

Galaxy S21 FE Repair Training

SM-G990U





Samsung Care

What are we learning?

What components make up the Galaxy S21 FE? How do you properly disassemble the device during repair? How do you ensure the device is correctly assembled after a repair is complete? What tools are required during repair? How do I validate my repair? This training will explore how to provide expert repairs on the Galaxy S21 FE.

This module will cover:

- Parts of the Device
- Tools and Equipment for Disassembly/Reassembly
- How to Properly Disassemble the Device
- Correctly Assembling the Device Post Repair
- Required Outbound Quality Check and Calibrations

So how does this help me?

After completing this training you will be able to discuss all the hardware components that make up the Galaxy S21 FE. You will be able to explain what tools and equipment are required for assembly and disassembly of the device. You will be able to complete repairs and the required quality control checks/calibrations following your repair.

Galaxy S21 FE

Hardware Components

Removable Parts of the Galaxy S21 FE



Removable Parts

Galaxy S21 FE has multiple removable parts. Being able to identify the parts and understand their functions will assist you in diagnostics and repair of the device.

The Parts Include:

- On-Cell Touch Assembly (OCTA) / Display Module
- Main Printed Board Assembly (PBA)
- Sub PBA
- Components
- Rear Assembly
- Battery
- Back Cover

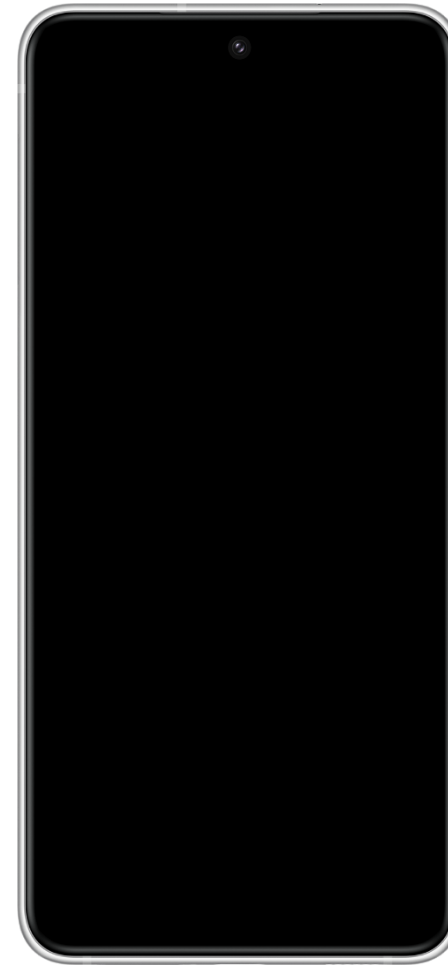
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On-Cell Touch Assembly (OCTA)

Galaxy S21 FE OCTA includes the following:

- The Display Panel
- The Front Glass and Laminate
- Ultrasonic Fingerprint Sensor
- Front Facing Camera (FFC)
- Vibrator Motor
- Battery
- Power and Volume Keys
- Millimeter Wave (mmWave) Modules (2)



Front



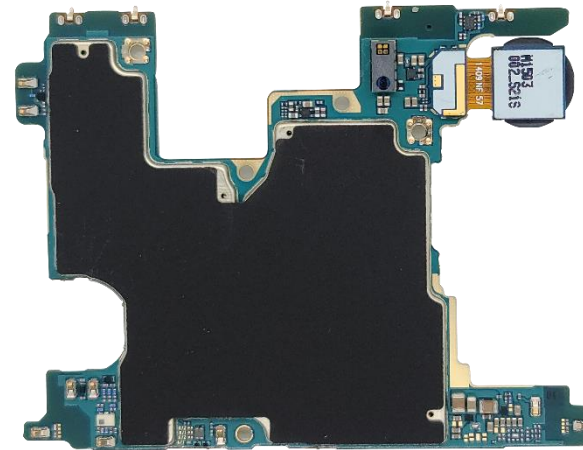
Back

Main PBA

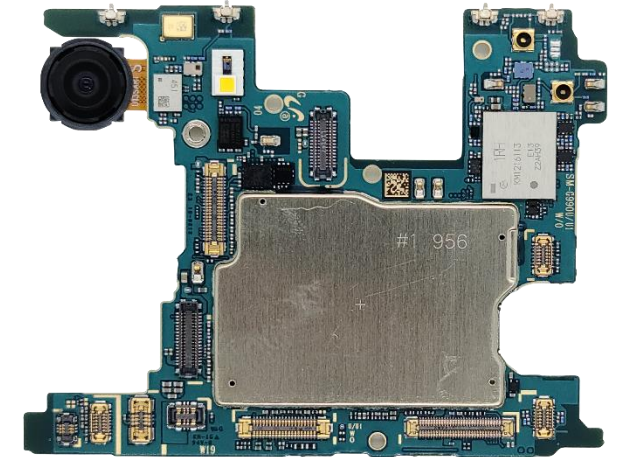
The Main PBA is the main board of the device.

It contains the most essential components of the device such as:

- Mobile Chipset
- Main Camera
- Built in Storage
- Sub Microphone



Inner



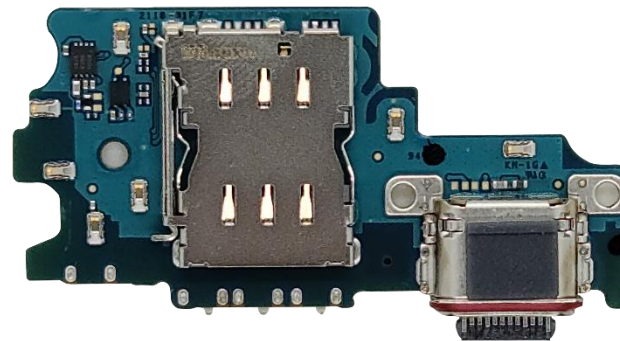
Outer

Sub PBA

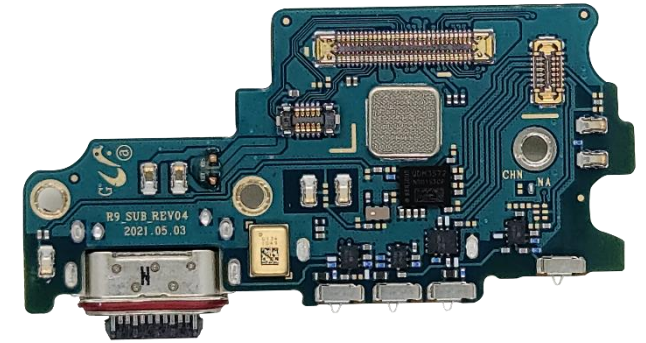
The Sub PBA is the secondary board of the device.

