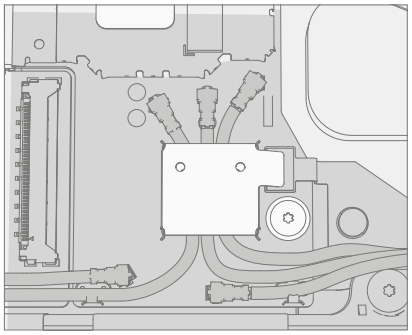
⚠ **WARNING:** It is highly recommended that prior to handling battery the operator should remove any personal jewelry, wear gloves and safety glasses, and have a bucket of sand prepared in case of any battery event.

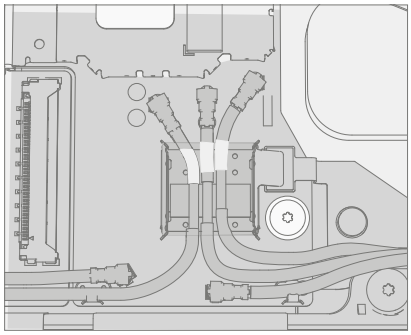
⚠ **WARNING:** In case of battery event submerge entire device sand in. **Do not attempt to pick up device.**

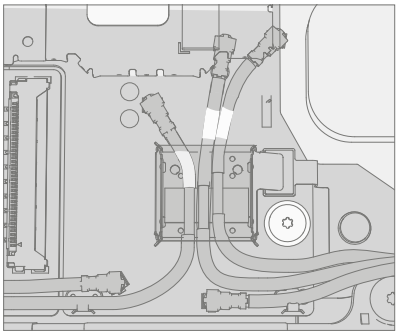
1. **Disconnect battery connector** – Using a plastic spudger, disconnect the battery connector from the motherboard.



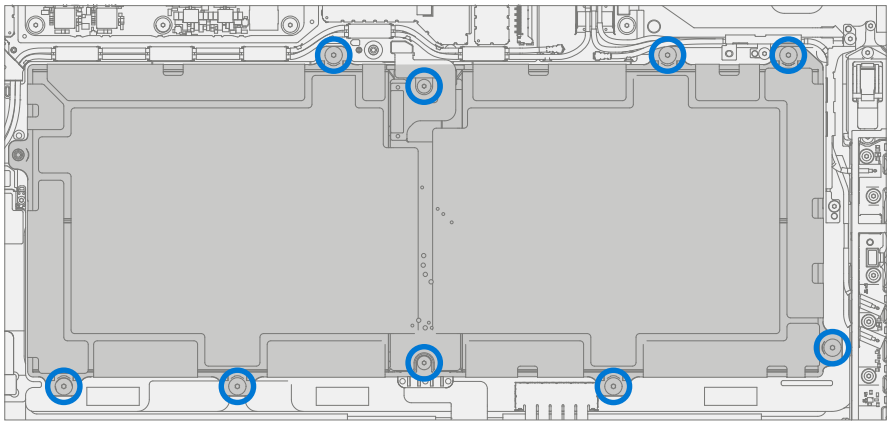
2. **Remove Coax Cable shield** – Carefully remove the shield lid covering the bottom coax cables with a pair of tweezers. Then using a plastic spudger, carefully lift the right two from the motherboard.

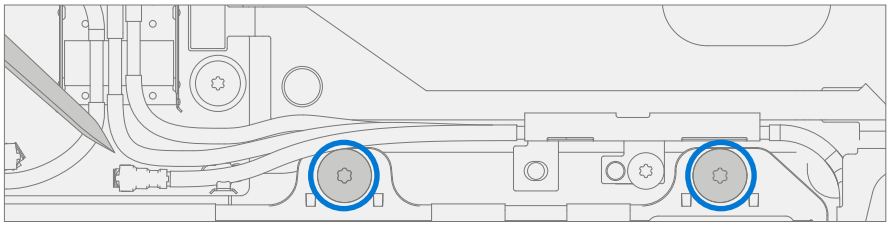






3. **Remove Battery Screws** – Use a 3IP driver to remove the 7 screws from the Battery Frame, and 2 center PCM screws as highlighted in red. For the top right screws, use a plastic spudger to move 3 coax cables to expose the screws and avoid damaging the cables during removal.

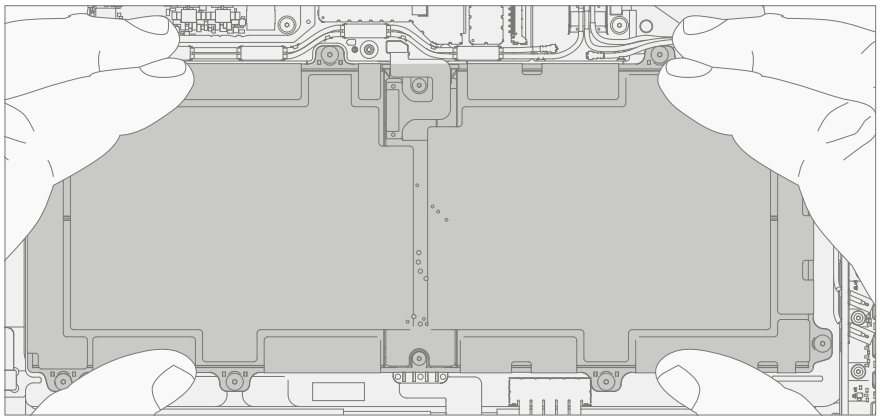




4. **Lift out the battery** – Using two gloved hands, grasp the battery by the frame on both sides as shown and gently lift the battery out of the chassis. Set battery on a clean, flat surface.

⚠ **WARNING:** Only handle battery by plastic frame. Bending, twisting, or impacting battery may damage the battery, damage the device, and/or result in severe personal injury or property damage. Always use two hands when handling the battery.

IMPORTANT: Place the battery in a location where it cannot be accidentally contacted or damaged. When replacing the battery dispose of the old battery according to local laws.



Procedure – Installation (Battery)

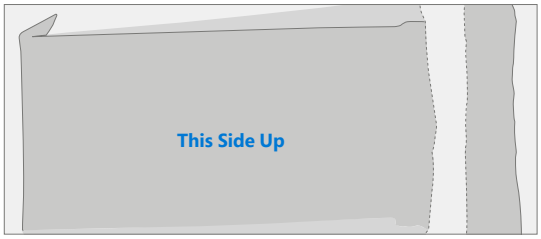
IMPORTANT: Do not reuse the old battery when performing repairs. Always use a new battery when the old battery has been removed from the device.

1. **Pre-installation device inspection** – Check the chassis for any loose articles that may be present.
   a. Check and remove any foreign object that the magnets may have attracted.
   b. Pay special attention to the magnetized areas around the bucket edge.
   c. Verify all removed screws are accounted for and have not been misplaced inside the device
   d. Loose screws should never be stored on the magnetic areas of the bucket.

⚠ **WARNING:** Verify the battery's condition. Devices exhibiting battery issues as outlined in the Battery Inspection Process require whole unit replacement.

2. **Opening the battery packaging** – Open the Battery Box and remove the foil pouch. Using both hands, peel open the foil pouch by pulling on the dotted line along the right side, as shown below. Remove the contents from the pouch.

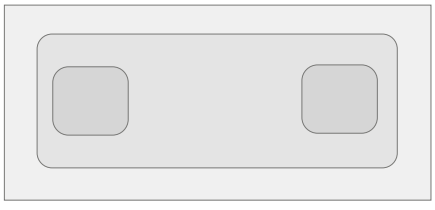
⚠ **WARNING:** Do not use scissors or other sharp objects to open the pouch.

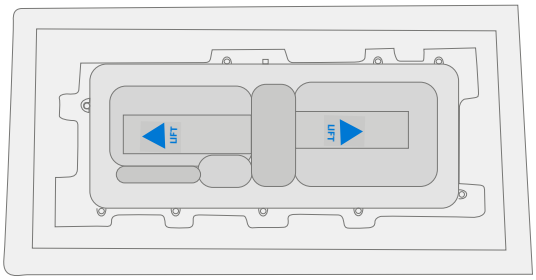


3. **Remove the Foam Lid** – Remove the foam lid to reveal the replacement battery

⚠ **WARNING:** Only handle the new battery with the plastic loops that come attached to the new battery. Bending, twisting, or impacting battery may damage the battery, damage the device, and/or result in severe personal injury or property damage. Always use two hands when handling the battery.

