



**iPhone 13 Pro**

**iPhone 13 Pro Max**

# Apple Recycler Guide

February 2022

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# About This Guide

Apple Recycler Guides provide guidance for electronics recyclers on how to disassemble products to maximize recovery of resources. The guides provide step-by-step disassembly instructions and information on the material composition to help recyclers direct fractions to the appropriate material recycler.

To conserve important resources, we work to reduce the materials we use and aim to one day source only recycled or renewable materials in our products. A key path to reaching that goal is resource recovery from end-of-life electronics.

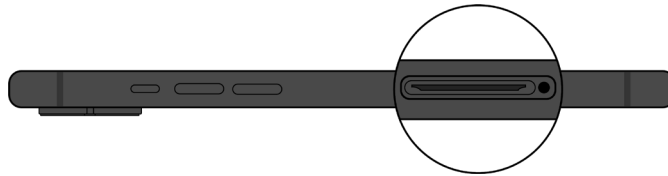
Disassembly procedures are intended to be performed only by trained electronics recycling professionals. The recycler is responsible for independently evaluating and ensuring compliance with all applicable environmental, health, and safety laws related to the work. These include but are not limited to laws relating to the management, handling, shipping, and disposal of the outputs of this work as waste and laws in place to ensure the health and safety of all employees who support this work.

For questions or feedback about this guide, email [contactesci@apple.com](mailto:contactesci@apple.com).

**Note:** This guide may show images from other similar models, but the procedures are the same.

# Identification

You can find the model number of the iPhone inside the SIM tray slot.



*Model numbers:*

*A2483, A2484, A2636, A2638, A2639,  
A2640, A2641, A2643, A2644, A2645*

# Directive 2012/19/EU Annex VII Components

Directive 2012/19/EU Annex VII requirements apply to the following substances and components.

| Substance/Component   | Location         | Removal Instructions |
|---|------------------|----------------------|
| Printed circuit board if the surface is greater than 10 square centimeters  | Main logic board | Follow steps 1–14    |
| External electric cables  | Charge cable     | Follow step 1        |
| Battery   | iPhone enclosure | Follow steps 1–6     |
| Cover glass and organic light-emitting diode (OLED) display if the surface is greater than 100 square centimeters | Display          | Follow steps 1–5     |
| No further substances or components as listed in Annex VII  |                  |                      |

# Safety Considerations

The recycler is responsible for independently evaluating all activities undertaken by its employees to perform or support the work and ensuring compliance with all applicable health and safety laws related to the work. These include but are not limited to laws relating to the health and safety of all employees who perform or support this work. The recycler is also responsible for evaluating the workspace and ensuring that the area in which the work is to be undertaken is designed using ergonomic best practices and meets all ergonomic requirements to ensure the protection of its employees.

## Personal Protective Equipment

Personal protective equipment should be worn during the entire recycling process.



Wear hand protection



Wear foot protection



Wear eye protection



Wear a mask



Wear protective clothing

## Battery Safety

This product uses a lithium-ion polymer battery. Follow these steps for safe removal and disposal of the battery:

- Discharge the battery to less than 25 percent before beginning any disassembly. Thermal runaway is less likely to occur in a discharged battery.
- Remove anything from your person that could conduct energy, such as jewelry and watches, to avoid electric shock to yourself or the logic board.
- To avoid the potential for thermal runaway and the release of potentially noxious fumes, don't puncture, strike, or crush lithium-ion polymer batteries or devices powered by them.
- Don't throw, drop, or bend the battery.
- Don't expose the battery to excessive heat or sunlight.
- Use only tools that are not sharp and do not conduct electricity.
- Keep your workspace clear of foreign objects and sharp materials.
- Dispose of batteries according to local environmental laws and guidelines.

## Workspace safety guidelines

- Use heat-resistant gloves and safety glasses.
- Keep a sand dispenser within arm's reach (2 feet or 0.6 m) on either side of the workstation, not above the workstation. The dispenser should be a wide-mouthed, quick-pour metal container with a flip-top lid or tray that contains 8–10 cups (1.9–2.4 L) of clean, dry, untreated sand.
- Keep the battery at least 2 feet (0.6 m) from paper and other combustible materials.
- Work in an area with adequate ventilation.

## Handling a thermal runaway

If you notice any of the following signs, a thermal runaway is likely underway, and you should act immediately:

- The lithium-ion polymer battery or a device containing one begins to smoke or emit sparks or soot.
- The battery pouch suddenly and quickly puffs out.
- You hear hissing or popping sounds.

