

Repairability and recyclers information on Fairphone 4

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1. Product Identification

This document refers to Fairphone 4 5G a product by Fairphone, that was launched in the market on the 25th of October 2021.

This device comes in different configurations:

Grey

6 GB RAM, 128 GB Internal Memory
579 EUR RRP

Grey, Green and Green speckled

8 GB RAM, 256 GB Internal Memory
649 EUR RRP

The main technical specifications are as follows:

- 5G European operator ready
- Dual SIM (NanoSIM and eSIM)
- Cameras*
 - 48MP wide OIS with laser AF
 - 48MP ultra-wide / macro
 - Color sensor & 1D TOF sensor (low-light assist)
 - 25MP FF (Selfie)
- Qualcomm 750G (7225) Chipset
- 3905 mAh Battery (50% charge in 30min)
- Qualcomm 4.1 Quick Charge
- 6.3 inches Full HD+ Display
- 1080 x 2340 resolution
- Pixelworks Technology
- Corning Gorilla Glass 5
- IP 54 Rating
- Side Mounted Fingerprint Sensor
- Expandable SD card slot (up to 2TB)

2. Electronic board, wiring and connection diagrams

At the moment of writing this document we are still early in the product lifecycle and very few repairs have been necessary. Once we have a larger pool of devices that can be investigated for board repairs, we will publish the necessary electronic board, wiring and connection diagram.

If you need any information to facilitate your repair, please email product.management@fairphone.com and we will be happy to share more information.

3. List of repair and test equipment needed

Repairing FP5 is very simple and the list of required tools is short. Most of the repairs will only need 1 and 2 below. For more complex repairs you will need tools 3 to 7.

1. Phillips screwdriver PH00 (for most of the repairs)
2. Torx screwdriver T5 (only for PCBA repairs)
3. USB-C cable (to test charging)
4. Battery Discharge Power measurement equipment
5. ESD protection gear
6. Soldering gun and solder tin
7. Software flashing tool, but can also be done using a computer. You can find the instructions [here](#).

4. Technical manual

Any person can access our technical manual online. There are tens of different guides depending on the needs. See below for a selection of the 10 most important articles.

1. [FP4. Charge your phone](#)
2. [FP4. Set up SIM card](#)
3. [FP4. Set up eSIM card \(embedded SIM\)](#)
4. [FP4. Connect to Mobile data](#)
5. [FP4. Connect to Bluetooth](#)
6. [FP4. Connect to a Wi-Fi](#)
7. [FP4. Migrate data from another phone](#)
8. [FP4. Update to the latest Fairphone OS](#)
9. [FP4. Maximize battery lifespan](#)
10. [FP4. Replace a spare part](#)

You can access all the rest [here](#)

5. Diagnostic fault and error codes

- We make use of Android's (AOSP) default logging and tracing mechanisms, which mostly means Android *logcat* messages generated by the Android framework, apps and HAL implementations, as well as kernel logs.
- Additionally, we use logging and diagnostics in components of third party suppliers, most of which comes from Qualcomm. These components use the same technical mechanisms as AOSP code: Android *logcat* and kernel logs.
- For modem and low-level implementations, we fully rely on logging and diagnostics implemented by our chipset vendor Qualcomm and their proprietary tooling.
- We currently mostly use a "pure-AOSP" approach -- keeping customization compared to AOSP to a minimum -- which facilitates maintenance and longevity
- For any customization we add on top of AOSP and device-specific code (from Qualcomm and other suppliers), we again make use of Android *logcat* and kernel log.
- If you encounter a pop-up with an error code "There has been an error" then you can use usb debugging <https://developer.android.com/studio/debug/dev-options> and the "adb logcat" tool to get the full log that contains all the strings to help you figure out what the error code is.

In summary, our failure analysis relies on analyzing Android logcat, Linux kernel logs, and additionally Qualcomm modem logs where applicable, making use of existing tagging mechanisms from Android and Linux to identify failing components. Within the scope of Android and Linux kernel, we currently do not have any proprietary formal error/fault codes (e.g., numerical error codes that follow certain specifications to identify which code would be related to what fault state). Our fault analysis relies on the mostly text-based analysis of Android and Linux logs.

6. Component and diagnosis information

For any question on this chapter please contact product.management@fairphone.com.