It contains other essential components of the device such as:

- Main Microphone
- USB Type-C Interface (I/F) Connector
- Sub FPCB Connection Ports
- SIM Tray



Inner



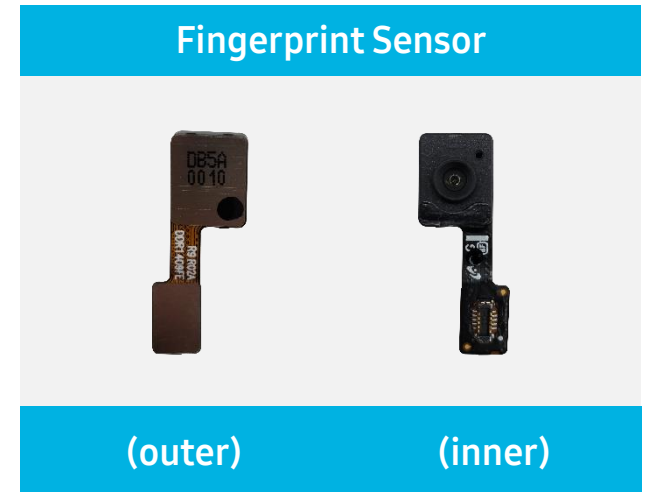
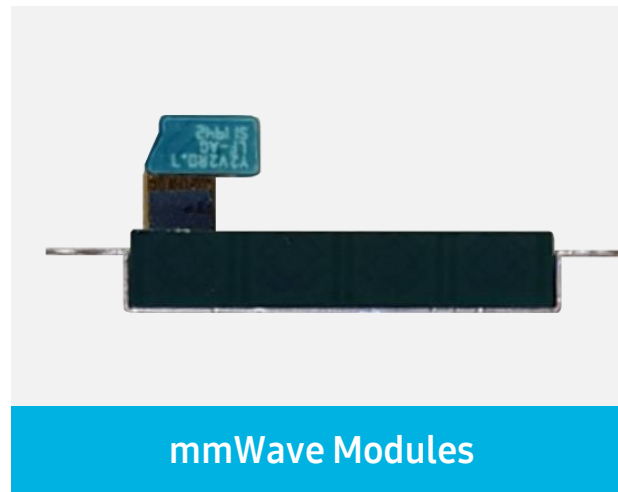
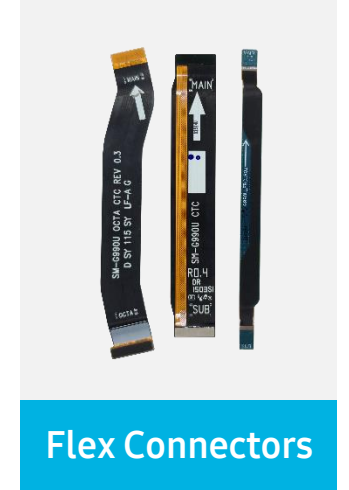
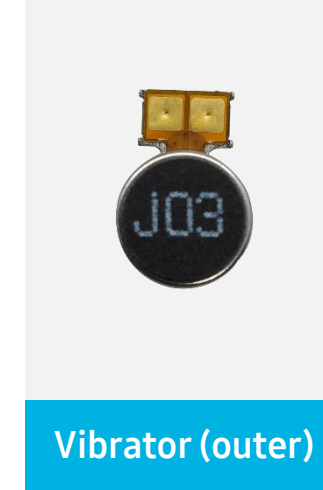
Outer

Components

There are a few smaller components on the Galaxy S21 FE that can be removed.

These are:

- The Vibrator Motor
- The Front Facing Camera (FFC)
- mmWave Modules
- Main (Rear) Camera(s)
- mmWave Antennas
- Fingerprint Sensor



Rear Assembly

Galaxy S21 FE has a Rear Assembly that is broken down into three (3) Pieces:

The Top/Middle Pieces contain:

- Receiver
- Near Field Communication (NFC) and Wireless Charging (WC) Pad
- NFC Flex Connector

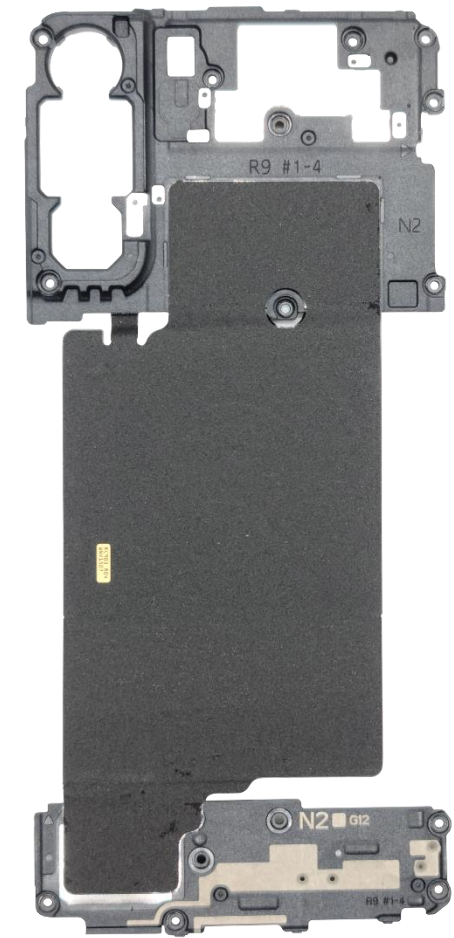
The Bottom Piece contain:

- Main Antenna
- Speaker

The rounded pads on the Bottom Piece allow for the Speaker to make contact with the Sub PBA for sound while the rounded pads on top piece allow for the Receiver to make contact with the Main PBA.



Inner



Outer

Battery

The Battery is a Lithium-ion (Li-ion) cell and must be handled carefully. Improper removal can damage the cell, causing it to ignite and cause injury:

- Only hold the Battery from the center sides
- Do not squeeze the Battery or use any unauthorized tools when handling it
- Do not hold the Battery by its flex connector, as this can accidentally short the leads



Note: When handling the Battery, be careful not to puncture or damage it.

Back Cover

Galaxy S21 FE has a Back Cover that is bonded to the frame and can only be removed utilizing heat.