**Don't** use water or an ABC/CO<sub>2</sub> fire extinguisher on a thermal runaway battery or a device containing one. Water and ABC/CO<sub>2</sub> fire extinguishers will not stop the reaction.

**Do** smother the battery or device immediately with plenty of clean, dry sand, dumped all at once. Timing is critical; the faster you pour all the sand, the faster the thermal runaway will stop.

**Do** leave the room for 30 minutes if the thermal runaway causes any irritation.

**Do** wait 30 minutes before touching the battery. Wear heat-resistant gloves and safety glasses to remove the battery from the sand, or use a touchless thermometer to measure the battery temperature. Only touch the battery when the event has finished.

**Do** dispose of the damaged battery or device (including any debris removed from the sand) according to local environmental laws and guidelines.

## OLED Safety

Broken OLEDs must be handled properly to ensure the safety of your employees and mitigate any hazards. Package broken OLEDs in an appropriate container to properly manage the hazards associated with the materials and store only with compatible materials. All waste must be properly classified, packaged, and labeled in accordance with all relevant laws and regulations.

## Hazard Warnings



Broken glass hazard



Chemical inhalation hazard

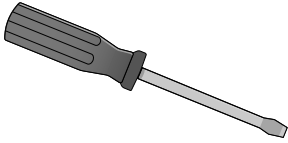


Rechargeable battery hazard

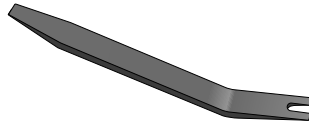


## Recommended Tools

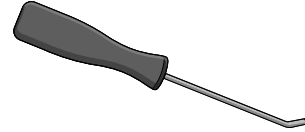
Flat-blade screwdriver



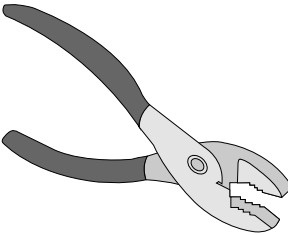
Miniature plastic pry bar



Miniature pry bar



Slip-joint pliers



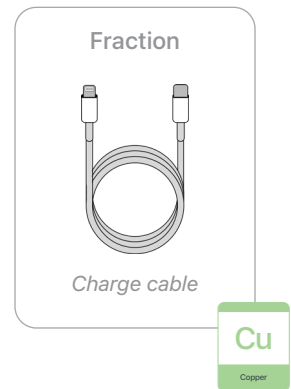
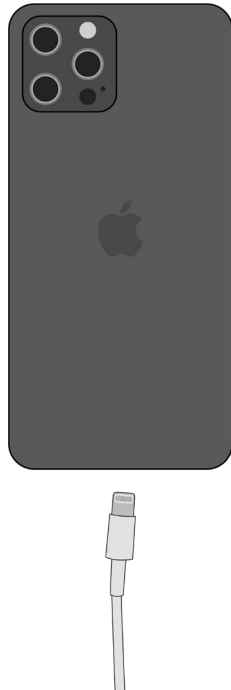
# Disassembly Instructions

## 1. Remove the charge cable.

» Turn off the iPhone.



» Unplug the charge cable.