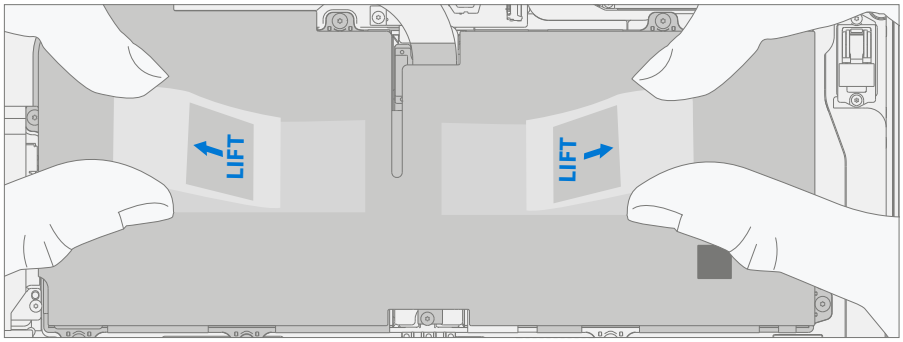
⚠ **WARNING:** Do not remove or peel the battery handling liner until the battery has been assembled in the device.





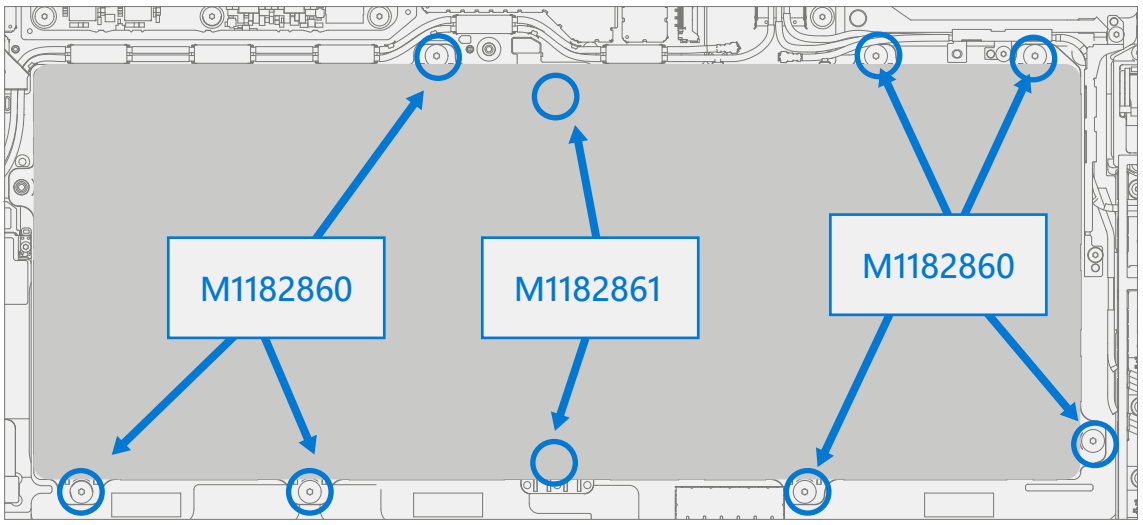
4. **Insert new battery** – Check area under battery for any loose screws/debris before installing new battery into the chassis. Using the attached loops carefully install the new battery into the device.

> ⚠ **CAUTION:** If battery is dented or punctured during installation, discard the battery and use a new battery pack.



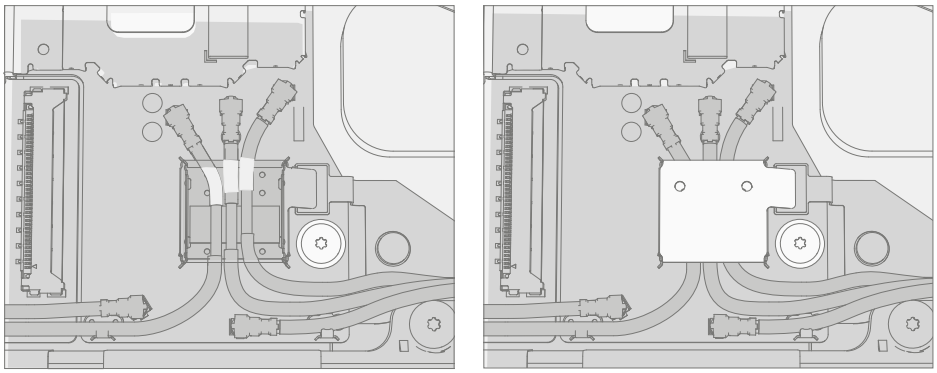
5. **Install Battery Screws** – Use a 3IP (Torx-plus) driver to install the 7 screws around the battery frame, and 2 center PCM screws as highlighted below. For the top right screws, use a plastic spudger to move 3 coax cables to expose the screw holes and avoid damaging the cables during installation. Turn screws until finger tight then tighten by an additional 1/8 turn (45-degrees) or until fully fastened.

> ⚠ **CAUTION:** Do not overtighten screws on battery or battery frame. If frame is cracked battery must not be used.
>
> ⚠ **CAUTION:** Exercise caution when fastening to ensure cables are not pinched during the operation.



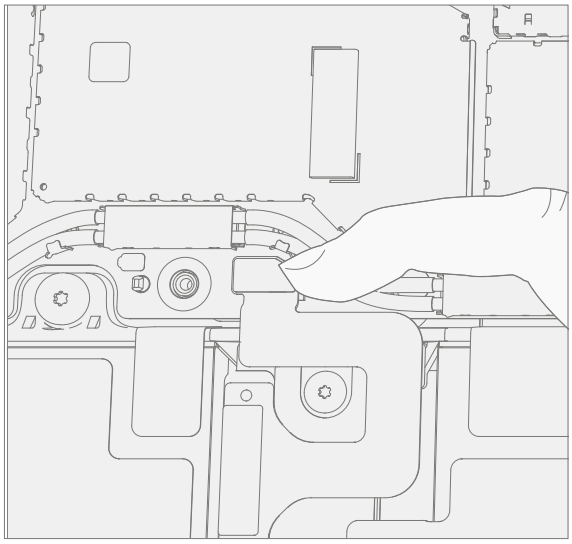
6. **Remove liner** – After all screws have been seated, hold one of the tabs on the right or left of the Battery liner to peel the Handling Liner away from the Battery Pack. While working on other components, apply the Battery protective cover to ensure the Battery Pack is protected during the rest of the re-assembly steps.

7. **Install coax cable and shield** – Carefully align and install the right two coax cables back onto the motherboard ensuring that the stripped portion of the wire makes good contact with the metallic foam. Place the shield lid covering the bottom coax cables with a pair of tweezers and press down to snap into place.



8. **Connect battery connector** – Connect battery connector to motherboard by aligning the connector and gently pressing it down with your finger. There should be a small audible snap as you press down lightly.

> ⚠ **WARNING:** Do not apply too much pressure to the connector. Too much pressure can damage the motherboard or the battery connector.



9. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
10. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
11. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
12. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
13. **New Battery Charging** – New batteries are shipped and stored at low states of charge in compliance with shipping regulations. They should be charged up to at least 50%. This step will take between 20 minutes and 1 hour and is needed to validate full functionality of the new battery. Carefully place the device right-side up. Open device, connect the power supply, and power it on.

14. **New Battery Authentication** – After charging the new battery to at least 50%, ensure new battery reads as authenticated in the Battery Repair (Validation) workflow in SDT. If the battery shows inauthentic run the SDT Battery Repair (Validation) workflow in its entirety.

    a. Connect the SDT Configuration USB drive.

    b. Run the SDT Battery Repair (Validation) to ensure battery is properly authenticated and all features and functions operate as expected.

    IMPORTANT: Battery authentication requires a stable internet connection. If any battery steps fail retry with a new internet connection. If failures continue reach out to Microsoft Support.

    c. Power off at completion of tests. Remove SDT Configuration Files USB drive and power supply.

    d. If no further repairs are required proceed to final steps.

15. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run all SDT diagnostics tests to ensure all device features and functions operate as expected.

Button Replacement Process

Preliminary Requirements

Required Tools and Components

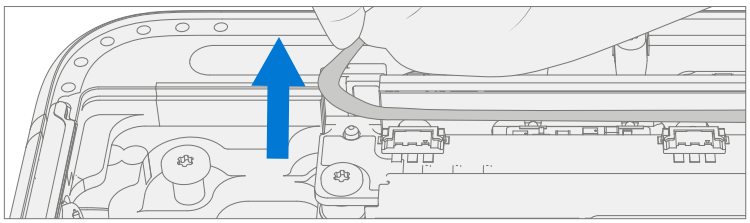
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Volume and Power Buttons (Refer to Illustrated Service Parts List)
  - Button PCB Screws (M1183159-001) Qty. 2

Prerequisite Steps

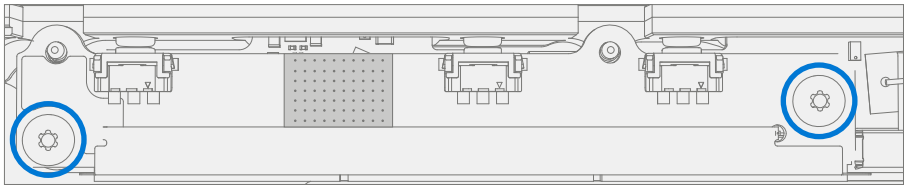
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)

Procedure – Removal (Buttons)

1. **Remove foam** – Use your fingers to remove the foam on the button board.

