



# PINE64

## FCC ID:2AWAG-PINEPHONE

## PinePhone

From PINE64

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The PinePhone is a smartphone created by Pine64, capable of running mainline Linux and supported by many partner projects. The "BraveHeart" edition was the first publicly-available version of the phone, though it came without a fully functional OS (factory test image) and was geared specifically towards tinkerers and hackers. People looking for a stable consumer-grade phone should wait for the final release, which is expected to occur in March 2020 and will be available for at least five years.

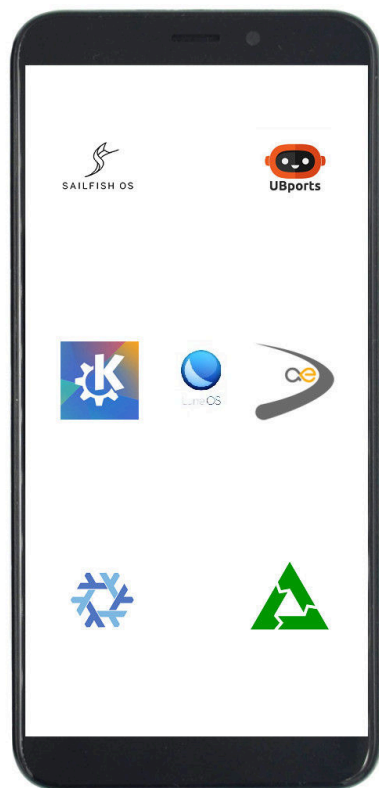
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## “BraveHeart” PinePhone Unboxing and First Time Preparation Guide



PinePhone is capable of running a multitude of different Linux mobile OSes

From the factory the battery has a sticker on it that isolates the battery from the phone. The battery **will not** charge until this is removed.

After unboxing remove the back panel. Then remove the battery and peel off the clear plastic sticker below it that isolates the charging contact. Then replace the battery. See [#Battery](#) for more info.

If you power on the phone the factory test image will boot. RTL8723CS (WiFi modem) will fail unless there is a WiFi network in range for it to see and the battery is charged. EG25 will fail until battery is charged.

By default there is no true OS image installed on Braveheart phones. An SD card with a bootable image needs to be inserted into the phone. See section 12 below for a list of OS options. Note the SD and sim sockets are stacked on each other. The SD slot is the "shallower" socket and the SIM card goes in the "deeper" socket.

**Some videos that illustrate the process:**

[Excellent first time guide video from Rob Braxman Tech](#)

[Flash an OS to microSD card video from Rob Braxman Tech](#)

## Specifications

**Dimensions:** 160.5 x 76.6 x 9.2mm

**Weight:** Between 180-200 grams

**SIM Card:** Micro-SIM

**Display:**

**Size:** 5.95 inches (151mm) diagonal

**Type:** HD IPS capacitive touchscreen, 16M colors

**Resolution:** 1440x720, 18:9 ratio

**System on Chip:** [Allwinner A64](#)

**RAM:** 2GB LPDDR3 SDRAM

**Internal Storage:** 16GB eMMC, extendable up to 2TB via microSD, supports SDHC and SDXC

**Back Camera:** Single 5MP, 1/4", LED Flash

**Selfie Camera:** Single 2MP, f/2.8, 1/5"

**Sound:** Loudspeaker, 3.5mm jack & mic (jack doubles as hardware UART if killswitch 6 is deactivated)

**Communication:** [EG25-G](#)

**LTE:** B2, B4, B5, B7

**WCDMA:** B2, B4, B5

**GSM:** 850, 1900 (MHz)

**WLAN:** Wi-Fi 802.11 b/g/n, single-band, hotspot

**Bluetooth:** 4.0, A2DP

**GNSS:** GPS/GLONASS/BeiDou/Galileo/QZSS, with A-GPS

**Sensors:** Accelerometer, gyro, proximity, ambient light, compass

**Killswitches:** Modem, Wifi & Bluetooth, Microphone, Cameras

**Battery:** [Lithium ion](#) Rated Capacity 2800mAh (10.64Wh), Typical Capacity 3000mAh (11.40Wh) (nominally replaceable with any Samsung J7 form-factor battery)

**I/O:** USB Type-C (SlimPort), USB Host, DisplayPort Alternate Mode output, 15W 5V 3A Quick Charge, follows USB PD specification

# PinePhone Board Information, Schematics and Certifications

- PinePhone Main Board Schematic:
  - ["Braveheart" PinePhone mainboard Schematic ver 1.1](#)
  - ["Braveheart" PinePhone mainboard component top placement drawing ver 1.1](#)
  - ["Braveheart" PinePhone mainboard component bottom placement drawing ver 1.1](#)
- PinePhone USB-C Small Board Schematic:
  - ["Braveheart" PinePhone USB-C small board Schematic ver 1.0](#)
  - ["Braveheart" PinePhone USB-C small board component top placement drawing ver 1.0](#)
  - ["Braveheart" PinePhone USB-C small board component bottom placement drawing ver 1.0](#)
- PINE A64 Certifications:
  - Not yet available