## 2. Remove the display.

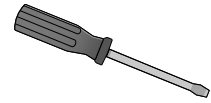


Broken glass hazard

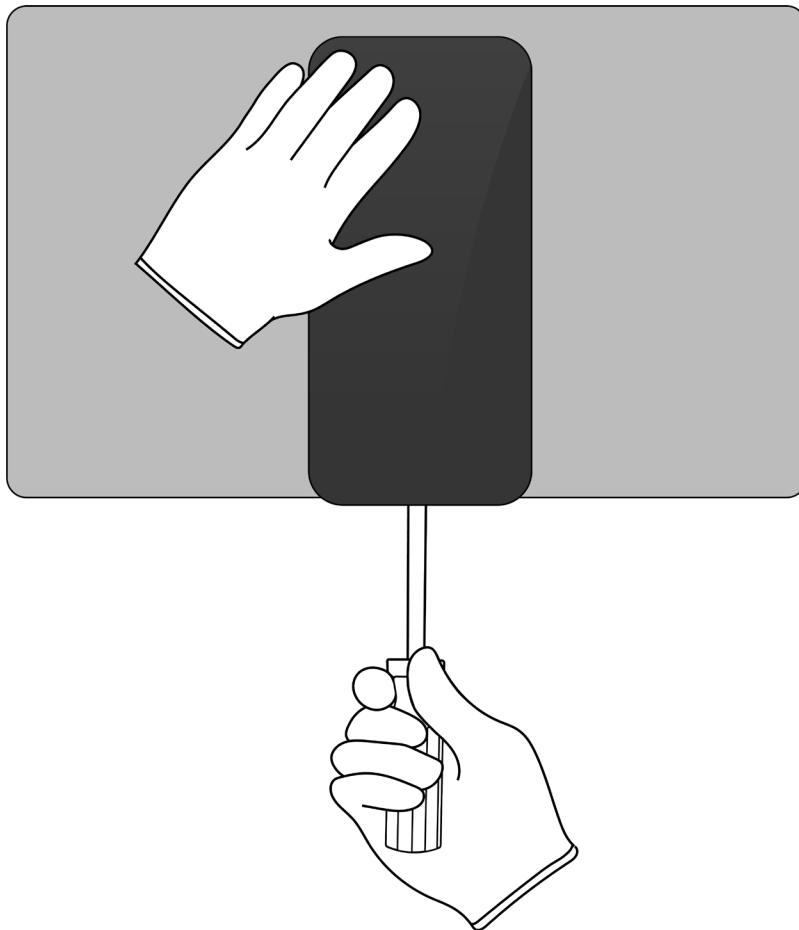


Chemical inhalation hazard

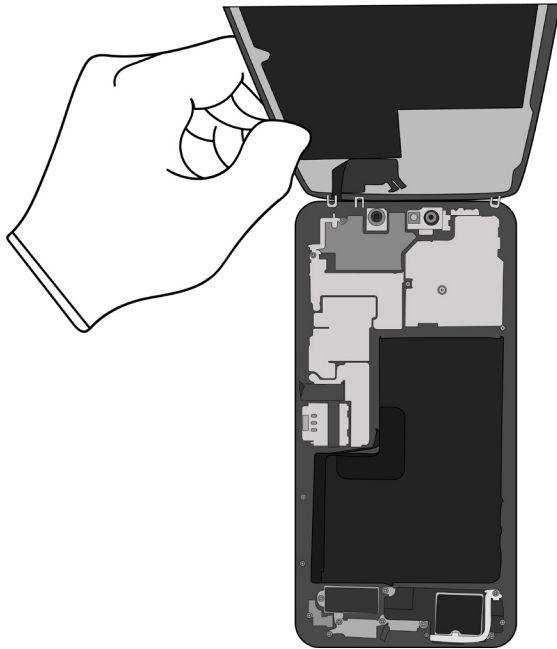
### Tools Used



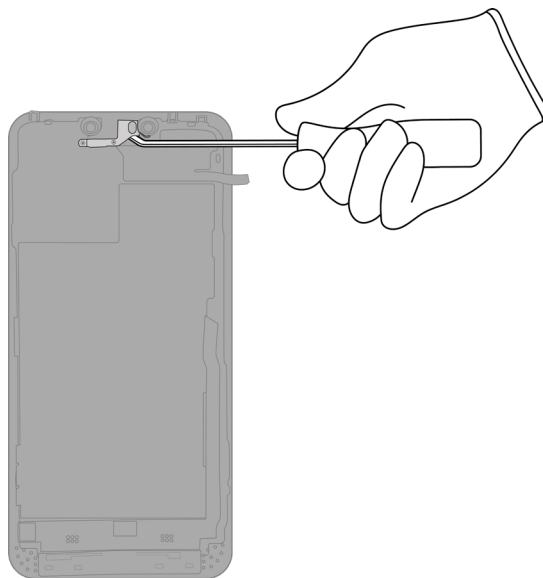
- » *Hold the iPhone at the edge of a counter with the display face up and the Lightning connector toward the counter edge.*
- » *Insert the tool tip into the Lightning connector. Push the handle down to pry the display from the enclosure.*



» Remove the display by hand. Set the enclosure aside.



- 3.** With the display facing down, pry off the light sensor and microphone cover.