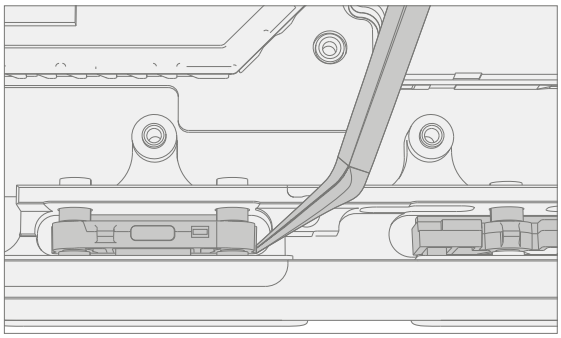


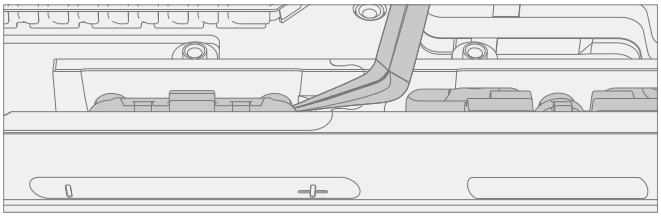
2. **Screw removal** – Remove the metallic foam from the top of the unit, then remove the two marked screws using a 3IP (Torx-plus) driver and lift the button PCB out of the chassis.



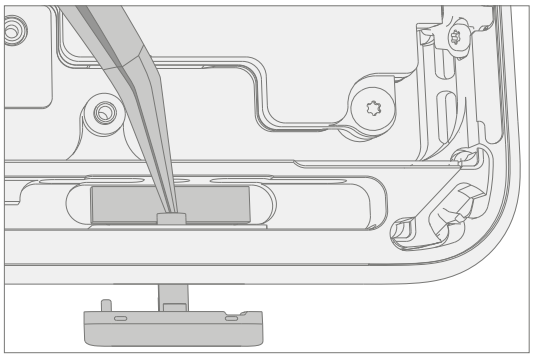
3. **Remove button clips** – Using a plastic spudger or a pair of tweezers, get under the edge of the button clip and leverage them up till the clip pops out.

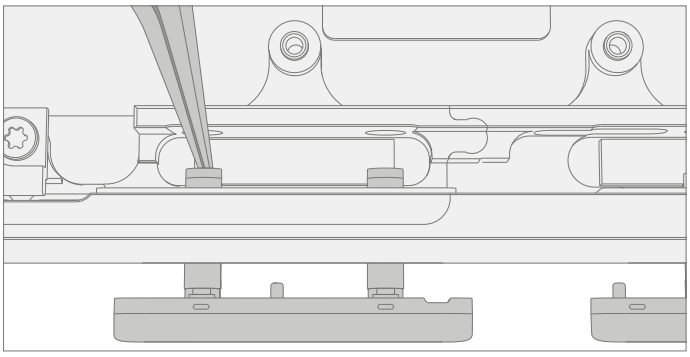
> **IMPORTANT:** When prying out the buttons, make sure you secure them with your finger as they will eject.





4. **Remove buttons** – Using a plastic spudger or a pair of tweezers, push on the button posts to remove the buttons from the chassis.

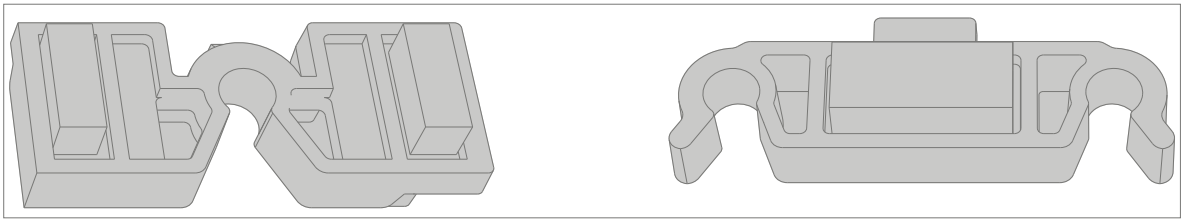


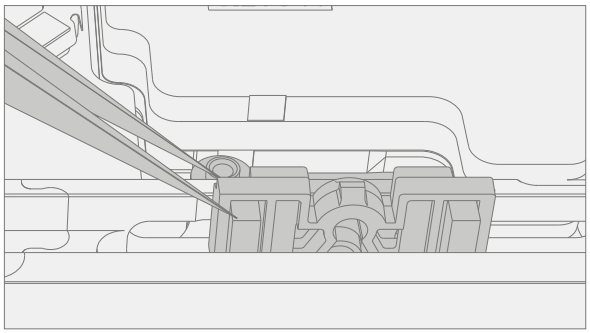


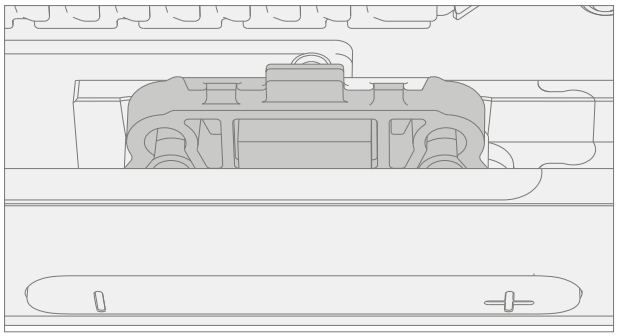
Procedure – Installation (Buttons)

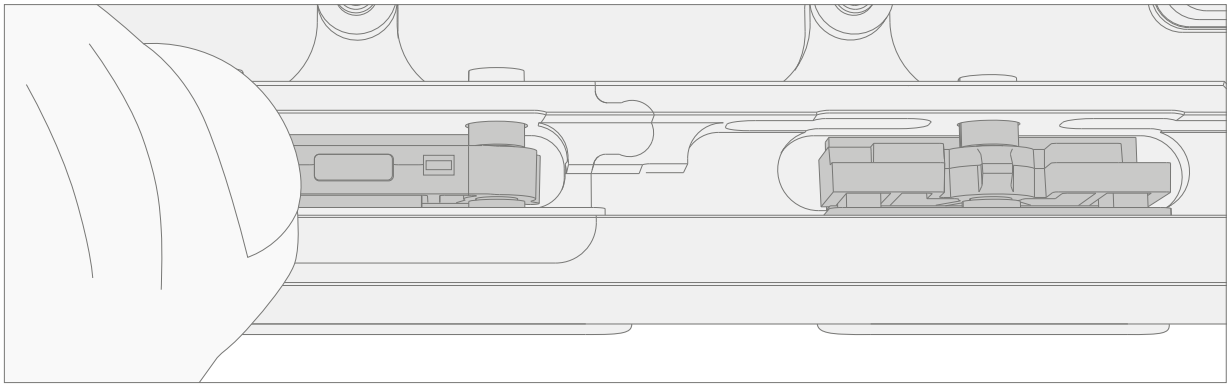
1. **Insert buttons** – Using your fingers, insert the button posts in the chassis.
2. **Install button clips** – Using a plastic spudger or a pair of tweezers, align the button clips with the posts and press down with your fingers until they click into place.

> **IMPORTANT:** The button clips have rubber pads on them. These rubber pads must face towards the exterior of the chassis when installed.

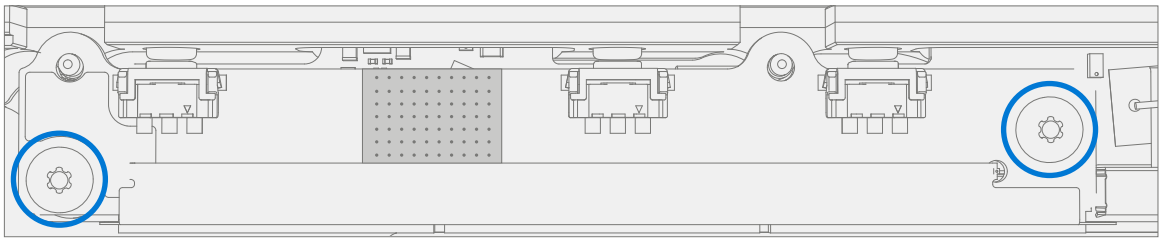








3. **Install button PCB** – Install the button PCB by aligning the screw holes with the posts in the chassis.
4. **Install screws** – Using a 3IP (Torx-plus) driver install the two screws marked below, turning each screw until finger tight then tightening by an additional 1/8 turn (45-degrees).