The Back Cover will contain double-sided tape located on the edges that must be replaced every time the Back Cover is removed.



inner



outer

Galaxy S21 FE

Steps for Disassembly

Disassembly of the Galaxy S21 FE



Disassembly

Taking the device apart

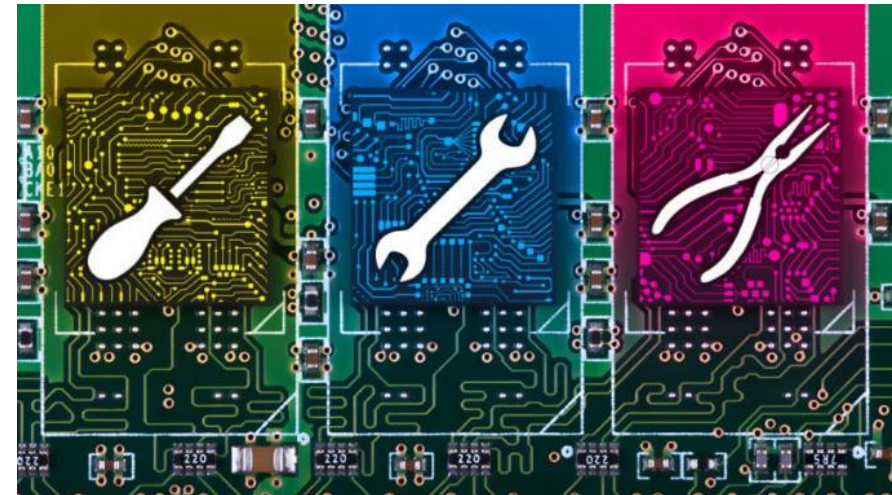
In this section we will review the disassembly of the Galaxy S21 FE.

This guide will cover

- The tools and equipment needed
- The steps of disassembly

So how does this help me?

With this knowledge you will be able to completely disassemble the Galaxy S21 FE.



Tools and Equipment

To ensure proper disassembly without damage to the device, use the proper tools and equipment:



Tweezers



Disassembly Stick



Ceramic Scissors



Roller Jig



Suction Cup



Screwdriver



SIM Ejector Tool



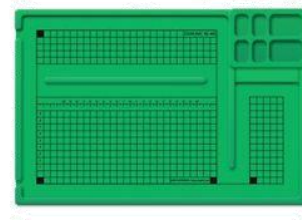
99% Isopropyl Alcohol

Tools and Equipment, cont.

To ensure proper disassembly without damage to the device, use the proper tools and equipment:



ESD Wrist Strap



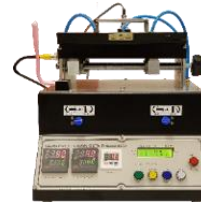
Grounded Mat



Anti-static Gloves



Center Suction (77mm)



AOD



ESD Spatula

Steps of Disassembly

You will disassemble the device in the following order:

- Back Cover
- Rear Assembly
- Main PBA
- Parts on the Main PBA:
 - Main Camera
 - Sub PBA
- Parts on the Bracket:
 - Vibrator Motor
 - Main Cameras
 - mmWave Module Antennae
- Battery
- Front Assembly (OCTA)



Electrostatic Discharge Precautions

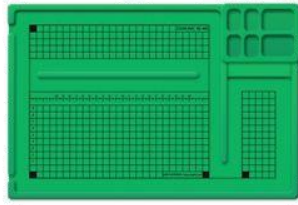
Before you begin to disassemble, make certain that all ESD precautions are met.

This includes:

- Wearing an ESD Strap which has passed all required tests
- Wearing Anti-static Gloves
- Working over a Grounded Mat



ESD Wrist Strap



Anti-static Mat



Anti-static Gloves



Swollen Battery Precautions

A swollen Battery may cause a device to bulge.

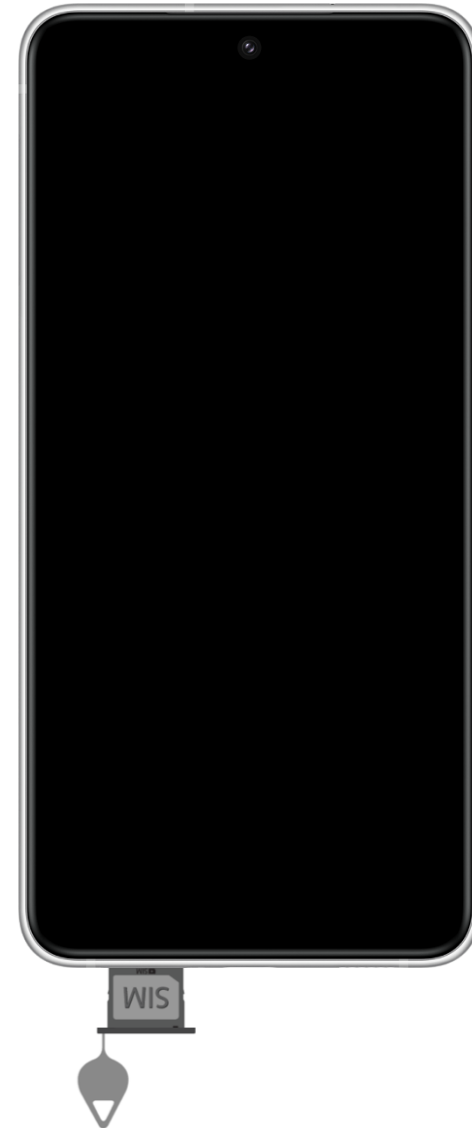
- If the device has a swollen battery, **DO NOT** heat the device
- Before disassembling the device, make certain that there are no signs of Battery swelling.
- Heating a device with a swollen battery can cause further damage to the device and cause the battery to ignite and cause injury
- In the event of a swollen battery, use **ONLY** 99% Isopropyl Alcohol applied to a Swab to carefully separate and remove the Back Cover.