Tools Used



Fraction

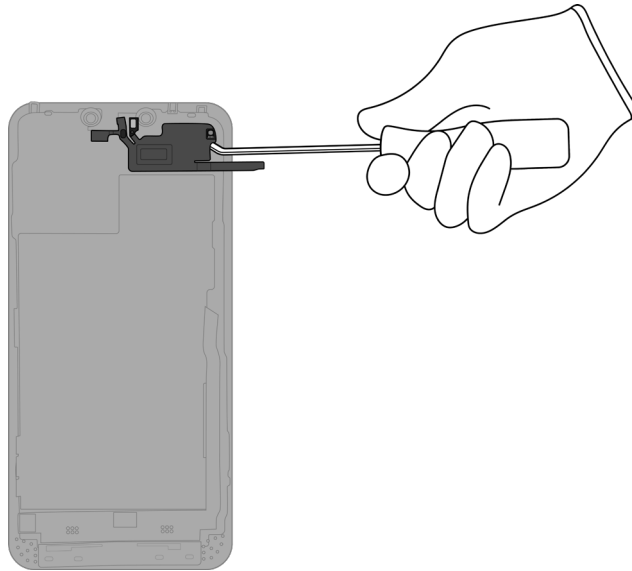


Light sensor and  
microphone cover

Fe

Ferrous

#### 4. Pry off the light sensor and microphone.



##### Tools Used



##### Fraction

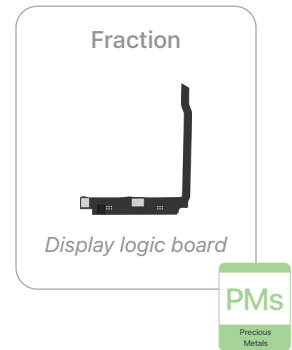
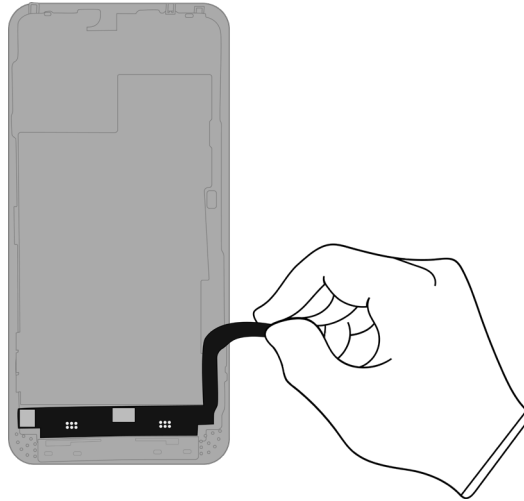


*Light sensor and  
microphone*

**Cu**

Copper

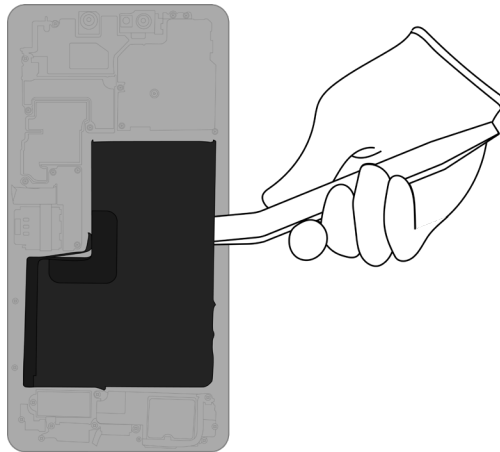
**5.** Remove the display logic board by hand.



6. Inside the enclosure, carefully remove the lithium-ion polymer battery.



Rechargeable battery hazard



Tools Used



Fraction

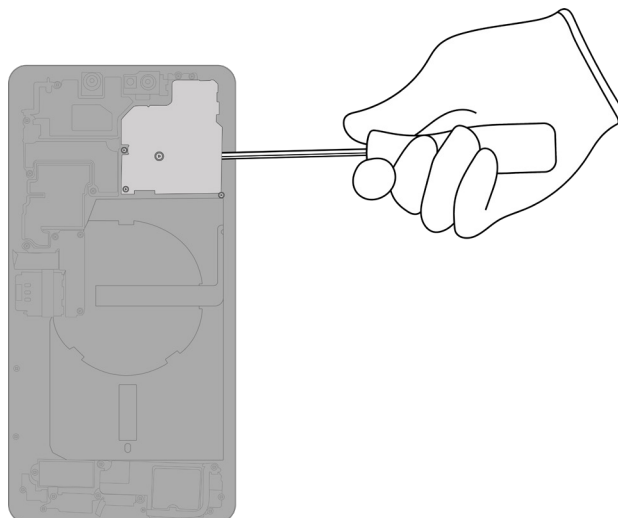


Lithium-ion polymer battery

BT

Battery

7. Pry off the rear camera cover.



Tools Used



Fraction

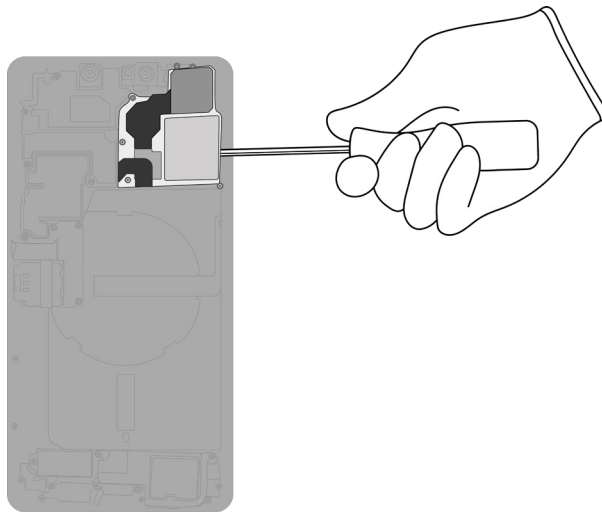


Rear camera cover

Fe

Ferrous

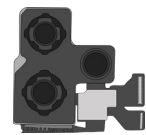
8. Pry off the rear camera.