5. **Install foam** – Use your fingers to install the foam on the button board, starting from the left side and maintaining alignment within the enclosure.
6. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
7. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
8. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Speaker Replacement Process

Preliminary Requirements

Required Tools and Components

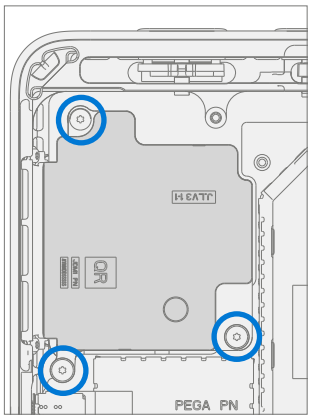
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Speakers (Refer to Illustrated Service Parts List)
  - Speaker Screws (M1165301-001) Qty. 6

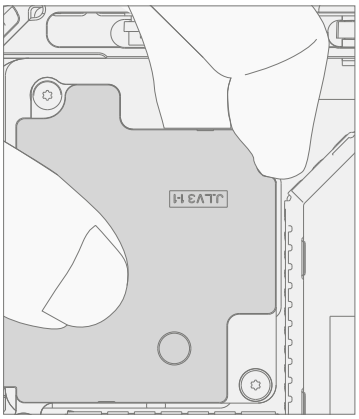
Prerequisite Steps

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)

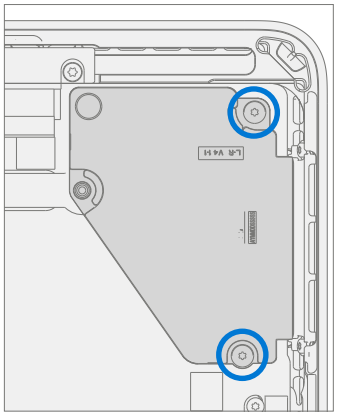
Procedure – Removal (Speaker)

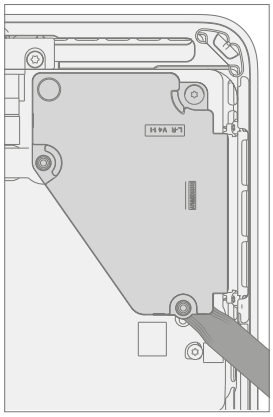
1. **Remove screws from left speaker** – Using a 3IP (Torx-plus) driver remove the three marked screws from the left speaker and lift out of chassis.





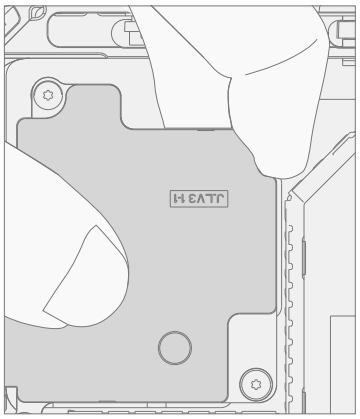
2. **Remove screws from right speaker** – Using a 3IP (Torx-plus) driver remove the two marked screws from the right speaker and lift out of chassis.

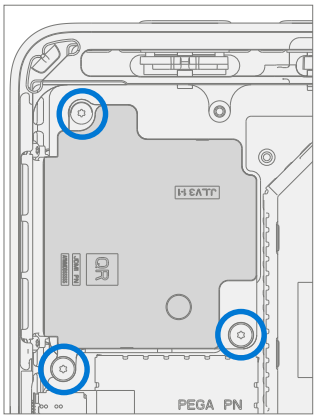




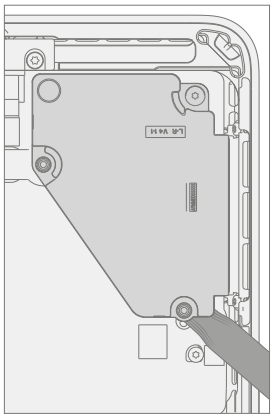
Procedure – Installation (Speaker)

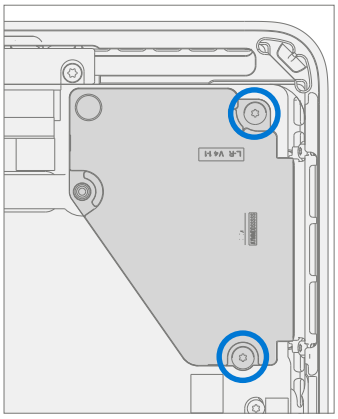
1. **Insert left speaker** – Place left speaker into chassis making sure to align screw holes on the speaker with holes in chassis. Using a 3IP (Torx-plus) driver install the three screws marked below, turning each screw until finger tight then tightening by an additional 1/8 turn (45-degrees).





2. **Install right speaker** – Place right speaker into chassis making sure to align screw holes on the speaker with holes in chassis. Using a 3IP (Torx-plus) driver install the two screws marked below, turning each screw until finger tight then tightening by an additional 1/8 turn (45-degrees).





3. **Install thermal module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
4. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
5. **Install display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
6. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
7. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Camera Deck Replacement Process

Preliminary Requirements

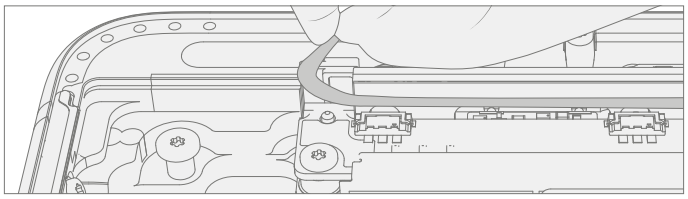
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Camera Deck (Refer to Illustrated Service Parts List)
  - Camera Deck Screws (M1171176-002) Qty. 4

Prerequisite Steps

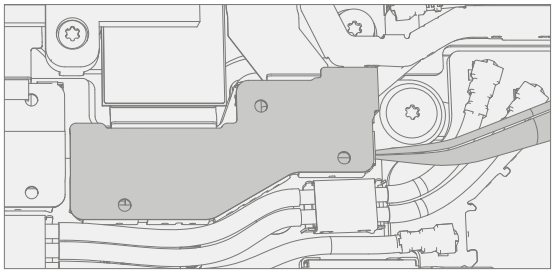
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)

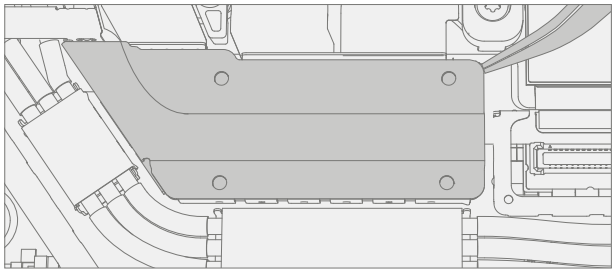
Procedure – Removal (Camera Deck)

1. **Remove foam** – Use your fingers to remove the foam to uncover components that will be removed in the following steps.

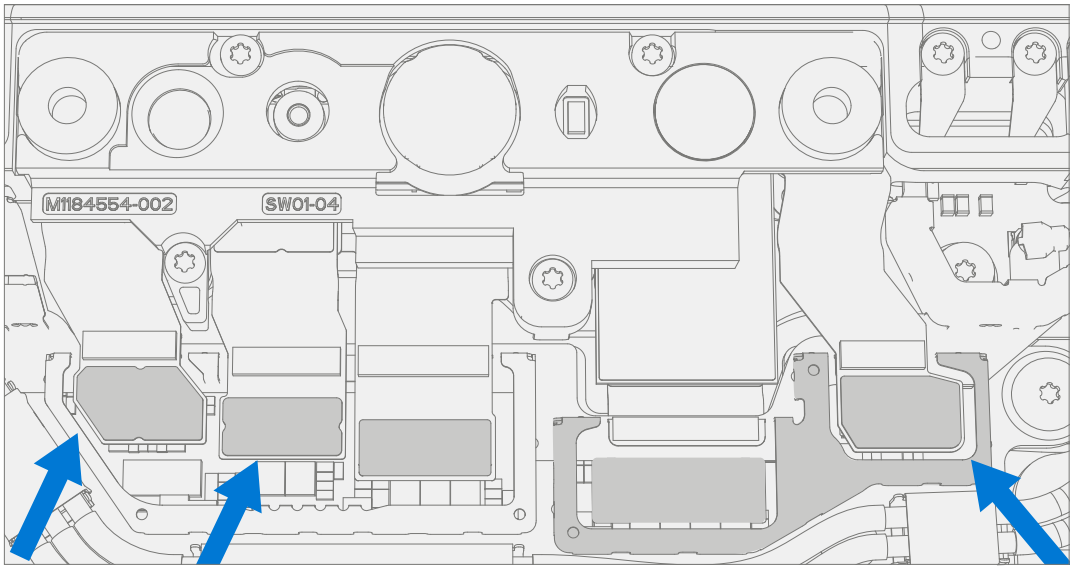


2. **Remove connector shielding** – Using a pair of tweezers or a plastic spudger lift the corner of the shielding for the camera deck and peel off.