Fairphone 4 contains the following key components with the following key data points:

Component	Part details	Vendor	Key specs
Battery	Model: F4AC1	Kayo	Capacity : 3905 mAh Nominal Voltage: 3.85 V Cut off Voltage: 3.0 V Charging Voltage: 4.4 V Dimensions: 91.3 x 46.8 x 6.5 mm Internal Impedance < 120 mΩ Standard discharge: Continuous 0.2C to 3.0V Operational Charging Temperature Range: 0-60°C Operational Discharge Temperature Range: -20°C - 60°C Recommend full charge & discharge cycle once every 3-6 months.
Chipset	SM7225	Qualcomm	64 bit application processor Dual DSP Always on sub system & processor Supports: GNSS, WLAN/BT, LTE, TD-SCDMA, WCDMA, GSM and 5G NR. Support camera interfaces: 3 x ISP, 1 x ISP-lite, 16+16+16MP ZSL, MCTF. Adreno 619 GPU 14 QUP (Qualcomm Universal Ports): multiplexed serial interface functions (eights ports on GPIO and six ports on LPI GPIO)
Display	Model: 9A-3R063-11 02B LTIPS & incell	DJN	6.3" Outline: 71.00(W)*157.4(H)*2.09(T) Viewing area: 67.47(W)*145.71(H) Active Area: 67.068(W)*145.314(H) Viewing Direction: all directions MIPI Interface LCM Input voltage: IOVCC=+1.8V(+1.95V Max) AVDD=+5.5V(6VMax) AVEE=-5.5V(-6V Max) Storage Temp: -40 to 80°C
Board to Board Camera Connector	Model: BM24-30DP /2-0.35V(51)	Tohoku Hirose Electric Co.	Voltage 30V A/DC Signal contact 0.25 A Power Contact 5.0 A Op Temperature: -40°C to 85°C Storage Temperature -10°C to 60°C Electrical Contact Resistance: 20 mV AC or less 1kHz, 1mA Electrical Insulation Resistance 100 V DC Electrical Voltage Proof 150V AC for max 1 minute
Speaker	Dynamic	AAC	Dimensions: 11 x 15 x 2.5 mm 8 Ω @ 2 kHz, 1 Vrms input

	Miniature Speaker SLS1115D-01		1 W rated noise (1.5W Max) in 0.7cc 200-20kHz Frequency range Operating Temperature: -20°C to +70°C Storage Temperature: -40°C to 85°C
Microphone	Part Number: SM0103B-RI S421-M02	AAC	AOP 134 dB SPL Power Supply Rejection (@10%THD @ 1kHz) 134 dB SPL Min Load Resistor 5kΩ Operating Temperature: -40°C to +100°C Storage Temperature: -40°C to 100°C Soldering Information: Preheat 150-180°C for a maximum of 120 secs. Soldering Above 220°C for a maximum of 90 secs. Peak 260°C for a maximum of 30 seconds. Do not reflow more than 2 times.

There are several components in your device that can be diagnosed. We advise you to follow our [diagnosis tree in our website](#).

Find & fix an issue yourself

Welcome to our online repair tool!

Did you know you can solve many common issues yourself?
We will guide you with our online repair tool below.

This tool leads you to quick and easy fixes.
If not, it helps us diagnose the issue and gives us all relevant information. This will help us to help you faster!

Welcome message of our diagnostics tool

Nevertheless you can also test one of the phone functions or components directly. To do so, please go to **My Fairphone App** on your phone. Please only do this under the instruction of our customer support :

- In the My Fairphone App, Click on “phone” menu
- Click on Test and Troubleshoot
- Click on “Open Internal Test App”

To exit the test mode, scroll down and press exit.