Tools Used



Fraction

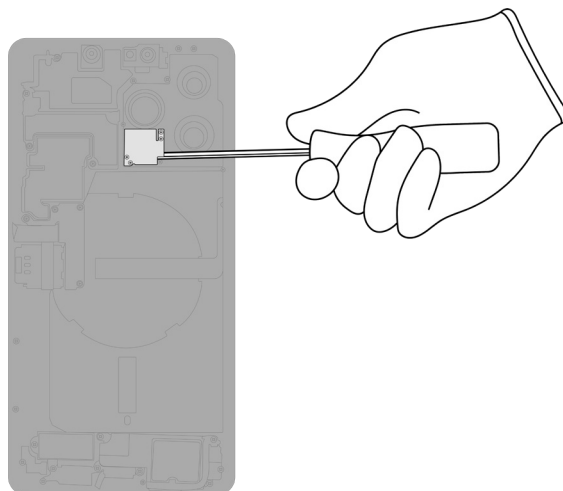


Rear camera

PMs

Precious Metals

9. Pry off the LiDAR Scanner cover.



Tools Used



Fraction



LiDAR Scanner  
cover

Fe

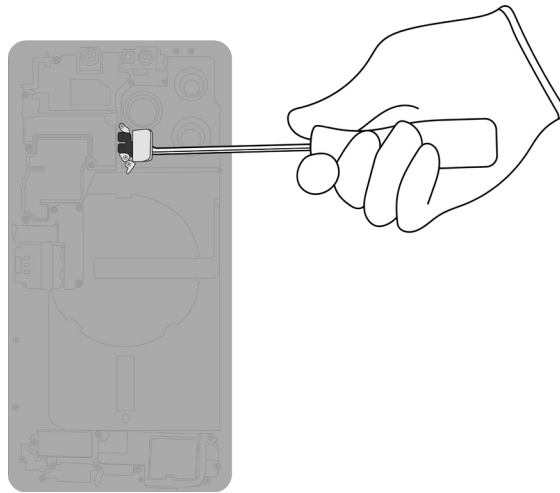
Ferrous



## 10. Pry off the LiDAR Scanner.



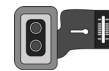
Chemical inhalation hazard



### Tools Used



### Fraction

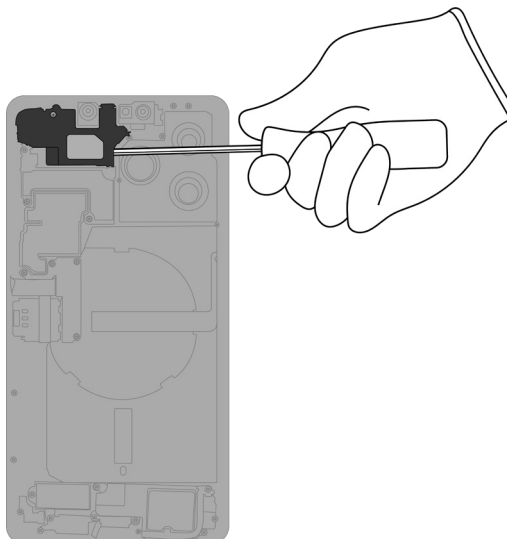


LiDAR Scanner

PMs

Precious Metals

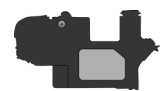
## 11. Pry off the receiver.



### Tools Used



### Fraction

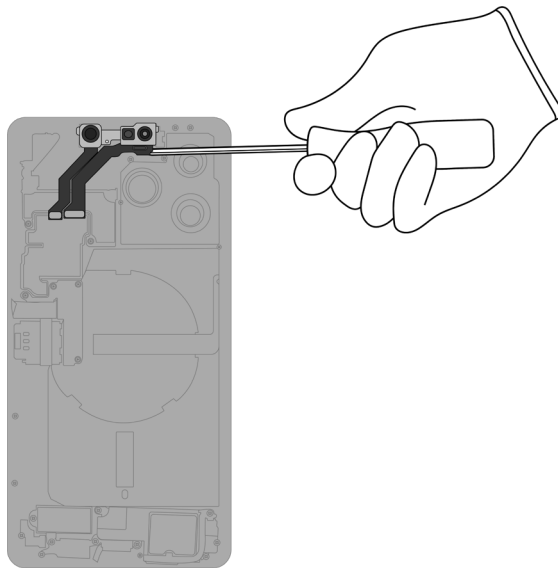


Receiver

REE

Rare Earth Elements

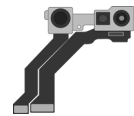
## 12. Pry off the front camera.



