EarStudio: Manual

Buttons / LED / How to Connect / App Features / Factory Reset / DFU

Radsone Inc.
[Power Button]

Power On/Off

- **Power On:** Press & hold for more than 2 seconds
  - BLUE LED blinks once when power is on. “power-on sound” plays when it is on.
  - Automatically connects to a device that has been connected before. GREEN LED blinks once every 3 seconds after the “connection sound.”
  - Enters Discoverable Mode/Paring Mode when there’s no device that has been connected before. GREEN LED blinks twice every 0.5 seconds.

- **Power Off:** Press & hold for more than 4 seconds
  - RED LED blinks once right before power off. “power-off sound” plays when it is off.

Play/Pause

- **Play:** Press once
  - GREEN LED slowly blinks once every 3 seconds during Bluetooth/USB playback.

- **Pause:** Press once
Hands-free Calling

- **Receiving Incoming Call**: Press once
  - BLUE LED slowly blinks once every 3 seconds
  - “Call-receiving sound” when received.

- **Rejecting Incoming Call**: Press & hold for more than 2 seconds
  - “Call-rejection sound” when refused.

- **End Call**: Press once
  - “Call-end sound” when ended.

[Next Track Button]

Playback Control

- **Next Track**: Press once

Ambient Shortcut Key (F/W ver.1.1.4 or Over)

- **Ambient mode on/off**: Press & hold for more than 2 seconds
  - Only available during playback.
  - To use it, you must set 'Ambient Shortcut Key' to 'on' in the EarStudio app.

[Previous Track Button]

Playback Control

- **Previous Track**: Press once

Pairing mode

- **Enter Discoverable mode/Pairing mode**: Press & hold for more than 2 seconds
  - GREEN LED blinks twice every 0.5 seconds after “enter paring-mode sound.”
- Disconnects from the current connected device when entering this mode.

[Volume Up Button]

Volume Control

• **Volume Up: Press once/Press multiple times/Press&hold**
  - Volume increases by 0.5dB for each press.
  - Press&holding the button increases the volume consistently up to 6dB.

[Volume Down Button]

Volume Control

• **Volume Down: Press once/Press multiple times/Press&hold**
  - Volume decreases by 0.5dB for each press.
  - Press&hold the button decreases the volume consistently down to -60dB.
  - Pressing the button at the minimum volume turns to a mute level.
Discoverable mode / Pairing mode: GREEN - Blinks twice every 0.5 sec.
Bluetooth Connected: GREEN - Blinks once every 3 sec.

Incoming Call: BLUE - Blinks 3 times every 2 sec.
Outgoing Call: BLUE - Blinks 3 times every 2 sec.
Active Call: BLUE - Slowly blinks once every 3 sec.

Bluetooth Playback: GREEN - Slowly blinks once every 3 sec.
USB Playback: GREEN - Slowly blinks once every 3 sec.

Battery Low: RED - Maintains the regular LED pattern. The LED-off phase changes to RED
Charging: RED - Maintains the regular LED pattern. The LED-off phase changes to RED.
Charging Complete: GREEN - Maintains the regular LED pattern. The LED-off phase changes to GREEN.

(Ex. LED changes during Bluetooth playback:
   GREEN LED slowly on - LED Off repeats every 3 seconds.
   LED changes during Bluetooth playback while battery low state:
   GREEN LED slowly on - RED LED repeats every 3 seconds.)
[How to Connect]

[Connecting Bluetooth]

1. Turn on EarStudio (Press Power button for 2 seconds)

2. Once the power is turned on, it automatically enters into Pairing mode. GREEN LED blinks twice every 0.5 seconds during Pairing mode. Then, select EarStudio from the Settings from the Smartphone.

   (When EarStudio is already connected to the other Smartphone and when it is not in Pairing mode, please press the Previous Track Button for over 2 seconds to enter into Pairing mode)
3. When it is successfully connected, EarStudio appears on the list of MY DEVICES. It is now able to play audio streaming is through Smartphone music/video player.