Diagnostic tests you can perform:

- a. Traceability test
- b. Fingerprint sensor (raw data)
- c. Touch panel (raw data)
- d. Psensor (raw data)

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- e. SD Memory card
- f. SIM
- g. eSIM
- h. Earpiece (top speaker)
- i. Speaker (bottom speaker)
- j. Bluetooth
- k. Wifi 2.4G
- l. Wifi 5G
- m. GPS
- n. Fingerprint enroll (image capture)
- o. Touch panel
- p. LCD
- q. LCD Backlight LEDs
- r. Keyboard
- s. E-compass
- t. G-Sensor
- u. Gyroscope
- v. Front Camera
- w. Main Camera
- x. Ultra Wide Camera
- y. Camera LED
- z. Audio
- aa. Vibration sensor
- bb. NFC
- cc. Proximity sensor
- dd. Light sensor
- ee. Back Light Sensor
- ff. USB / Charger
- gg. USB Type-C
- hh. Accessory
- ii. USB 3.0
- jj. DP (video output)
- kk. USB NTC (for temperature)
- ll. Camera OTP
- mm. Attestation Key Check
(tests public and private keys to validate SW in the device)
- nn. Calling

7. Instructions for software updates.

Fairphone OS releases for Fairphone 4 5G (FP4), based on Android 11 (A11), and we provide regular software updates.

Instructions on how to download and **install** these updates **directly on your phone** [here](#).

Instructions on how to download and **install** these updates **using your computer** can be found [here](#).

Instructions on how to make a factory reset can be found [here](#).

8. Data records of reported failure incidents

Fairphone maintains data records of failure incidents in accordance with GDPR regulations, when customers contact us about a reported failure it is necessary for us to hold a certain amount of data to be able to process this failure and potential return

of the product to our repair center. We also maintain records of reported failures in an anonymised way where no customer data is required for varied business related purposes such as cost management and future warranty provisioning. We do not make this information available publicly. We do make information available about certain known failures on our products on a case by case basis. For any question on this chapter please contact product.management@fairphone.com.

9. Technical bulletins

Fairphone OS releases for Fairphone 4 5G (FP4), based on Android 11 (A11), available for the open market. [Here](#) you will also find the updated list of new features, bug fixes, and security patches of each release. The date and availability of system updates may vary by network carriers or country.

To take advantage of the latest improvements and security fixes, make sure to [update to the latest Fairphone OS](#). In case you need to manually download the latest software version, please go to [FP4. Install Fairphone OS offline](#).

10. Guidance for self-repair and technical manual.

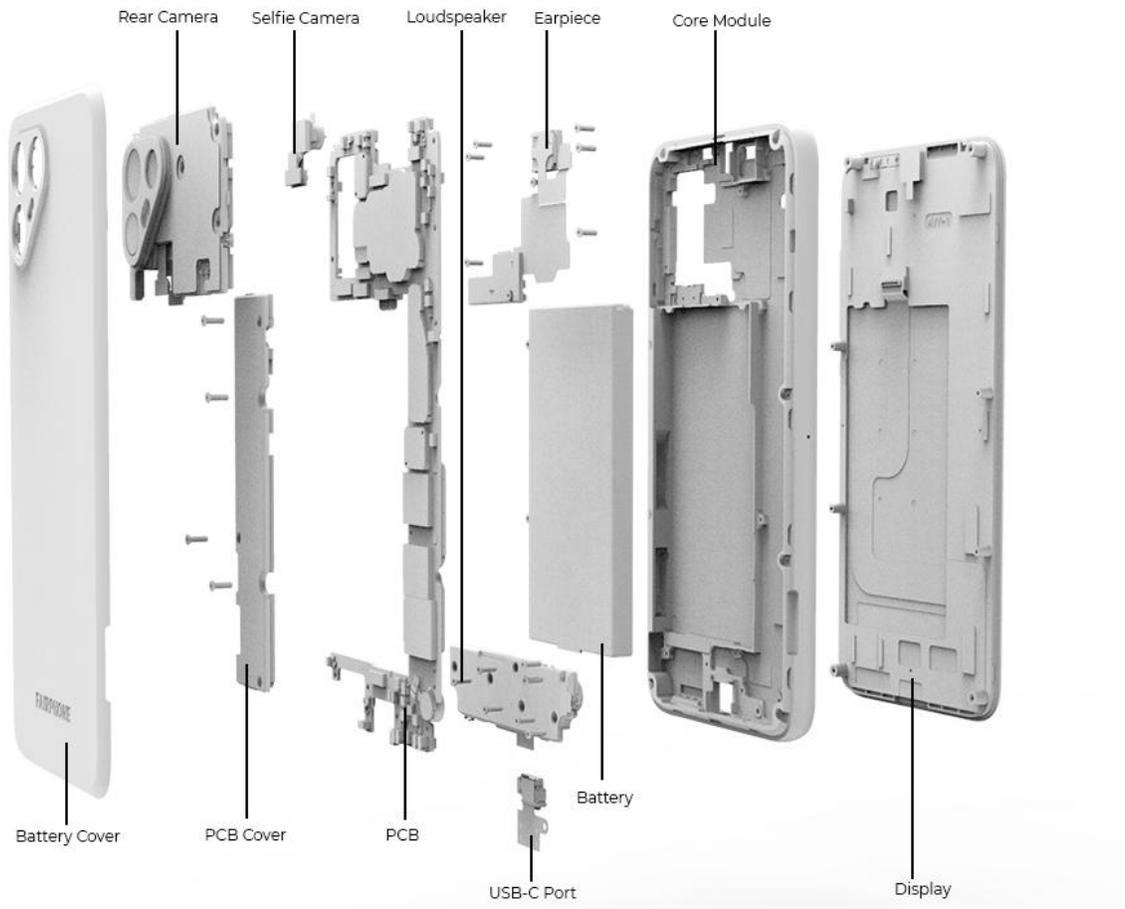
Repairing the Fairphone 4 is very easy. Any of the actions contained in this chapter have any consequence for your warranty.