### Tools Used



### Fraction

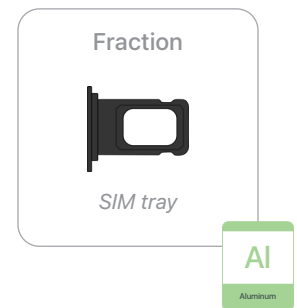
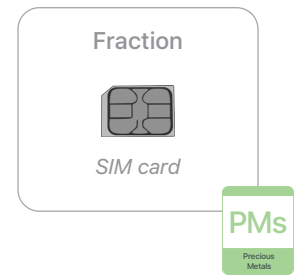
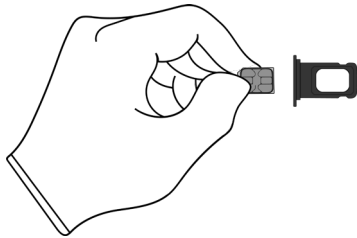
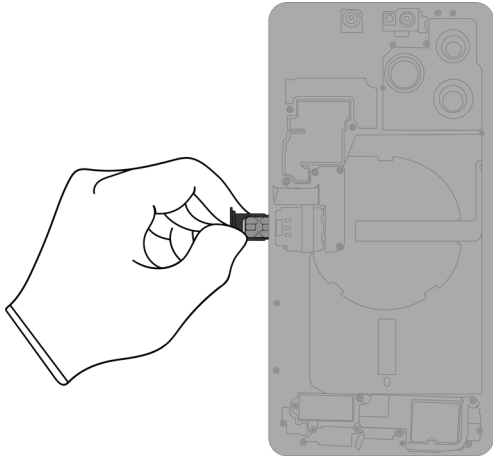


Front camera

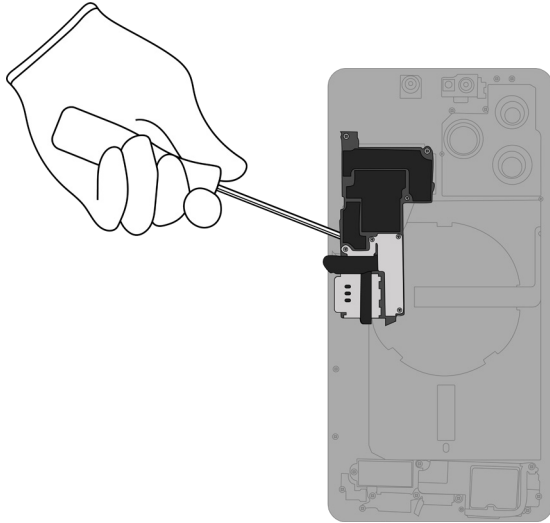
PMs

Precious  
Metals

- 13.** Remove the SIM card and SIM tray by hand.  
Separate the SIM card from the SIM tray.



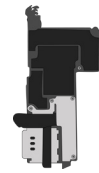
## 14. Pry off the main logic board.