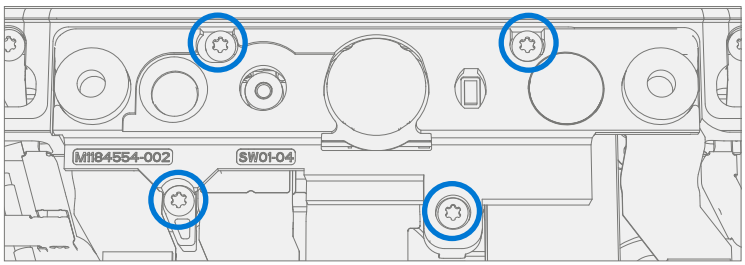




3. **Disconnect camera deck** – Disconnect the three FPC's for the camera deck using a plastic spudger.

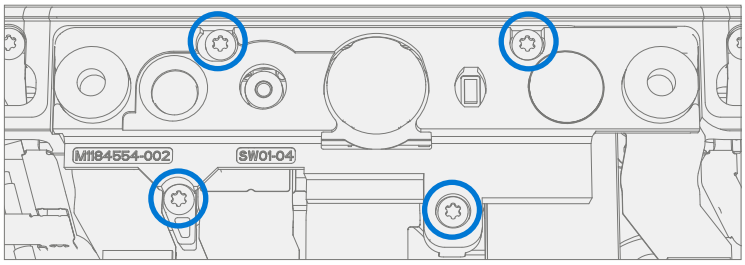


4. **Remove the camera deck screws** – Using a 3IP (Torx-plus) driver remove the 4 marked screws on the camera deck. Lift the deck out of the chassis and set aside.

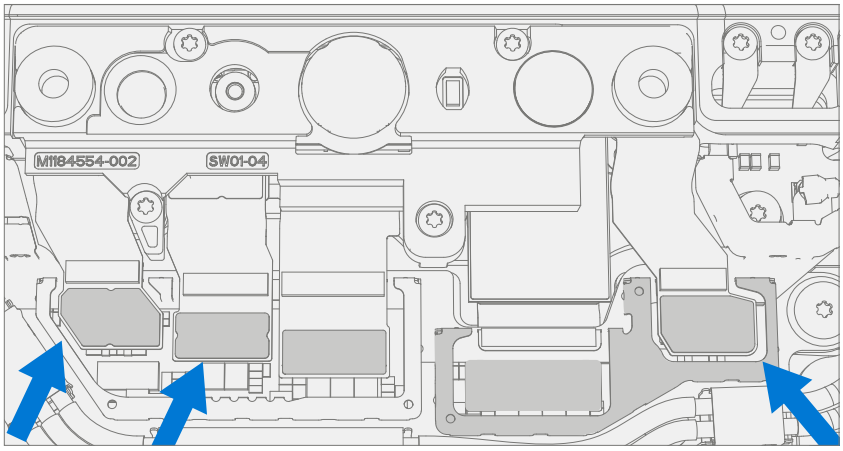


Procedure – Installation (Camera Deck)

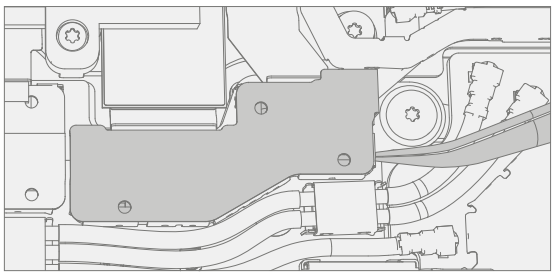
1. **Install camera deck screws** – Place camera deck over front camera and secure in place using a 3IP (Torx-plus) driver and 4 screws. Tighten each screw until snug then turn another 45-degrees (1/8 turn) or until fully fastened.

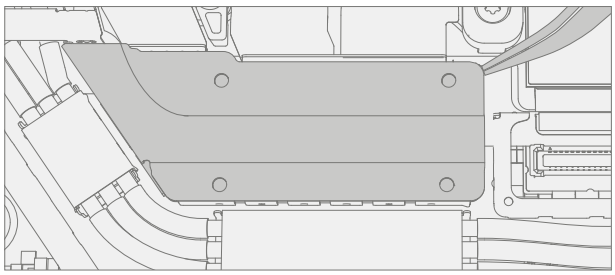


2. **Connect FPC's** – Connect the three FPC's for the camera deck to the motherboard by aligning to the motherboard and pressing down with your finger.



3. **Install connector shielding** – Using a pair of tweezers align the corner of the shielding for the camera deck and push down on the edges with your finger to snap in place.





4. **Install foam** – Use your fingers to install the foam onto the shield fence, starting from the left side and maintaining alignment within the enclosure.
5. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
6. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
7. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
8. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
9. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Front Camera Replacement Process

Preliminary Requirements

Required Tools and Components

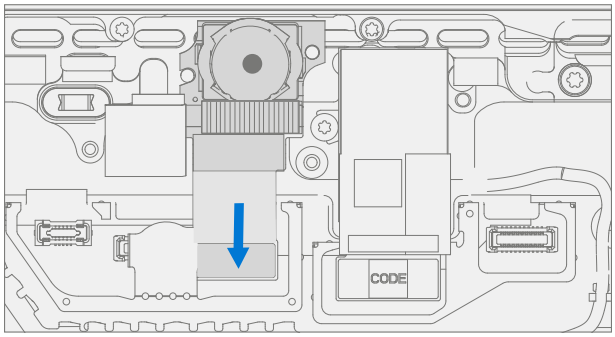
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Front Camera (Refer to Illustrated Service Parts List)

Prerequisite Steps

- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)
- **Remove Camera Deck** – Follow steps for Procedure – Removal (Camera Deck) on (page 75).

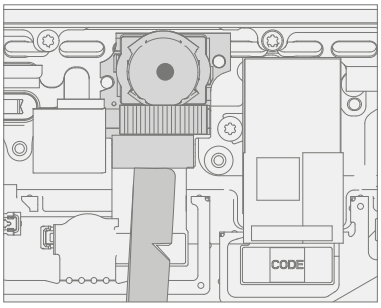
Procedure – Removal (Front Camera)

1. **Disconnect front camera connector** – Disconnect the FPC for the front camera using a plastic spudger.

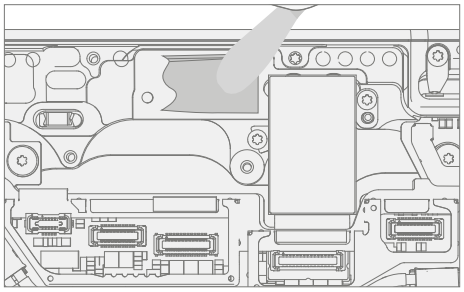


2. **Remove front camera** – Using a plastic spudger lift out the front camera.

> **IMPORTANT:** The front camera has a conductive adhesive on the back. It may take some force to remove.

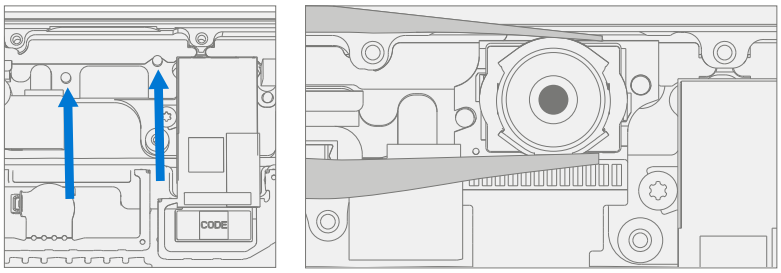


3. **Clean PSA residue** – Using IPA and a cotton swab, clean any residual adhesive material from the chassis.