You can find any of our video self repair videos and a simple self-repair guide in this [link](#).

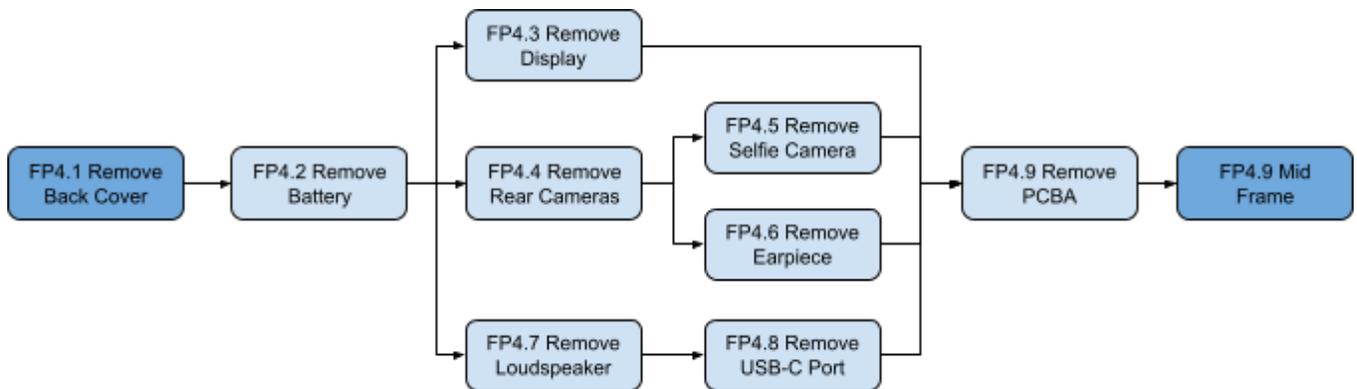
In this document you can also find a printed version of our repair manuals.



a. Spare Parts Overview and disassembly map

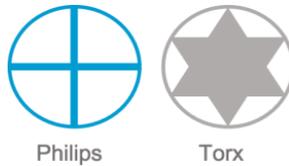


b. Disassembly Flow



c. Cautions Before Disassembly

- i. **Power off the device:** Before disassembly please power off the device and take out the battery.
- ii. **Press the power button** more than 5s after the battery is removed, to release the electricity residual in capacitors.
- iii. **ESD Protection:** Electronic sensitive components inside, (esp. in winter) suggest to release the static electricity on the body (e.g. finger touch metal objects).
- iv. **Pay attention to the three different types of screws:**
 1. Black Phillips head (M1.4) (for display repairs)
 2. Silver Phillips head (M1.4) (for other repairs, not involving PCB)
 3. Torx head (for repairs involving accessing the PCB)



- v. **Prepare your tools:**
 1. Phillips screwdriver PH00.
 2. Torx screwdriver T5.
- vi. **If you are a professional repairer, consider the torque force** needed for screw/unscrew operation:
 1. Torque Force for Phillips screws: $0.8 \pm 0.15 \text{KGF}$
 2. Torque Force for Torx screws: $0.4 \pm 0.05 \text{KGF}$

d. Check for water ingress

Step 1: Lift up back cover and remove back cover.