### Tools Used



### Fraction

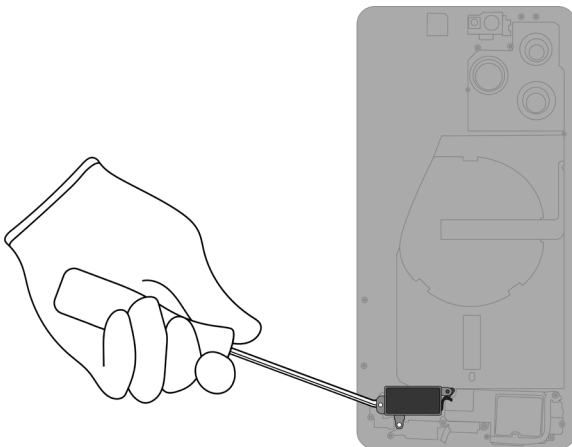


*Main logic board*

**PMs**

Practical  
Metals

## 15. Pry off the Taptic Engine.



### Tools Used



### Fraction

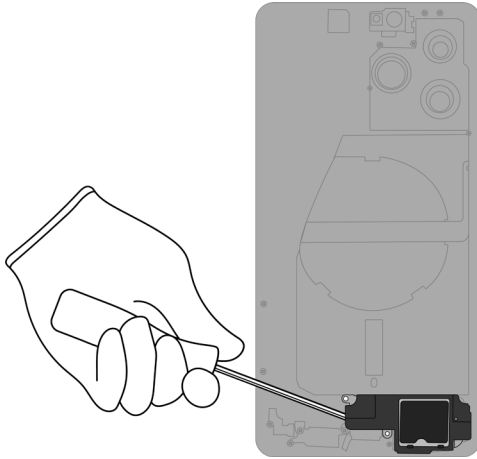


*Taptic Engine*

**REE**

Rare Earth  
Elements

## 16. Pry off the speaker.



### Tools Used



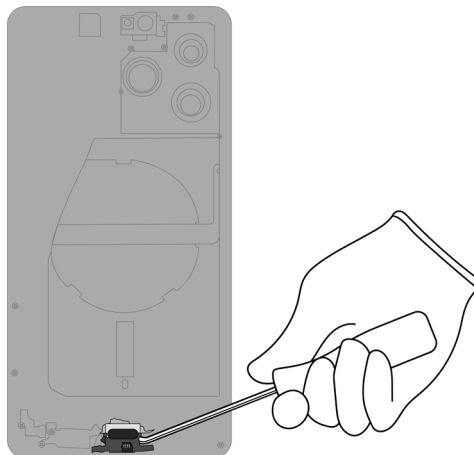
### Fraction



*Speaker*

**REE**  
Rare Earth  
Elements

## 17. Pry off the Lightning connector.



### Tools Used



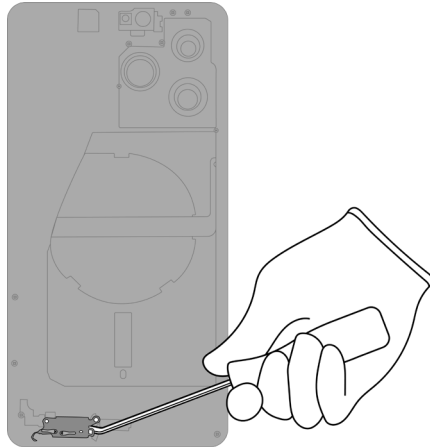
### Fraction



*Lightning connector*

**Cu**  
Copper

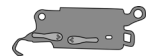
## 18. Pry off the microphone cover.