Eject SIM Tray

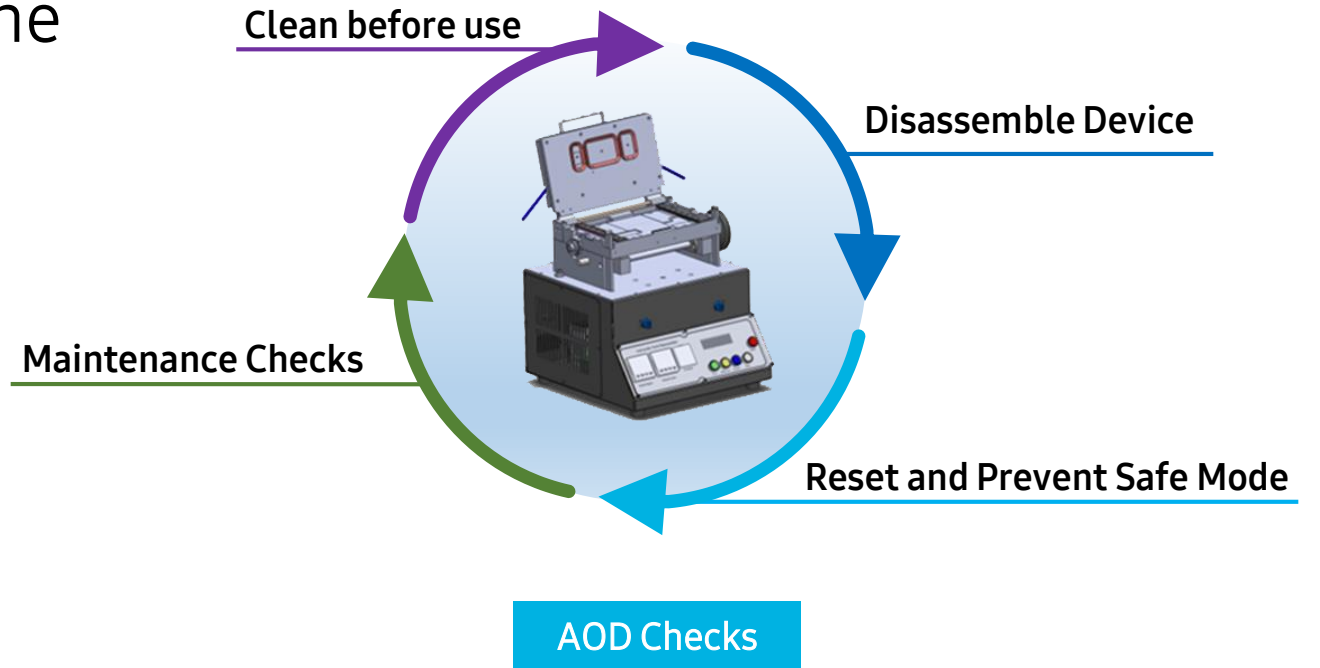
To prevent damage to the Main PBA, the SIM Tray must be removed before completing disassembly. The SIM Tray is located on the bottom of the device.

SD Card – Galaxy S21 FE is not supported.



AOD Maintenance Check

To prevent damage when removing the Back Cover, perform all required maintenance checks before using the AOD.



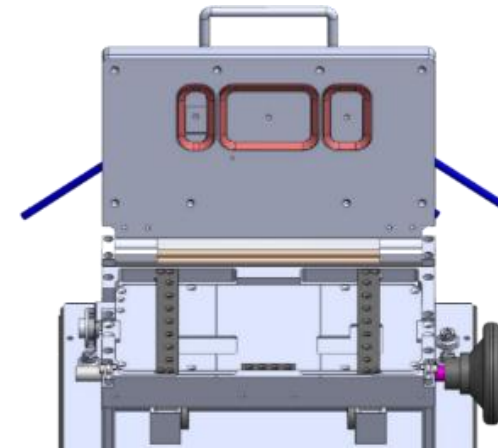
Note: Refer to Automatic OCTA Disassembler training for more information on AOD maintenance

Change the Center Suction Seal

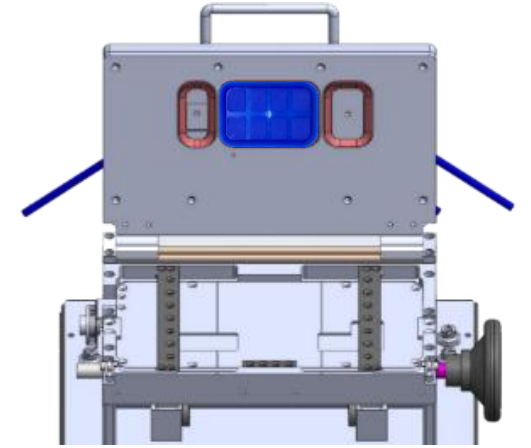
To prevent damage to Camera windows, replace the Orange Center Seal with the 77mm Blue Seal (GH81-18490A).

To Replace the Center Seal:

- Gently remove the Orange Seal by pulling it off of the upper plate
- Align the new Blue Rubber Seal and press down on the corners
- Run your thumbs along to sides of the Rubber Seal to secure the Seal in place



Before

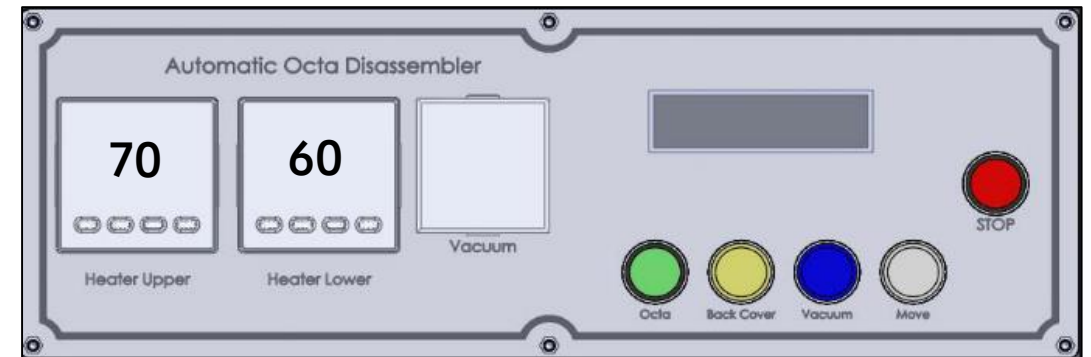


After

Configure the AOD

Set the AOD to the following temperature to remove the Back Cover from the Galaxy S21 FE:

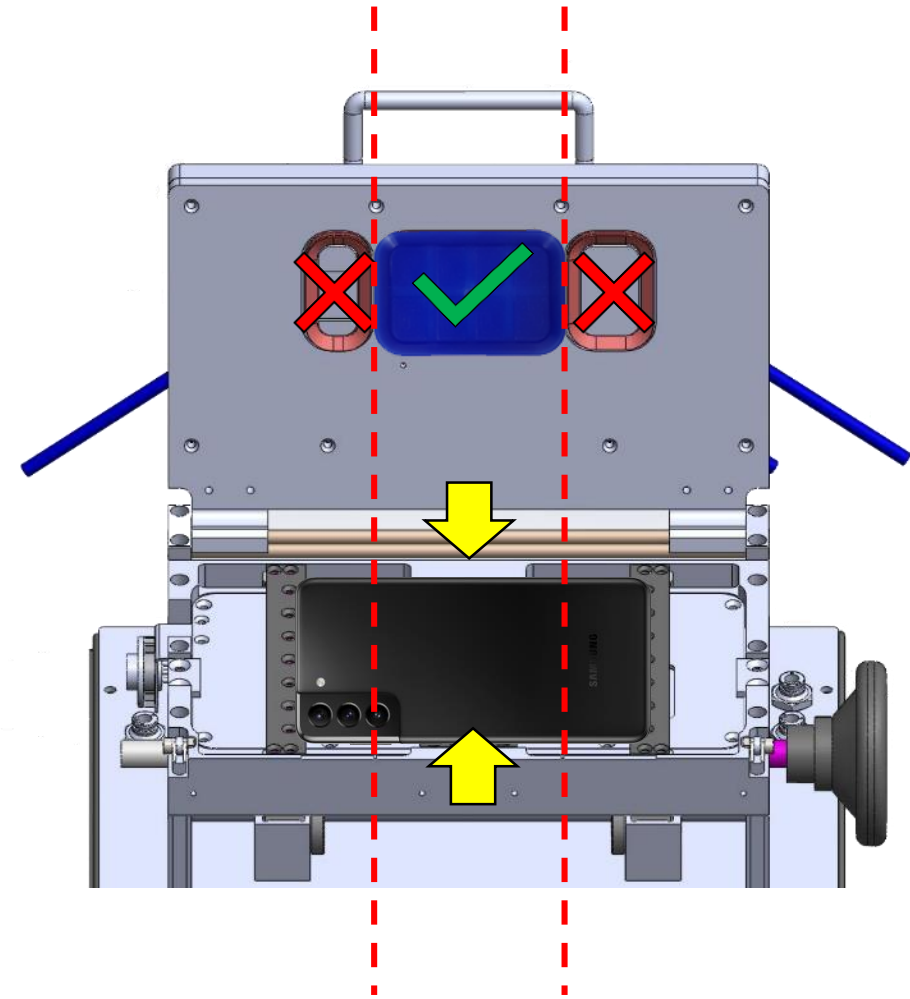
- Heat the upper to 70°C and lower to 60°C for five (5) minutes
- The heating process loosens the adhesives that hold the Back Cover on the device



Note: If the state of charge cannot be identified, assume that the SOC is 68% or higher and heat under 60 °C for five (5) minutes.

Device Placement

- Place the device face down with the Camera positioned to the lower left side of the lower plate
- Align the device with the suction lines so that the Center Seal is aligned directly with the center of the Back Cover
- Once aligned, lock the device in place by twisting the Torque Wheel, then lower the upper plate



Back Cover Removal

1. Press the Vacuum button to create suction
2. Press Back Cover to begin the heating process
3. Upon reaching desired temperature, the upper plate will begin to rise, lifting the Back Cover from the device

Use the ESD Spatula to assist with the lifting and disconnection process

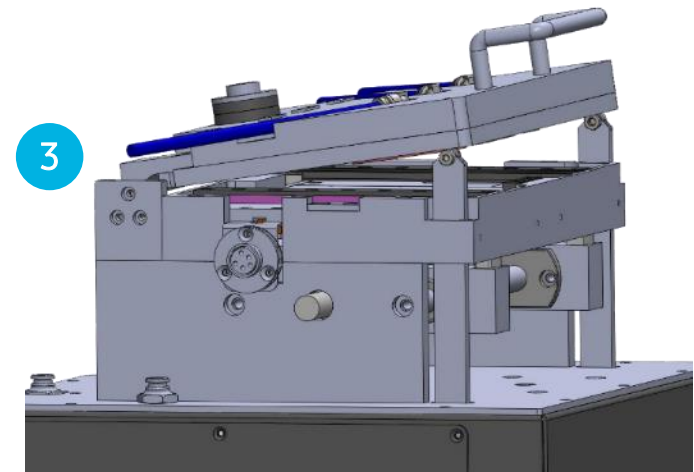
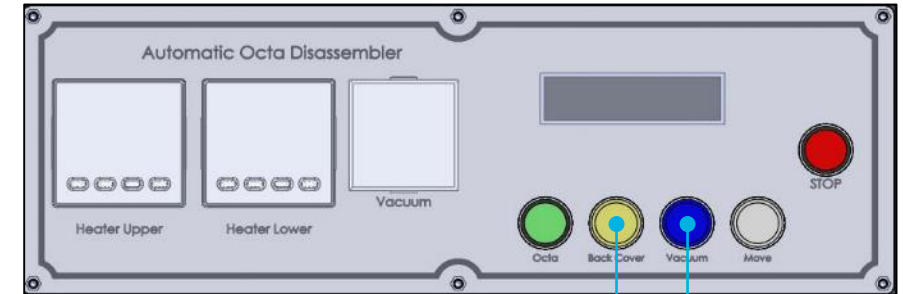
Tool Required



Spatula Stick



Note: DO NOT use metal tipped tools to detach the Back Cover



Remove the Back Cover Tapes

Galaxy S21FE has double-sided tape that needs to be removed and replaced. These tapes are located around the edges of the Back Cover.

Use ESD Gloves when handling the Back Cover.

Tool Required



ESD Gloves



inner

Important Back Cover Handling Tips

As soon as the Back Cover is removed, immediately peel the double-sided tape up by hand. Do not wait for the Back Cover to cool down to remove the tape, because it will stick tighter again as it cools.

When removing the double-sided tape:

DO NOT use Disassembly Stick or other metal tools

DO NOT use fingernails. This can damage the print on the Back Cover

DO NOT use Rework Tape to remove residue

For hard to remove tape, please reheat the Back Cover and use the Roller to remove any remaining residue.

Tool Required



Roller Jig



Removing the Screws

Using the Screwdriver, remove and discard 15 screws from the rear assembly.

- Upon disassembling the screws, you will notice a substance on the tip of the screws. This is known as loctite
- The purpose of loctite is to lock and seal threaded screws to prevent loosening from vibration and leaks in your assembly
- Once screws are removed, the loctite material is degraded, and will not function as intended

Tool Required



Screwdriver



Note: New screws will be provided in the rework kit



Removing the Rear Assembly

To safely remove the Rear Assembly, begin with the top piece:

- Located at the top right, there is an engraved arrow indicating the disassembly point
 - Insert plastic tipped tweezers and gently twist to disconnect
- DO NOT** remove the top piece just yet. Underneath the top piece is the NFC pad connector that needs to be disconnected.
- Flip the top piece towards you and use the Disassembly Stick to disconnect the NFC flex connector.

Upon disconnecting the NFC pad, rest the top piece back on the device and remove the bottom piece:

- Located at the bottom left, there is an arrow pointing upwards indicating the disassembly point
- Insert plastic tipped tweezers and twist gently to disconnect the bottom piece
- Once disconnected, remove the Rear Assembly as one piece and place to the side
- The internals of the device should now be exposed



No Screws



Top Piece NFC Connector

Disconnecting the Flex Connectors

There are a total of 13 connectors that need to be disconnected from the Main and Sub PBAs. Beginning with the Battery, use the Disassembly Stick to disconnect its flex connector.