Step 2: Remove the battery lifting up from the tab at the bottom of the battery

Step 3: Follow the steps to remove the camera explained in section g.

Step 4: Remove PCBA Cover Torx Screws with a T5 screwdriver

Step 5: Check Rear Water Marker

Screw type: Torx Head screws (black) M1.4
Screwdriver type: PH00, T5
Disassembly direction: Counterclockwise (CCW)



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e. Replacing Back Cover (NFC Antenna) and Battery

Step 1: Lift up back cover and remove back cover. This part contains the NFC antenna.

Step 2: Remove the battery lifting up from the tab at the bottom of the battery.



f. Replacing Display

Step 1: Follow previous steps to remove the back cover and the battery

Step 2: Remove the 8 Phillips Black screws indicated in the picture below.

Step 3: Lift the display and disconnect the cable behind.

Step 4: Connect the new display by first connecting the cable back. Simply push the connector in until you hear a click.

Step 5: repeat actions in step 3, 2 and 1 in reverse order.

Screw quantity: 8 pcs
Screw type: Phillips-head screws (black) M1.4
Screwdriver type: PH00
Disassembly direction: Counterclockwise (CCW)



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g. Replacing Rear Cameras, Selfie Camera or Earpiece

Step 1: Follow instructions to replacing Back Cover (NFC Antenna) and Battery (e)

Step 2: Remove Camera Connectors Lid Screw

Step 3: Lift up and remove Camera Connectors Lid

Step 4: Lift up 3 Connectors

Step 5: Remove 5 Rear Cameras Screws (Silver)

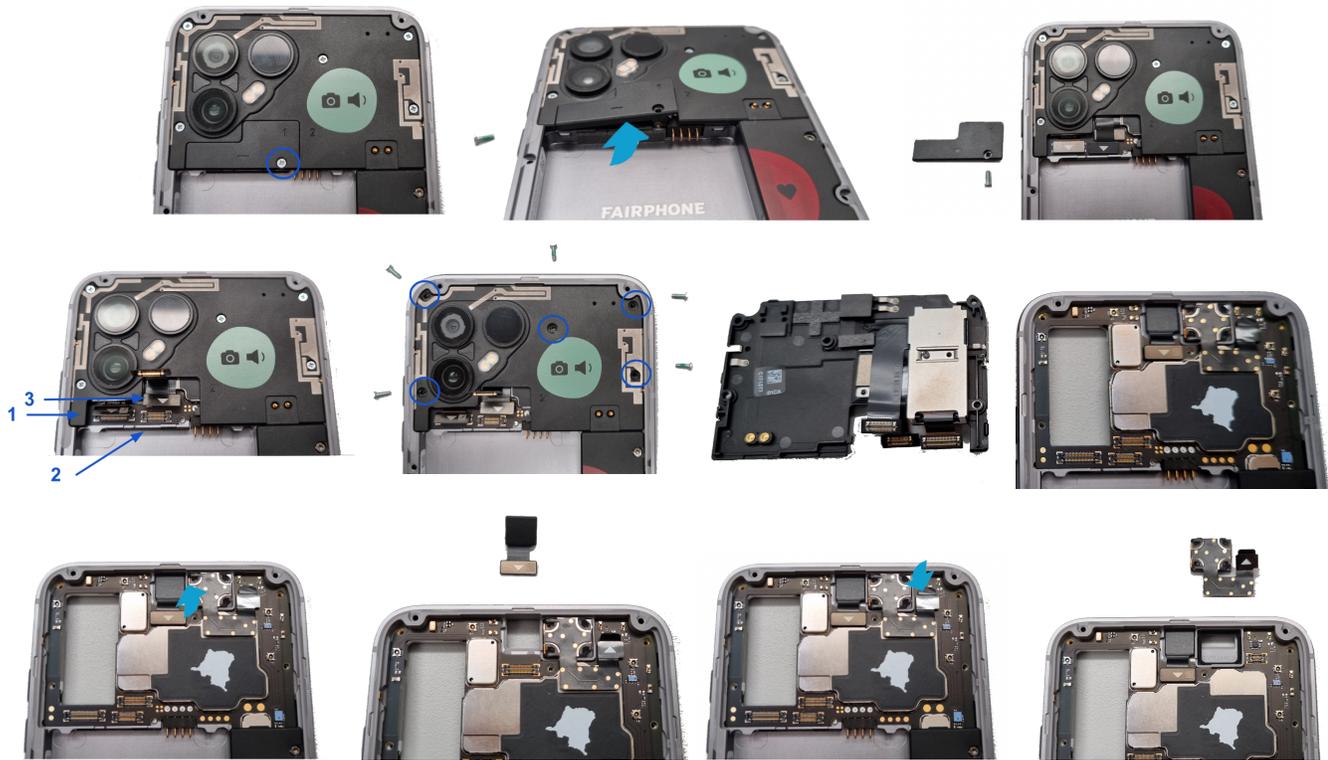
Additional step if you are replacing the selfie camera or the earpiece, change at this point any of the two.