### Tools Used



### Fraction

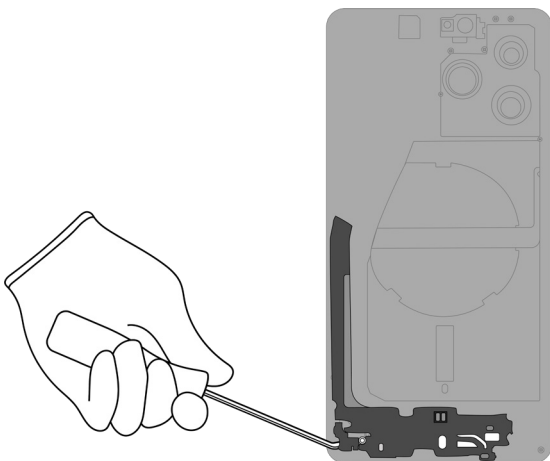


*Microphone cover*

Fe

Ferrous

## 19. Pry off the microphone and Lightning connector assembly.



### Tools Used



### Fraction

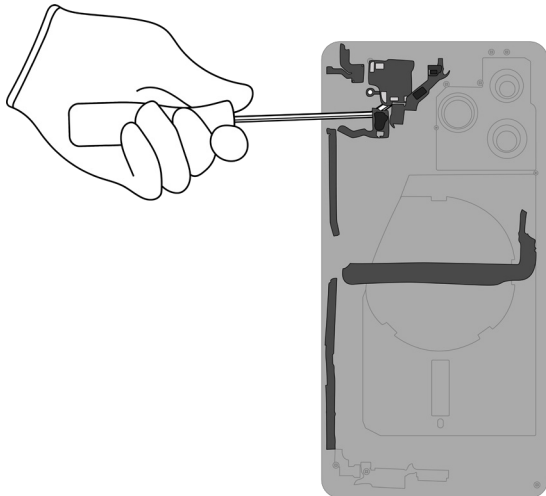


*Microphone and  
Lightning connector  
assembly*

Cu

Copper

## 20. Pry off the ribbon cables.



### Tools Used



### Fraction

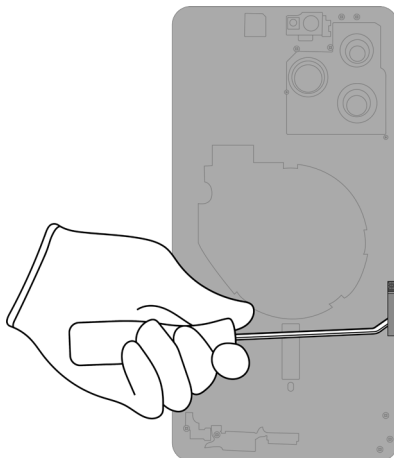


Ribbon cables

Cu

Copper

## 21. Pry off the 5G antenna.



### Tools Used



### Fraction

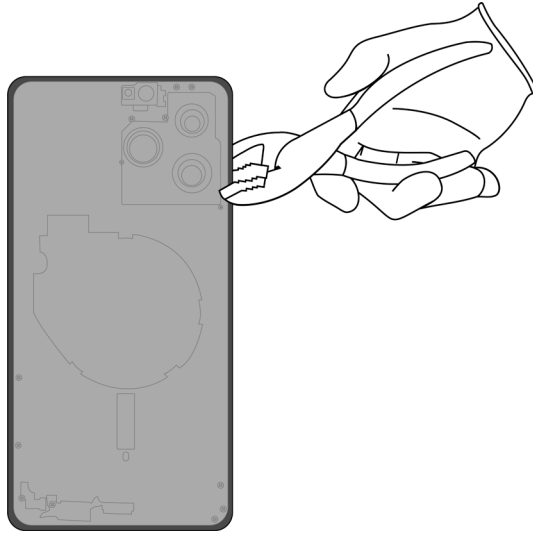


5G antenna

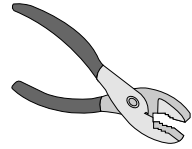
Cu

Copper

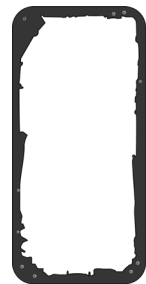
## 22. Pull the enclosure band off the support plate.



### Tools Used



### Fraction

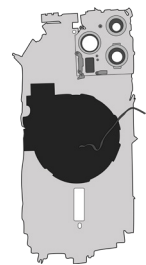


Enclosure band

Fe

Ferrous

### Fraction



Support plate






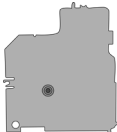

Cu

Copper



# Material Categorization of Output Fractions

All outputs from this process must be managed, handled, and disposed of in accordance with applicable waste laws and regulations, including but not limited to the Waste Framework Directive and its national enactments in Europe.

| Fraction   | Downstream Processing   |
|--|---|
| <b>Aluminum</b><br><br><i>SIM tray</i>  | <b>Primary Target Material</b><br>   |
| <b>Batteries</b><br><br><i>Lithium-ion polymer battery</i>   | <b>Primary Target Material</b><br>  |
| <b>Ferrous</b><br><br><i>Light sensor and microphone cover</i><br><br><i>Rear camera cover</i> | <b>Primary Target Material</b><br> |

| Fraction | Downstream Processing |
|----------|-----------------------|
|----------|-----------------------|

**Ferrous (cont.)**



*LiDAR Scanner cover*



*Microphone cover*



*Enclosure band*



**Glass**



*OLED display*

**Primary Target Material**



**Potential Additional Materials**



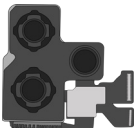
Fraction

Downstream Processing

Logic Boards



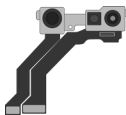
Display logic board



Rear camera



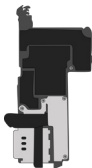
LiDAR Scanner



Front camera



SIM card



Main logic board

Primary Target Material

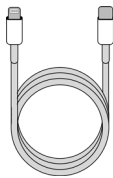


Potential Additional Materials



| Fraction | Downstream Processing |
|----------|-----------------------|
|----------|-----------------------|

Mixed Electronics



Charge cable



Light sensor and microphone



Lightning connector



Microphone and Lightning connector assembly



Ribbon cables



5G antenna

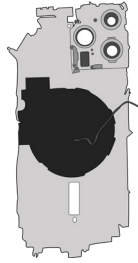
Primary Target Material



Potential Additional Materials



**Mixed Electronics (cont.)**



*Support plate*

**Rare Earth Magnets**



*Receiver*



*Taptic Engine*



*Speaker*

**Primary Target Material**



**Potential Additional Materials**