## Datasheets for Components and Peripherals

- Allwinner A64 SoC information:
  - [Allwinner A64 SoC Brief Introduction](#)
  - [Allwinner A64 SoC Data Sheet V1.1 \(Official Released Version\)](#)
  - [Allwinner A64 SoC User Manual V1.0 \(Official Release Version\)](#)
- X-Powers AXP803 PMU (Power Management Unit) information:
  - [AXP803 PMIC Datasheet](#)
- LPDDR3 (178 Balls) SDRAM:
  - [Artemis LPDDR3 Datasheet](#)
- CMOS Camera module information:
  - [PinePhone 5M Pixel Real CMOS Image Sensor Module](#)
  - [OV5640 5MP CMOS Image Sensor SoC for Rear Module Datasheet](#)
  - [PinePhone 2M Pixel Front CMOS Image Sensor Module](#)
  - [GC2145 2MP CMOS Image Sensor SoC for Front Module Datasheet](#)
- LCD Touch Screen Panel information:
  - [5.99" 1440x720 LCD IPS Panel Specification](#)
  - [ST7703 LCD Controller Datasheet](#)
- - [GOODiX GT917S Capacitive Touch Controller Datasheet](#)
- Lithium Battery information:
  - [PinePhone Lithium Battery Specification](#)
  - [PinePhone Lithium Battery ZCV Curve Chart](#)
- Wifi/BT module information:
- LTE module information:

- [Quectel EG25-G LTE Module Specification](#)
  - [EC25&EC21 AT Commands Manual](#)
- Sensors:
  - [ST LIS3MDL 3-axis Magnetometer Datasheet](#)
  - [InvenSense MPU-6050 Six-Axis \(Gyro + Accelerometer\) MEMS Datasheet](#)
  - [SensorTek STK3335 Ambient Light Sensor and Proximity Sensor](#)
- Digital Video to USB-C Bridge:
  - [ANX7688 Product Brief](#)
- Case information:
  - [PinePhone Case Exploded Diagram](#)
  - [PinePhone Back Battery Cover 3D file](#)

## Developer works

### Megous

[Getting start with PinePhone Hardware](#)

[State of development progress](#)

[PinePhone Technical News and Update, also applies to other Allwinner devices including PINE A64 SBC](#)

## Hardware Revisions

1. [Project Anakin](#)
2. ["Project Don't Be Evil" devkit](#)
3. [PinePhone v1.0 - Developer batch](#)
4. [PinePhone v1.1 - Braveheart](#)

## Hardware Addons

### [PinePhone Hardware Accessory Compatibility](#) list

List of devices working with the PinePhone (depending on OS support)

### USB-C Connector

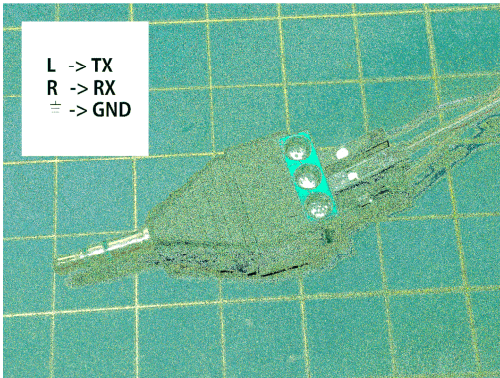
The USB-C can be used to power the device, and offers USB2 host and OTG possibilities, and also can make use of the USB-C capability to integrate HDMI signals. Some USB-C hubs are available that offer power throughput, USB connection, HDMI port and Ethernet connection. The driver that would make this connection available is not supported at this time.

### Pogo Pins

The PinePhone has 6 "pogo pins" on the back allowing for custom hardware extensions such as wireless charging or an IR blaster. The pogo pins provide access to an interrupt line, power input to charge the battery, 3.3v power source, and an I2C interface.

A step/stl/stp (3D model) file for the back cover is [freely available](#) for creating custom cases that interface with the pogo pins.

## Serial console



UART serial connector for PineBook and PinePhone

The PinePhone has a serial port in the headphone connector, it's activated by the 6th contact on the dipswitch. If the switch is on then the headphone connector is in audio mode, if it's off then it's in UART mode. This uart serial connection can also be used for communication with other devices from the PinePhone.

The uart is 115200n8

The pinout for the serial connector on the tablet side is:

- Tip: RX
- Ring: TX
- Sleeve: GND

The serial connection is 3.3V

You can also buy the debug cable from [PINE64 Store](#) The store cable uses a 4 ring plug, as seen in the [PDF](#), but a 3 ring plug works just as well. That cable uses a CH340 chipset based serial to USB converter, but any 3.3v serial connection can be used.

## Killswitch configuration

The PinePhone features six switches that can be used to configure its hardware. They are numbered 1-6, with switch 1 located nearest to the modem. Their on position is toward the top of the phone.