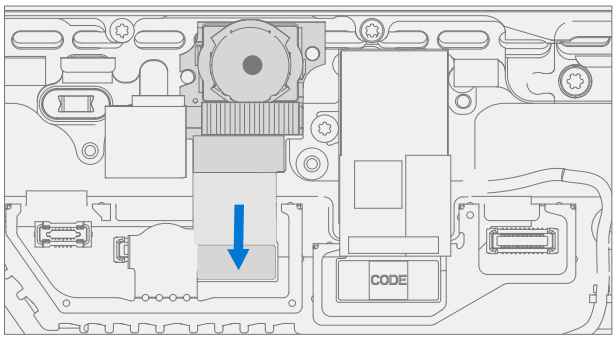


Procedure – Installation (Front Camera)

1. **Install front camera** – Using your fingers gently place front camera on aligning posts and snap FPC into motherboard. Clean lens with microfiber cloth.



2. **Connect camera connectors** – Connect the three FPC's for the WiFi deck and the one for the front camera.



3. **Clean camera** – Using a microfiber cloth, clean the lens of the front camera.
4. **Install Camera Deck** – Install the camera deck as detailed in the Procedure – Installation (Camera Deck) (page 76)
5. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
6. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
7. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
8. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
9. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Rear Camera Replacement Process

Preliminary Requirements

Required Tools and Components

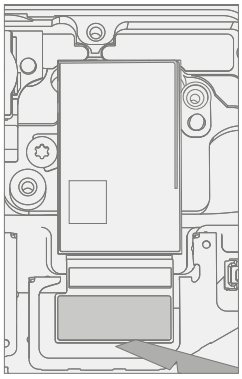
- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Rear Camera (Refer to Illustrated Service Parts List)
  - Rear Camera Screws (M1187505-001) Qty. 2

Prerequisite Steps

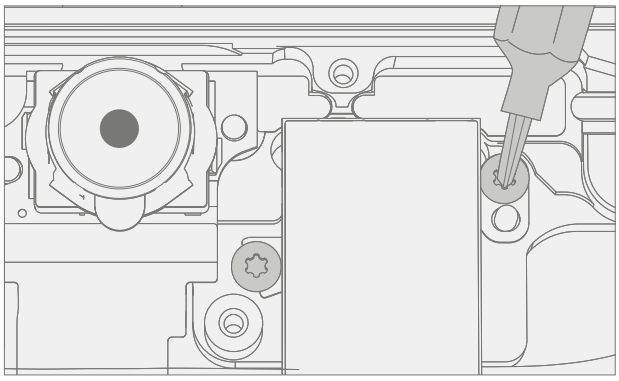
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)
- **Remove Camera Deck** – Follow steps for Procedure – Removal (Camera Deck) on (page 75).

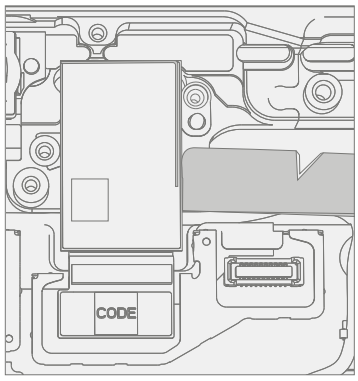
Procedure – Removal (Rear Camera)

1. **Disconnect rear camera FPC** – Disconnect the connector for the rear camera using a plastic spudger.



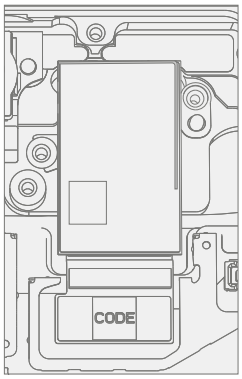
2. **Remove rear camera** – Using a 3IP (Torx-plus) driver remove the two screws securing the camera to the chassis. Then, using a spudger, lift out the rear camera.

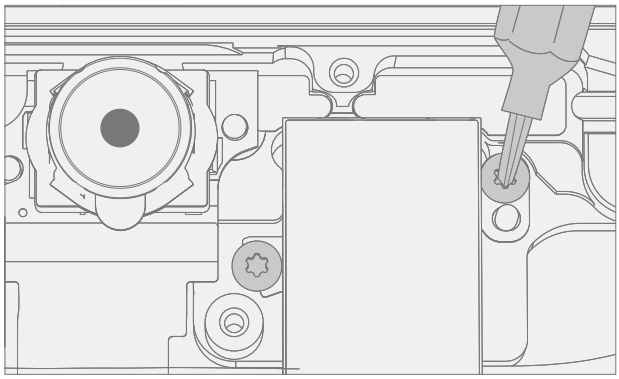




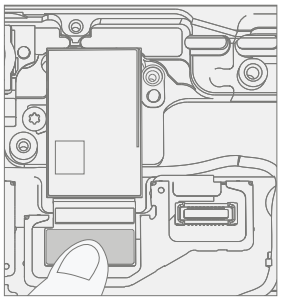
Procedure – Installation (Rear Camera)

1. **Install rear camera** – Clean lens with microfiber cloth. Then, using your fingers, gently place rear camera in the chassis. Using a 3IP (Torx-plus) driver tighten both screws until snug then turn another 45-degrees (1/8 turn) or until fully fastened.





2. **Connect rear camera** – Connect the rear camera FPC to the motherboard.



3. **Install Camera Deck** – Install the camera deck as detailed in the Procedure – Installation (Camera Deck) (page 76)
4. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
5. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
6. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
7. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
8. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected. If no further repairs are required proceed to final steps.

Motherboard Replacement Process

Preliminary Requirements

- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
  - IPEX MHF 4L Tool (MHF 4L 90609-0001)
  - IPEX MHF 5 Tool (MHF 5 90612-0001)
- **Components:**
  - Motherboard (Refer to Illustrated Service Parts List)
  - Motherboard Screws (M1182877-001) Qty. 9
  - Antenna Board Screws (M1184539-001) Qty. 3

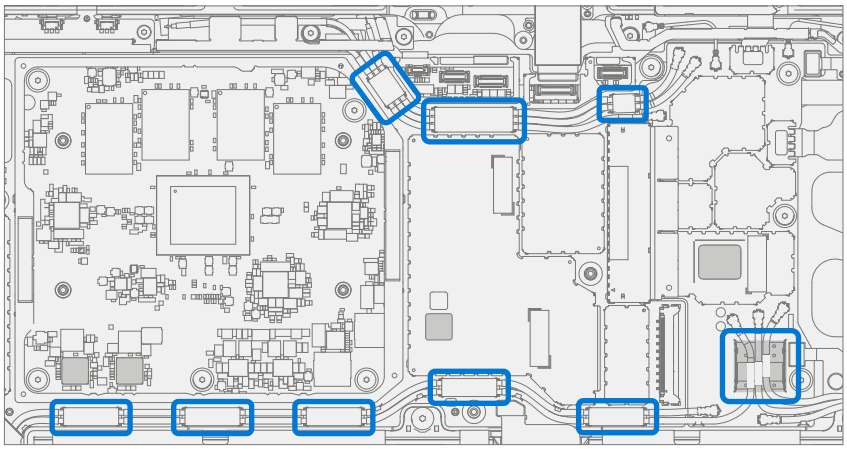
Prerequisite Steps

- **Prep Device** – Device must be set in Display Replacement Mode prior to removing a faulty display.
  a. **Connect software tools USB drive** – Use SDT to USB connector on device under repair.
  b. **Connect power supply to device.**
  c. **Power on device** – Depress the power button on the side of the device.
  d. **Run software tool** – At the device OS, use Windows Explorer, navigate to USB drive and run:
  SDT – Select Repair setup and validation. Run the Touch Display Setup. At the end of the tool process device will power down.

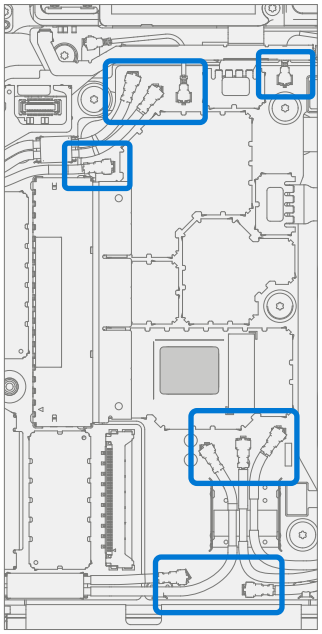
  IMPORTANT: This step must be conducted on the device successfully before removal of a faulty display. Ensure light levels in the work area remain consistent during the touch display setup process.
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)

Procedure – Removal (Motherboard)

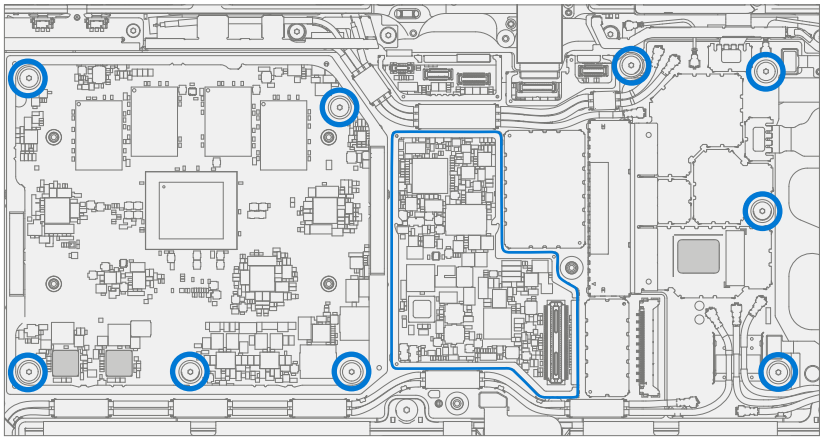
1. **Remove antenna shields** – Using a pair of tweezers, remove the highlighted antenna shields from the motherboard.