※ WARNING (iOS only)
From the list of MY DEVICES, ‘i’ button behind ‘Connected’ means connection available for Audio Streaming, “Connected” without ‘i’ button means connection available for App Control.

If you only have a connection to app control, you can not play music/movies on your Smartphone with EarStudio.
[App Connection]

1. Menu button on the top left - DEVICE SEARCH

2. Select EarStudio from the list.
3. Press Power button once, when Device Authentication window appears on the screen.

![Device Authentication Window](image)

4. When the connection is successfully completed, the App screen is activated. You can now control your EarStudio settings with the App.

![App Screen](image)
[App Features]

[Menu]

- **Tone Volume (EarStudio F/W ver.1.1.3 or Over / App ver 1.0.9 or Over)**
  - You can adjust the tone volume of EarStudio.(Power On/Off, Connected, etc.)
  - If you click the ‘Test Tone Play’ button, test tone is played at the currently set volume.

- **LED Option (EarStudio F/W ver.1.2.2 or Over / App ver 1.5.0 or Over)**
  - Able to set LED color.
[Home Tab]

- **Bluetooh Option**

- **Buffer Length (EarStudio F/W ver.1.2.1 or Over / App ver 1.4.0 or Over)**
  - Shorter buffer can reduce little amount of the latency, but it may cause audio lag in poor RF environment. The buffer length of 7 or higher is strongly recommended for seamless audio streaming.
  - The buffer length option is available only when Bluetooth audio streaming is not active.

- **Codec Option (EarStudio F/W ver.1.1.8 or Over / App ver 1.2.0 or Over)**
  - Codec option provides an auxiliary way to limit the choice for the transmitter, and to have preferred codec for the user.
  - The selection of the active codec entirely depends on the transmitter’s (SmartPhone) policy.

- **HD Jitter Cleaner**
  - HD Jitter Cleaner enhances the phase accuracy, removing the additional jitter caused by the inter clock mismatch between source and sink devices.
  - Able to set the values for Bluetooth playback and USB playback separately.

- **USB Connection Option**
• **Battery care (EarStudio F/W ver.1.3.0 or Over / App ver 1.6.0 or Over)**
  
  : The battery would be charged up to 80~90% only depending on the condition. This could help maximize the battery life.

• **Charger mode (EarStudio F/W ver.1.2.0 or Over / App ver 1.3.0 or Over)**
  
  - **Normal Mode**
    : When connected/disconnected to USB charger or Host PC, ES100 will reset the system automatically.
  
  - **Auto Power Off when Charger Connected**
    : When connected to USB charger, ES100 will be turned off. When connected to Host PC, ES100 will stay turned on as a USB DAC.
  
  - **Auto Power Off when Charger Disconnected**
    : When disconnected to USB charger or Host PC, ES100 will be turned off. For a dedicated preamplifier use case to Car Aux-in, this mode turns on and off ES100 upon the presence of USB power source from the vehicle.

• **Power Mode**
  
  - EarStudio's USB Power Mode can be set to Self-Powered Mode.
    Use it when USB Host requires Self-powered Mode when connecting to an iPhone using an Apple Camera Kit
  
  - When Battery is low, the Self-Powered mode is automatically released when the USB cable is connected.

  ❗️ **WARNING**
  
  In Self-Powered mode, EarStudio will not charge even when the charger is connected, so you must manually set it to Normal Mode before charging.

• **Output Mode**

![Output Mode](image-url)
- 3.5mm/2.5mm Output Modes PDF Link

- 2.5mm Pin-out Configuration

Pin-out Configuration for the 2.5mm Full-differential Port: R− / R+/ L+ / L−, starting from the tip of the jack as shown above.