Continue with the following:

- Two (2) Main to Sub connectors - Remove and place to the side
- Main to OCTA connector - Remove and place to the side
- Two (2) mmWave RF antenna connectors
- Two (2) Rear Camera connections – Take care with center Camera as disconnecting it may cause the camera to pop out
- Power Key connector
- Front Facing Camera (FFC) connector
- Fingerprint Sensor Connector



Removing the Main and Sub PBA

The Main PBA is secured to the bracket with one (1) black screw. Use the Screwdriver to remove the black screw.

The Sub PBA is secured to the bracket with three (3) black screws. Use the screwdriver to remove the three black screws.

Upon removing all four (4) screws, remove the Main PBA:

- Use the Disassembly Stick to lift the Main PBA from the right side
- Ensure all flex cables are out of the way when removing the Main PBA
- Take extra caution when removing the Main PBA; the top Rear Camera is connected to the Main PBA
- Once removed, place the Main PBA to the side

To remove the Sub PBA, use the Disassembly Stick to remove the Sub PBA from the right side:

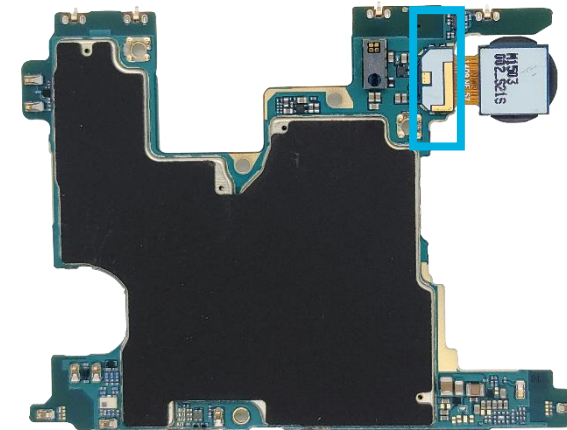
- Once Sub PBA is lifted, lift the rest towards you; there will be resistance around the interface (I/F) port
- Gently wiggle the Sub PBA to remove the interface port and Sub PBA
- Once removed, place to the side
- The inner side of the bracket should now be exposed



Disconnecting the Camera from the Main PBA

To remove the Main Camera from the Main PBA, use the Disassembly Stick to disconnect the flex connector.

Once disconnected, place the Camera to the side with the lens facing up to prevent lens damage.



Inner

Tool Required

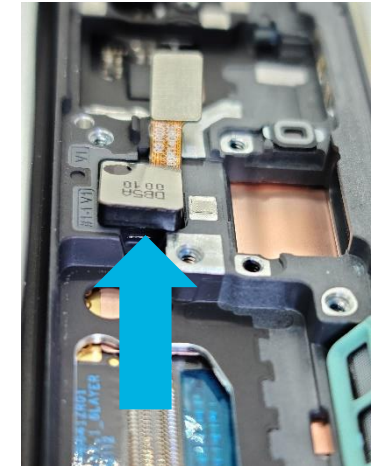


Disassembly Stick

Removing Additional Components From the Bracket

Upon removing the Main and Sub PBA, you will notice additional components adhered to the bracket. Some components can easily be removed, while others will require heat.

- Beginning with the Ultrasonic Fingerprint Sensor, use the plastic tipped tweezers to lift from the opening on the left side; ensure all flex cables are out of the way when removing the Main PBA so they don't get damaged
- Do not go all the way into the opening with the Tweezers as you may damage the lens
- While lifting, use a bit extra strength because the sensor is being held down by a small piece of double-sided tape
- Once removed, place to the side with the lens facing up to prevent damage to the lens



Removing Additional Components From the Bracket, Cont.

Two Main Cameras will be attached to the bracket. Begin by removing the middle Camera and placing it to the side facing up.

The second Camera may seem to be adhered to the bracket but it's not.

- The Camera is secured to the bracket very tightly and it will require the Disassembly Stick to remove
- Use the Disassembly Stick to **gently** lift the Camera up
- Insert the Disassembly Stick below the flex connector and lift up
- The Camera will pop out if caution isn't used, which may damage the Camera
- Once removed, place the Camera to the side lens up

Tool Required



Disassembly Stick



Removing Additional Components From the Bracket, Cont.

To remove the Vibrator Motor, use the plastic tipped tweezers and enter from the disassembly point located on the side.

Apply enough pressure to loosen the motor. Once loosened, remove the Vibrator Motor and place it to the side.

Tool Required



Tweezer



Vibrator Motor
Disassembly Point

Removing Additional Components From the Bracket, Cont.

There will be two (2) mmWave modular antennas attached to the bracket. These antennas will be adhered to the bracket and will require some heat to loosen up the tapes.

Use the Hot Plate to heat the device for a few minutes, then use plastic tipped tweezers to remove the antennas.

To avoid damage during disassembly, lift from the opposite end of the antenna connectors.

Once removed, place the antennas to the side.



Removing Additional Components From the Bracket, Cont.

The FFC must only be removed when it requires a replacement.

- Because the FFC is bonded to the bracket, a heating source, such as hot plate, mobile dryer, or AOD is required.

Configure the heating source to 70~75°C and heat the device for 5 minutes.

Use the SIM ejecting tool to detach the bond between the front cam and front bracket by moving the SIM tool along the edges of the front cam.

Do not apply pressure or go too deep as this could damage the LCD.

Once removed, gently detach any sponges on the front bracket. The FFC area should be free of tape residue.



Removing Additional Components From the Bracket, Cont.

If the Battery needs to be replaced, proper handling of the Battery is required. Batteries are **NOT** to be reused and must be discarded as outlined in the Standard Operating Procedures (SOP).

To remove the Battery, apply some Alcohol to the Swab and apply Alcohol around the edges of the Battery. Allow between 30-60 seconds for the Alcohol to dissolve the adhesive holding the Battery to the OCTA

Tool Required



Alcohol



Removing Additional Components From the Bracket, Cont.

Using the Ceramic Scissors, cut the lead from the Battery and return to Samsung per U-Class procedure.



Tool Required



Ceramic Scissor

The Device Has Now Been Disassembled

We have covered the disassembly process of the Galaxy S21 FE. At this point, all removable components have been removed.

Keep in mind:

- In a repair scenario, only remove as much as required for the repair
- With the device disassembled, you can now move on to device assembly
- Follow proper process and tool usage to avoid damage



Galaxy S21 FE

Assembly

Assembly of the S21 FE



Assembly of the S21 FE

Putting it back together

In this section we will review the assembly of the S21 FE.