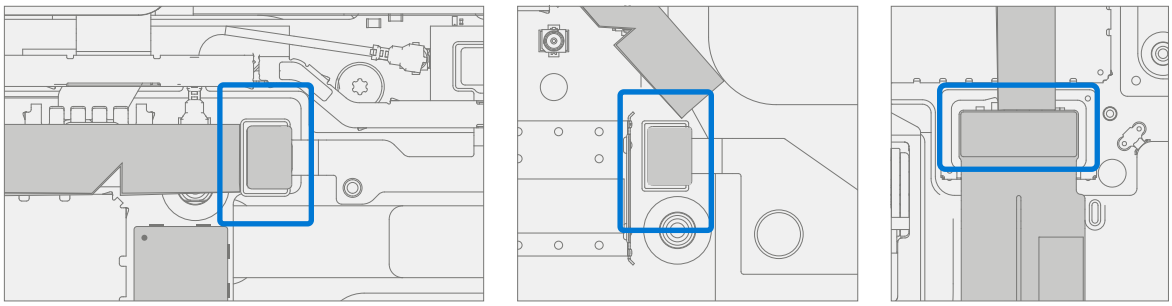
2. **Disconnect antennas** – Using an IPEX tool remove the highlighted coaxial cables from the motherboard.



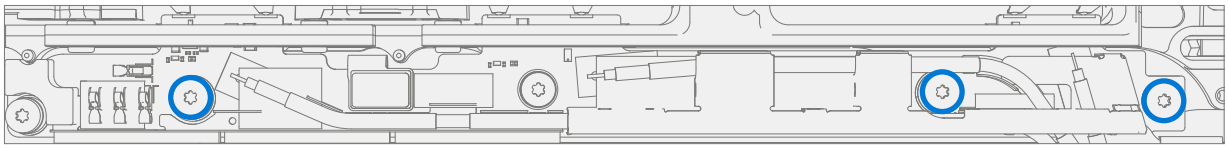
3. **Remove screws** – Using a 3IP (Torx-plus) driver remove the 9 screws securing the motherboard in the chassis.



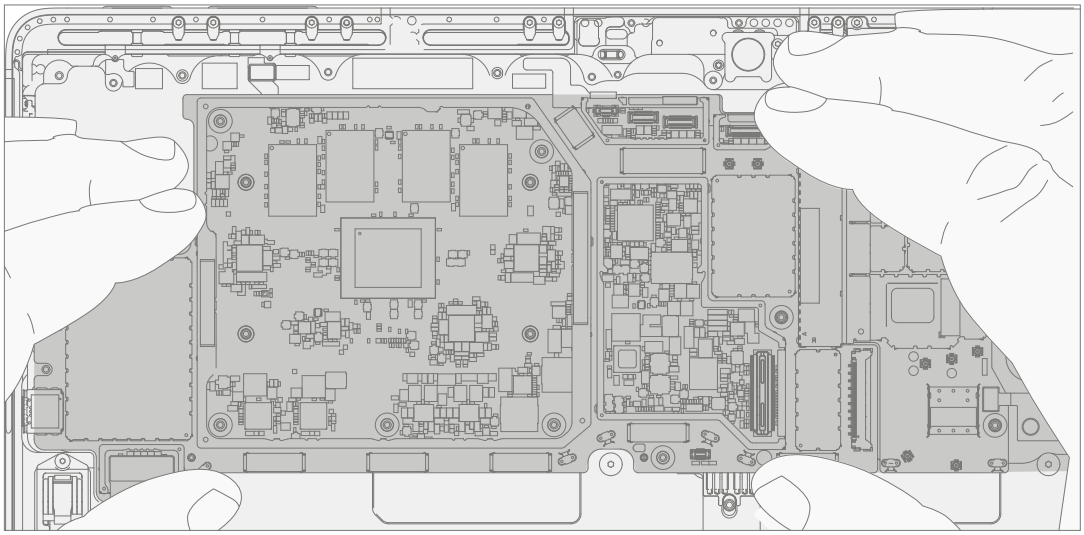
4. **Disconnect FPC's** – Using a plastic spudger remove the three FPCs connected to the motherboard. One on the upper right, one on the bottom right, and one on the bottom left.



5. **Remove the left WiFi antenna** – Using a 3IP (Torx-plus) driver remove the 3 screws from the upper left antenna. Lift the antenna board out of the chassis.

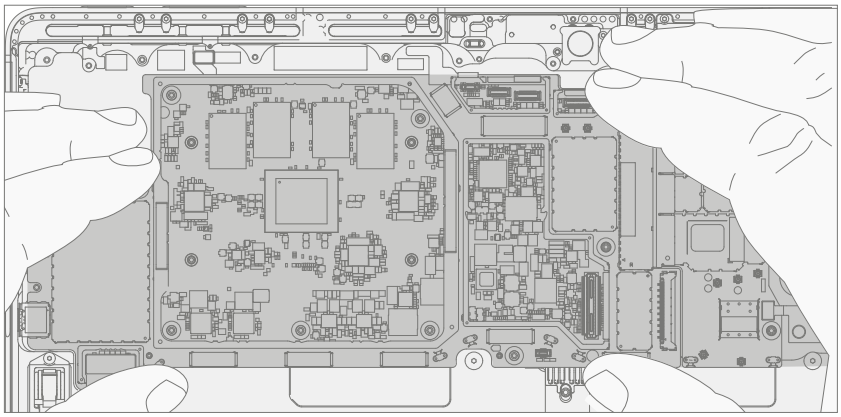


6. **Remove motherboard** – Using two hands remove motherboard from chassis.

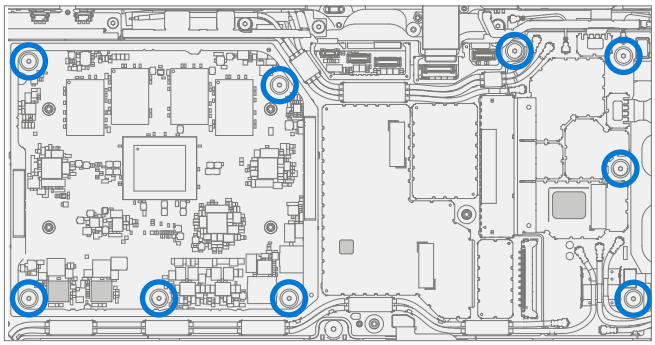


Procedure – Installation (Motherboard)

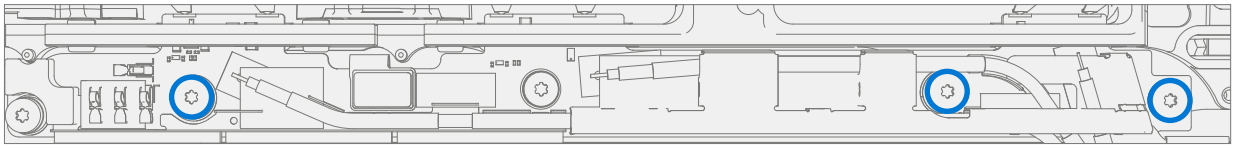
1. **Install motherboard** – Using two hands align screw holes on motherboard with the chassis and place motherboard in the chassis, first aligning the USB connector into the opening and then lowering into the screw posts in the chassis.



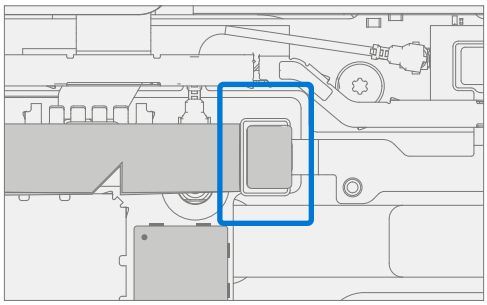
2. **Install screws** – Using a 3IP (Torx-plus) driver install the 9 screws marked below, turning each screw until finger tight then tightening by an additional 1/8 turn (45-degrees) or until fully fastened.