Photo of Brave Heart switches from OSAKANA TARO on Twitter

1. Modem: On enables 2G/3G/4G communication and GNSS hardware, off disables.
2. WiFi/BT: On enables Wi-Fi and Bluetooth communication hardware, off disables.
3. Microphone: On enables audio input from on-board microphones (not 3.5mm jack), off disables.
4. Rear camera: On enables the rear camera, off disables.
5. Front camera: On enables the front camera, off disables.
6. Headphone: On enables audio input and output via the 3.5mm audio jack, off switches the jack to hardware UART mode.

## Battery



The [supplied battery](#) is [meant to be](#) compatible with Samsung part number EB-BJ700BBC / BBE / CBE from the 2015 J7 phone. There is [a report](#) that the EB-BJ700CBE isn't quite the same size, causing the back not to fit properly.

The battery terminals, in order from nearest the edge to nearest the middle, are:

1. +ve
2. thermistor
3. -ve
4. not connected

The battery includes a protection circuit that isolates it in a number of fault conditions, including if it is discharged too far. The fully discharged battery [can be recharged](#) by connecting the phone to a charger. Once it has charged sufficiently you will be able to boot the phone.

If your battery is hard to remove from the phone, try loosening the screws around it. Possibly cutting up a piece of plastic and sliding it under the battery as a pull tab can work too.

**Your Brave Heart phone ships with a plastic sticker between the battery and the phone. You need to open the back cover (gently), then remove the battery and finally remove the sticker. This is to protect the device from turning on during shipping.**



Photo of Brave Heart case from OSAKANA TARO on Twitter





Photo of Brave Heart battery sticker from OSAKANA TARO on Twitter

There has been [a report on the forum](#) that this sticker can bend the pins that make connection between the battery and the phone: please check your setup carefully after removing the sticker.

**Note:** the EG25 modem and RTL8723CS wifi/bluetooth do not work without battery power, even if you are supplying enough power to the Pinephone with USB-C.

## Modem and Carrier Support

There is a document about using the modem by user *megi* [here](#). This is from circa 18 Jan 2020.

Note at this date there is no TL;DR version – the script at the end to disable the modem before power off is pretty essential to avoid corrupting your modem's flash memory.

To check if the PinePhone is supported on your carrier:

Search for your carrier on [frequencycheck.com](https://frequencycheck.com) and compare the carrier's LTE/GSM/WCDMA frequencies to the PinePhone's supported frequencies (listed under the [specifications](#) section).

It is likely that there will be a few frequencies that your carrier uses which are not supported by the PinePhone. Not all of the carrier's frequencies need to be supported by the PinePhone for it to work – as long as *most* of them are supported, you will still get good coverage.

## Factory Test Requirements

Most of the self tests should just work, but a couple of them will fail unless certain requirements are met.

### RTL8723CS – WiFi

- The self test needs a visible access point nearby so it can discover an SSID.
- The self test may fail if the battery charge is too low.

### EG25 – Modem

- A working micro-SIM that doesn't require a PIN to unlock
- Enough battery charge

## Operating Systems

The PinePhone will automatically boot from microSD if a bootable card is inserted. Although it is technically possible to use any ARM distro (because the PinePhone uses the mainline kernel), there are a few that are designed specifically for

The '[PinePhone Software Releases](#)' page has a complete list of currently supported Operating System images that work with the PinePhone as well as other related software information.

The list includes OS images and descriptions of:



[postmarketOS](#)



[Ubuntu Touch by UBPorts](#)



[Debian + Phosh](#)



[Maemo Leste](#)



[SailfishOS](#)



[Manjaro ARM](#)



[NixOS](#)



[LuneOS](#)



[Nemo Mobile](#)



[KDE Neon](#)



[Arch Linux ARM](#)



[Aurora](#)

## FCC ID: 2AWAG-PINEPHONE

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation



## **FCC compliance statement**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Important:** Changes or modifications to this product not authorized by Pine Store Limited could void the electromagnetic compatibility (EMC) and wireless compliance and negate your authority to operate the product. This product has demonstrated EMC compliance under conditions that included the use of compliant peripheral devices and shielded cables between system components. It is important that you use compliant peripheral devices and shielded cables between system components to reduce the possibility of causing interference to radios, televisions, and other electronic devices.

## **SAR Statement:**

This PINEPHONE meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health.

FCC RF Exposure Information and Statement the SAR limit of USA (FCC) is 1.6 W/kg averaged over one gram of tissue. Device types: PinePhone-Linux SmartPhone (FCC ID: 2AWAG-PINEPHONE) has also been tested against this SAR limit. This device was tested for typical body-worn operations with the back of the handset kept 10mm from the body. To maintain compliance with FCC RF exposure requirements, use accessories that maintain a 10mm separation distance between the user's body and the back of the handset. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.

## **Body-worn Operation**

This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 10mm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.