This section will cover

- The tools and equipment needed
- The steps of assembly

So How does this help me?

With this knowledge you will be able to completely assemble the Galaxy S21 FE.



Tools and Equipment

To ensure proper assembly without damage to the device, use the proper tools and equipment:



Tweezers



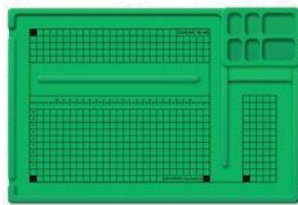
Disassembly Stick



Screwdriver



Anti-static gloves



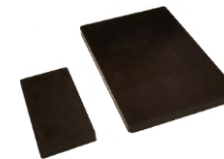
Anti-static Mat



Press Jig



Universal Device
Press Pads

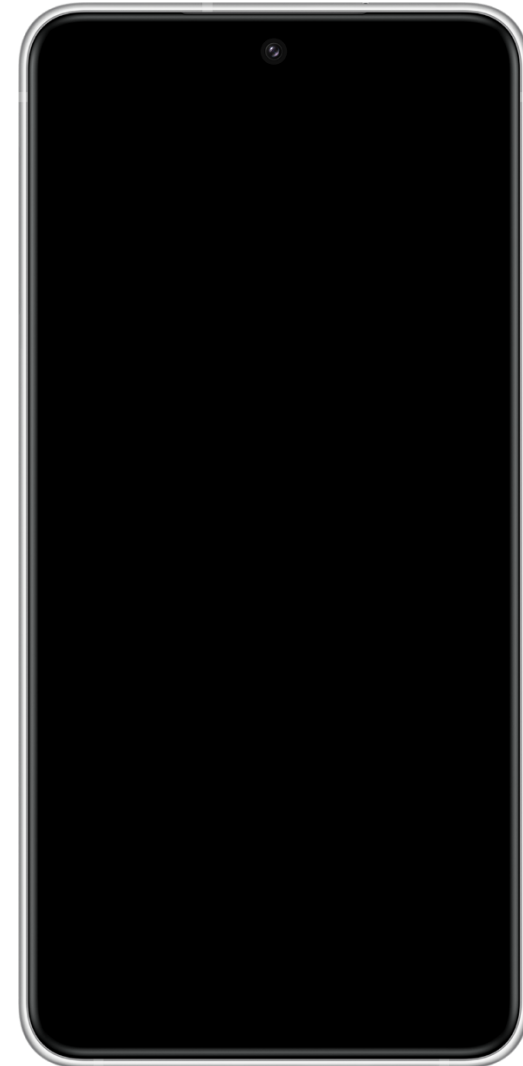


Battery Pads

Steps of Assembly

You will assemble the device in the following order:

- Battery
- Parts on the Bracket
- Vibrator, Front Camera, Rear Cameras
- mmWave Modules
- Parts on the Main PBA
- Main Camera
- Main PBA
- Sub PBA
- Rear Assembly
- Back Cover



Installing the Battery

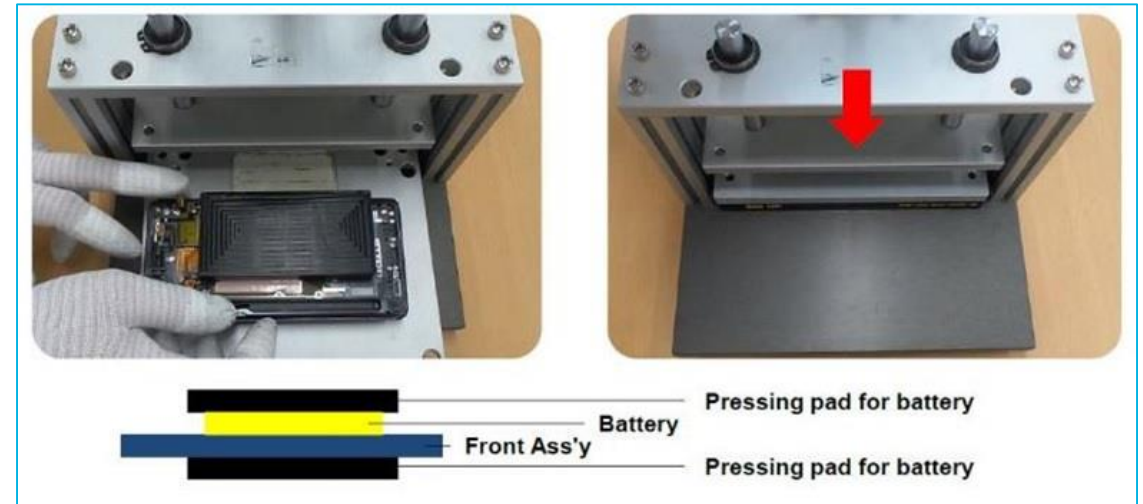
- Use and place the 0.6N Torque Wheel on the Press Jig base; remove the film from the new Battery and attach it to the OCTA from top to bottom
- Place the device face down on the large Battery Press Pad
- Place the smaller Battery Press Pad on top of the Battery
- Insert the device in the Press Jig and spin the Torque Wheel until it torques; wait five (5) seconds before unspinning and removing the device