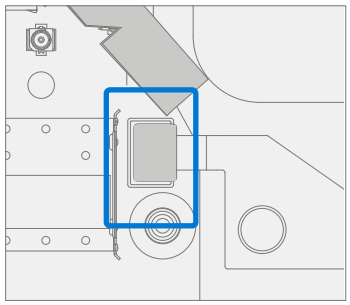


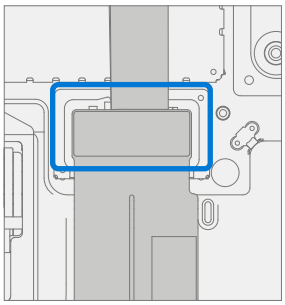
3. **Install left WiFi antenna** – Place the antenna board in the chassis making sure that the antennas touch the copper pads on the side of the PCB. Using a 3IP (Torx-plus) driver install the 3 screws securing the antenna board to the chassis. Turn each screw until finger tight then tighten by an additional 1/8 turn (45-degrees) or until fully fastened.



4. **Connect FPC's** – Using a plastic spudger align and press in the three FPCs connected to the motherboard. One on the upper right, one on the bottom right, and one on the bottom left.

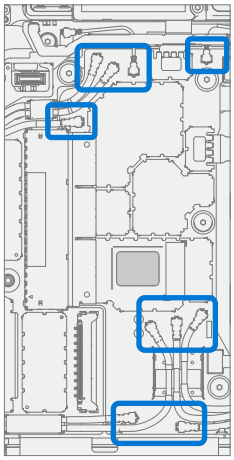




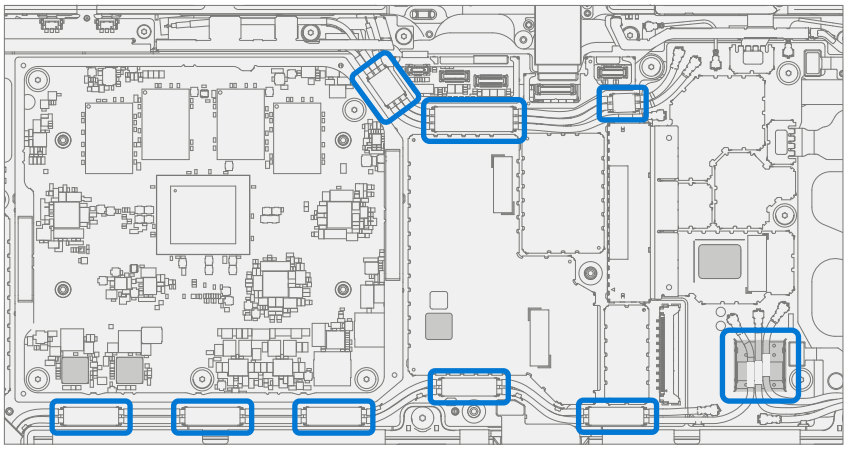


5. **Connect antennas** – Carefully align the coaxial cables with their connectors on the motherboard and gently press in using an IPEX tool.

> **IMPORTANT:** Each coaxial cable must go back to the same location it was removed from. The wires should be just long enough to return to their original position.



6. **Install antenna shields** – Using a pair of tweezers, align the highlighted antenna shields on the motherboard, then press each one down using a finger.



7. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
8. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
9. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
10. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
11. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected. If no further repairs are required proceed to final steps.
12. **Battery Authentication** – Authenticate new battery as detailed in Procedure – Installation (Battery), step 14 on (page 66).

Chassis Replacement Process

Preliminary Requirements

Required Tools and Components

- **Tools:**
  - 3IP (Torx-plus) driver
  - Anti-static wrist strap (1 MOhm resistance)
  - Soft ESD safe mat
  - Microfiber / lint free cloth
  - Isopropyl alcohol dispenser bottle (use 91% or greater IPA)
  - Cotton swab
  - USB drive with Surface Diagnostic Toolkit
  - Spudger
  - Plastic tweezers
- **Components:**
  - Chassis (Refer to Illustrated Service Parts List)

Prerequisite Steps

- **Device Serial Number Notation** – The Surface device serial number for this model is located on the chassis of the device. When the chassis is replaced during service/repair, the device serial number becomes physically disconnected from the customer's device. To ensure the customer has the best experience if any future Microsoft support is required, it is recommended to create a notation of the device serial number and provide it to the customer upon completion of the repair.
- **Power off device** – Ensure device is powered off and disconnected from a power supply.
- **General Safety** – Check to make sure that general guidelines and ESD compliance steps are followed prior to opening device. Refer to Prior to Device Disassembly section (page 18) for details.
- **Position device** – Place device onto a clean surface free of debris with the bottom facing up.
- **Remove rSSD** – Remove the rSSD as detailed in the Procedure – Removal (rSSD) (page 28)
- **Remove Display** – Remove the display as detailed in the Procedure – Removal (Display) (page 37)
- **Remove Surflink** – Remove the display as detailed in the Procedure – Removal (Surflink) (page 51)
- **Remove Thermal Module** – Remove the thermal module as detailed in the Procedure – Removal (Thermal Module) (page 55)
- **Remove Battery** – Follow steps for Procedure – Removal (Battery) on (page 61).
- **Remove Speakers** – Follow steps for Procedure – Removal (Speakers) on (page 72).
- **Remove Buttons** – Follow steps for Procedure – Removal (Buttons) on (page 68).
- **Remove Camera Deck** – Follow steps for Procedure – Removal (Camera Deck) on (page 75).
- **Remove Front Camera** – Follow steps for Procedure – Removal (Front Camera) on (page 78).
- **Remove Rear Camera** – Follow steps for Procedure – Removal (Rear Camera) on (page 81).
- **Remove Motherboard** – Follow steps for Procedure – Removal (Motherboard PCBA) on (page 84).

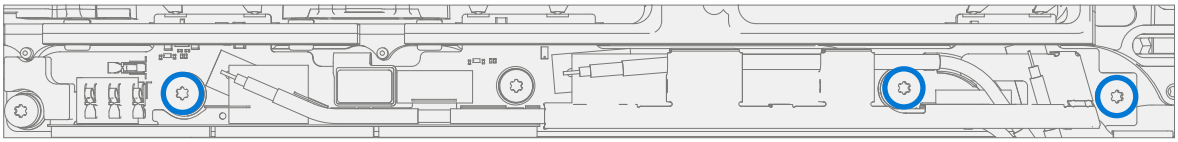
Procedure – Removal (Chassis)

1. **Prepare parts** – Follow all removal steps in the Prerequisite Steps section of this chapter.

Procedure – Installation (Chassis)

1. **Remove tape** – Remove tape used to retain the Coaxial Cables.
2. **Remove the left WiFi antenna** – Using a 3IP (Torx-plus) driver remove the 3 screws from the upper left antenna. Lift the antenna board out of the chassis.

   IMPORTANT: Retain the screws and hardware removed during this step. They will need to be reused during reassembly.

3. **Install Motherboard** – Install the motherboard as detailed in the Procedure – Installation (Motherboard) (page 86)
4. **Install Rear Camera** – Install the Surflink as detailed in the Procedure – Installation (Rear Camera) (page 82)
5. **Install Front Camera** – Install the Surflink as detailed in the Procedure – Installation (Front Camera) (page 79)
6. **Install Camera Deck** – Install the Surflink as detailed in the Procedure – Installation (Camera Deck) (page 76)
7. **Install Speakers** – Install the Surflink as detailed in the Procedure – Installation (Speakers) (page 73)
8. **Install Battery** – Install the new battery as detailed in the Procedure – Installation (Battery) (page 63)
9. **Install Thermal Module** – Install the thermal module as detailed in the Procedure – Installation (Thermal Module) (page 57)
10. **Install Surflink** – Install the Surflink as detailed in the Procedure – Installation (Surflink) (page 52)
11. **Install Display** – Install the display as detailed in the Procedure – Installation (Display) (page 42)
12. **Install rSSD** – Install the rSSD as detailed in the Procedure – Installation (rSSD) (page 29)
13. **Run SDT** – Power on device and connect USB drive with SDT Configuration Files. Run SDT to ensure all device features and functions operate as expected.

Environmental Compliance Requirements

All waste electrical and electronic equipment (WEEE), waste electronic components, waste batteries, and electronic waste residuals must be managed according to applicable laws and regulations and H09117, "Conformance Standards for Environmentally Sound Management of Waste Electrical and Electronic Equipment (WEEE)," which is available at this link: https://www.microsoft.com/en-us/download/details.aspx?id=11691. In case of questions, please contact AskECT@microsoft.com

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