Step 6: Put new camera on the right position and click it in

Step 7: Connect back the 3 connectors (pay special attention to the first connector is hidden behind a cable).

Step 8: Screw all the screws back

Step 9: Place the Camera Connectors Lid back, by introducing first the small lip on the left side and then placing back the screw.



Selfie camera

Earpiece

h. Replacing Loudspeaker, Vibration Motor or USB-C Port

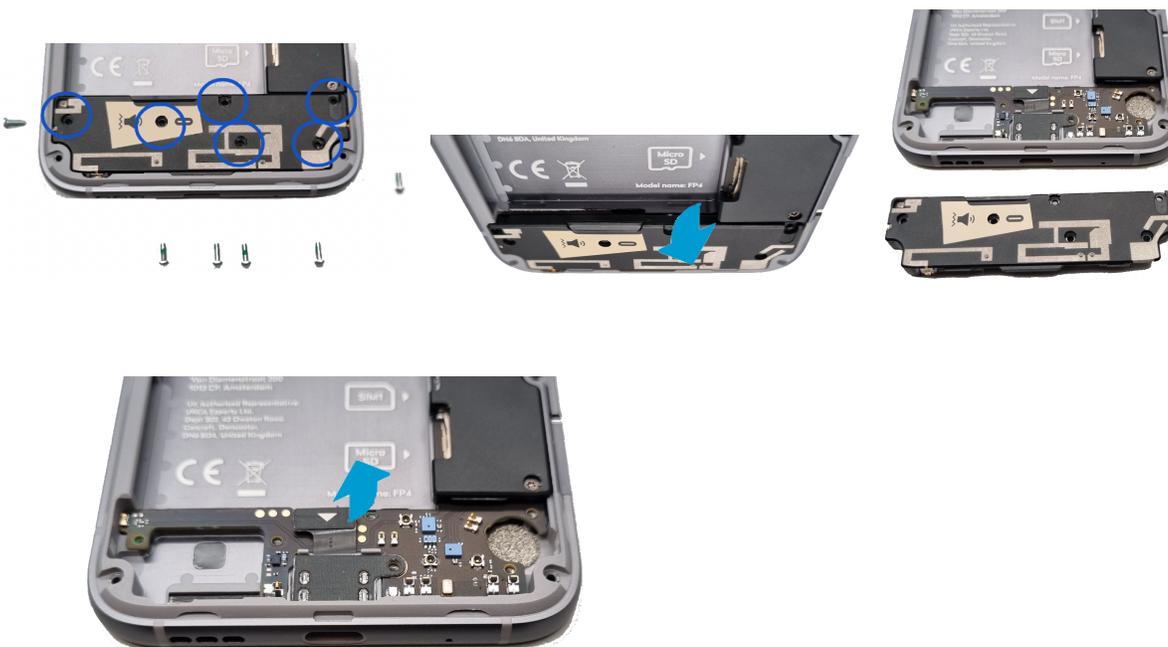
Step 1: Follow the steps in e.

Step 2: Remove Loudspeaker 6 Phillips Screws (Silver)

Step 3: Lift up Loudspeaker lifting the central lip and remove it. This part also contains the vibration mechanism.