Press Jig

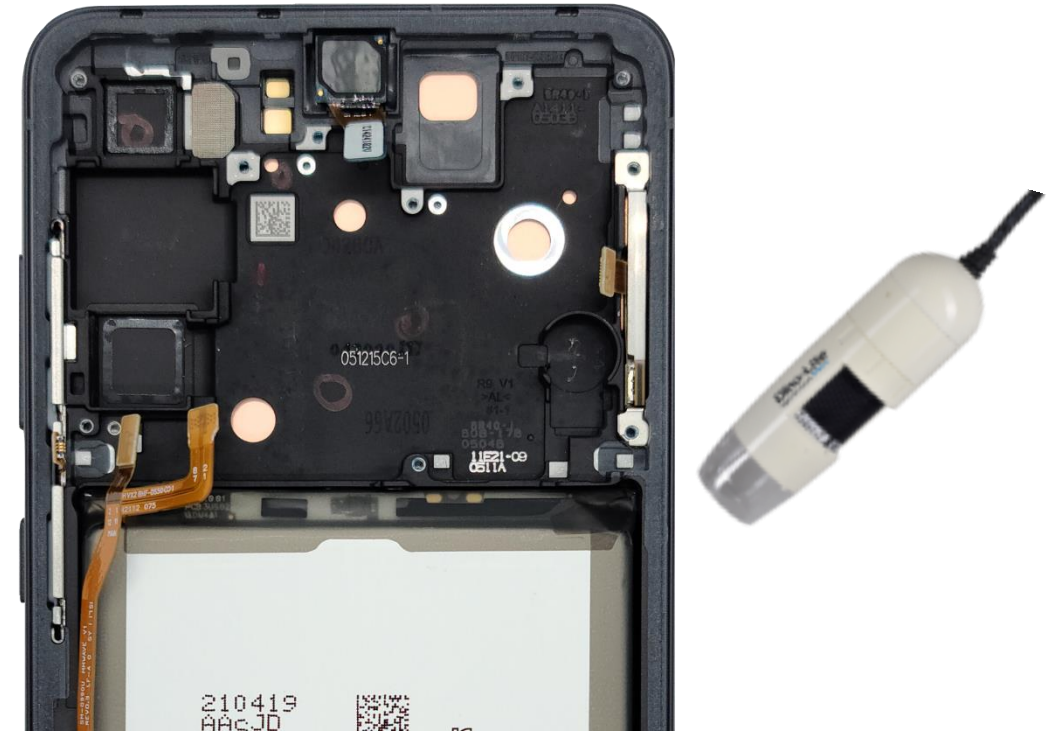


Universal Press Pads



Installing the Front Facing Camera

- To install the FFC, attach the rework tape to the bracket then gently place the FFC on the bracket.
- The FFC lens must be aligned directly at the center of the LCD FFC area. Using the Dino-lite and/or otoscope will ensure accuracy by magnifying the area that the FFC needs to align with.
- Use the magnifying source with one hand as you're aligning the FFC with the other. Check the Camera position to ensure the barrel area of the lens (blue area) is centered. If the barrel is covered, it will require reassembling.
- Once installed, alignment workmanship will be tested via the Camera Vignetting Test in Galaxy Diagnostics.



Installing the Vibrator Motor

- The Vibrator Motor must be inserted in the correct orientation
- With the Vibrator Motor properly aligned, gently press down for about one second to secure it in place
- The contact pads of the Vibrator Motor must not be damaged in any way, such as separation from the frame; if there is any physical damage to the Vibrator Motor, the Motor **MUST** be replaced
- If the adhesive of the Vibrator Motor is worn out, attach new tape to the Vibrator Motor before installation



Installing the Rear Cameras

- Place both Cameras in the correct orientation on the bracket
- Be careful not to touch the lenses when placing the Cameras on the bracket



Installing the Fingerprint Sensor

Place the Fingerprint Sensor on the bracket and gently press down to secure it in place.



Installing mmWave Module Antennas

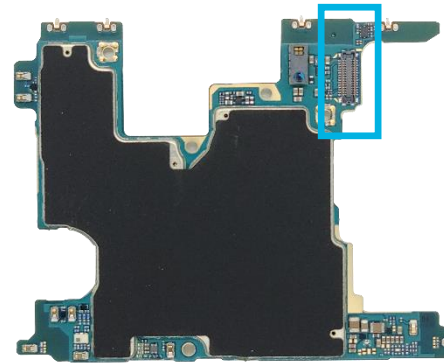
- Install the two (2) Modules back into the Front Assembly
- Insert two (2) black screws into the left Modules



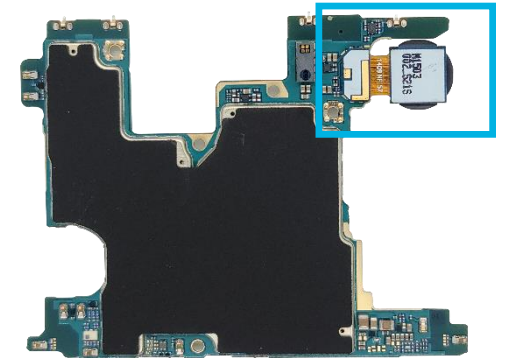
Note: mmWave Calibration is required upon replacement of mmWave Modules or Main PBA.

Installing the Main Camera

- Align the Camera onto the Main PBA without touching the lens
- Connect one (1) Camera FPCB to the back of the Main PBA



Main PBA (inner)



Main PBA w camera (inner)

Installing the Main and Sub PBA

- Align the Main PBA onto the bracket; make sure to move the flex cables out of the way to ensure it lays flush (flat) in its place
- Align the Sub PBA onto the bracket and insert starting with the interface port; ensure the Sub PBA is secured tightly
- Upon inserting the Main and Sub PBA, use a Screwdriver to insert one (1) Main PBA screw and three (3) Sub PBA screws
- Once the screws are in, begin by reconnecting all of the flex connectors with the Battery connector being the last



No Connectors and PBA Screws



With PBA Screws

Installing the Rear Assembly

- Starting with the bottom piece, insert and ensure the bottom clips into place
- Once installed, connect the NFC flex connector to the Main PBA; once connected, press the top piece down into place
- Inspect the Rear Assembly to ensure the Rear Assembly is resting flat and is securely in place



PBA with Screws

Attaching the Back Cover

- Align the tape precisely on the Rear Assembly
- Gently press around the edges to ensure a secure fit
- Once aligned, pull on the tab at the top to remove the film
- Once the double-sided tape is exposed, place the Back Cover on a press along the edges



With PBA Screws



Rework tape

Pressing the Device

Before the final press, perform a visual inspection:

- Make sure the Back Cover is properly aligned
- There should be no gaps or overlaps between the OCTA and Back Cover

Press the device in the Press Jig:

- Place the device into its Press Pads, and insert the Press Pads into the Press Jig
- Using the large 1N Torque Wheel, press the device for one (1) minute



Press Jig



Universal Device
Press Pads

Preparing for Water Resistance Test

- To prepare for the Water Resistance Test, attach Microphone and Rear Flash Lens tapes to the device:
- Cover the rear flash lens
- Cover the upper mic
- Cover the air vent next to upper mic
- Cover the lower mic



Lower Mic



Upper Mic



Device Rear

Galaxy Diagnostics – Calibrations

Launch Galaxy Diagnostics and perform Outgoing Quality Control (OQC) tests and calibrations to ensure that all components are functioning properly.

Calibrations

Galaxy S21 FE requires the following calibrations:

- Vignetting (If FFC was replaced)
- Multi TSP Calibration
- TSP Calibration
- Range Sensor Calibration
- mmWave Calibration (whenever Main PBA or mmWave Module(s) are replaced)



Customer Pickup

Perform one last visual inspection and return the device in the following condition:

- Updated to the most recent firmware build
- State of charge at 100%
- Wiped clean using microfiber cloth to remove any fingerprints or debris