Additional step: if you are replacing the USB-C port, you can now access it. Please mind that there is not screw holding the USB-C port at this point. You have already removed it when removing the Loudspeaker Screws. Place the new USB-C back in place and push the connector until to feel a click.

Step4: Put the new Loudspeaker in place. Click it in and place back the 6 screws



i. Replacing PCB and Mid-frame

- j. Step 1: Follow the steps in **e** to remove back cover and battery.
- k. Step 3: Follow the steps in **f** to remove display
- l. Step 4: Follow steps in **g** to remove cameras and earpiece
- m. Step 7: Follow steps in **h** to remove loudspeaker and USB-C port
- n. Step 9: Remove PCBA Cover Torx Screws
- o. **Attention:** The PCBA will include 2 copies of the IMEI sticker. Everytime there is a PCBA or Mid Frame swap, please make sure the IMEI on the PCBA matches the IMEI label on the mid frame.



p. Additional resources

- [Fairphone Website](#) (where you can find our spare parts)
- [Fairphone Support Page](#) (where you can ask us questions)
- [Fairphone Youtube channel](#) (with all video repair guides)

11. Material information for recyclers

Below you can find materials information about the Fairphone 4. We have focussed on the materials that we think are most important for recyclers and indicated where they are mostly situated. This weight information is to give the idea for recyclers to estimate the value for recycling the phone. The exact weight for each material can vary, due to the calculation method and the limitation of the analytical techniques.

Material	CAS no.	Total mass in FP4 (g)	You can find mainly in these components	% of total mass in FP4	The components belong to these modules
Tungsten	7440-10-0	0.75	Vibration Mechanism	99%	Loudspeaker (contains vibration motor)
Tin	7440-10-0	4.4	Solder paste in PCBA	51%	PCBA
			Solder paste in Battery	25%	Battery
Aluminum	7429-90-5	30.61	Mid frame	98%	Mid frame (includes buttons)
Rare Earth Elements**	see rare earth	0.16	Speaker, Vibration Mechanism	76%	Loudspeaker (contains vibration motor)
Nickel	7440-02-0	2.44	Shields Copper alloy	62%	PCBA
			Battery	12%	Battery
Zinc	7440-10-0	1.68	Shields Copper alloy	94%	PCBA
Copper	7440-50-8	23.06	Shields Copper alloy	23%	PCBA
			PCB	37%	PCBA
			Battery	30%	Battery
Magnesium	7439-95-4	7.89	LCD frame	57%	Display
Gold	7440-57-5	0.011	PCB	0.27%	PCBA
			Battery PCB	0.06%	PCBA
			Battery connector	0.10%	Battery
			Speaker	3.47%	Loudspeaker (contains vibration motor)
			BtB connectors	5.18%	Main cameras
			all other components	91.00%	N/A
Plastics:	polycarbonate (PC)	2.99	LCD Frame		Display

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	polycarbonate (PC)	6.30	FP4-MIDDLE-HOUSING		Mid frame (includes buttons)
	polycarbonate (PC)	0.51	FP4-rear-cam-btb-cover		Main cameras
	polycarbonate (PC)	4.51	FP4-REAR-CAM-BACK		Main cameras
	polycarbonate (PC)	1.40	FP4-REAR-housing-SIM1		Main cameras
	polycarbonate (PC)	2.20	FP4-SPK-top-cover		N/A
	polycarbonate (PC)		FP4-SPK-bottom-cover		Loudspeaker (contains vibration motor)
	polycarbonate (PC)	13.65	FP4-BATTERY-COVER		Back cover (contains NFC antenna)
Indium	7440-74-6	0.0000045	LCD panel	40%	Display
			Solder paste	60%	PCBA
Cobalt	7440-48-4	12.25	battery	100%	Battery
Lithium	7439-93-2	23.14	battery	100%	Battery
Silver	7440-22-4	0.033	Solder paste	22%	PCBA
			battery package	14%	Battery
			passives	19%	PCBA
Mica	12001-26-2	0.03	camera	51%	Rear cameras
Palladium	7440-05-03	0.00115	Front End Module	60%	PCBA
Platinum	7440-06-04	0.00003	SAW Quadplexer	60%	PCBA

*Rare earth includes Neodymium, Praseodymium, Dysprosium