- WARNING

ES100 2.5mm Balanced Output can be interfaced only with the balanced input.
- Do NOT connect ES100 2.5mm Balanced Output to any aux-in port or RCA input, which is unbalanced.
- Do NOT connect your 3.5mm single-ended cable to ES100 2.5mm Balanced Output.

Both of connections above would short L− and R− amplifier output of ES100 and eventually, damage the amplifier.

- Analog Volume

- Volume Control PDF Link

- EarStudio’s Hardware Volume

- Able to set the volume during a call and during music play separately.
  Audio volume during a call can be controlled only during a call.

- Device Volume Control
• **Channel Trim Volume (EarStudio F/W ver.1.3.1 or Over / App ver 1.7.0 or Over)**
  - Able to adjust L/R channel trim volume.

• **Output Level Estimation (App ver 1.7.1 or Over)**
  - You can monitor the ES100 output voltage and the translated version of the voltage in [dBu] and [dBV] format.
  - Or if you're using ES100 as a headphone amplifier, you can monitor how loud you're listening to music with the estimated sound pressure level in [dB SPL].
  - To get the precise output level estimation, you need to have the source volume at the maximum.

• **Source Volume**
  - When USB Streaming is playing, the volume of the USB Host is displayed. Otherwise, the Smartphone Volume is displayed.
  - USB Source Volume cannot be controlled on the App.
  - Keep the source volume at the maximum level for the best audio performance.
• **Microphone Volume while on a call**

- Able to control while on a call.
- While on a call with EarStudio, the Source Volume is automatically changed to control Microphone Volume.
- Setting Preamp on increases the volume by 21dB.

• **Microphone Loopback while on a call (EarStudio F/W ver.1.2.0 or Over / App ver 1.3.0 or Over)**

- Able to control while on a call.
- The voice call loopback gain controls the amount of sound that is directly fed to the audio output from the microphone.
[Equalizer Tab]

- Equalizer

- There are 12 basic Presets and 4 User Presets that can be set by the user.
- To save the User Preset, move the slider to the desired value and press User Preset button for 3 seconds or more.
- You can change preset name when saving.
[Sound Control Tab]

- **DCT**
  
  DCT eliminates subtle digital noise inherent in all digital sound sources and restores sound details to provide music with originally intended sound quality. The higher the level, the greater the DCT intensity.

- **Crossfeed (EarStudio F/W ver.1.2.0 or Over / App ver 1.3.0 or Over)**
  
  Crossfeed simulates the loudspeaker listening environment, mixing the left and right channels based on the head-related transfer functions (HRTFs).

- **DAC Digital Filter**
  
  Able to set Digital filter of the built-in AK4375a DAC.
  
  Sharp Roll-off: Pre and post echoes make powerful sound.
Slow Roll-off : Minimal echo reproduces original sound.
Sharp Delay Sharp Roll-off : Post echo enhances bass sound.
Slow Delay Sharp Roll-off : Minimal echo reproduces original sound.

- **DAC Over Sample Rate (EarStudio F/W ver.1.1.4 or Over / iOS App ver 1.1.0 or Over / Android App ver 1.1.2 or Over)**

  - Able to set Over Sampling Rate of the built-in AK4375a DAC.
[Ambient Sound Tab]

- Ambient Sound

  - In the Ambient mode, DSP mixes up streamed music over Bluetooth and ambient sound captured from the built-in microphone of EarStudio.

  - Music Only : music only. ambient sound 0%.
  - 50% : music (50%) + ambient sound (50%)
  - Ambient Only : ambient sound only. music 0%

- It can be useful when you are on a bicycle or to catch an announcement on the subway or so.

- Ambient Sound Microphone Volume

  - Able to adjust the volume of the Ambient Sound before the DSP mixer. The larger the volume, the louder the sound captured by the microphone.
  - Setting Preamp on increases the volume by 21dB.
  - Not the same as Microphone volume during a call.
- You can control whether or not to use the ‘Ambient Shortcut Key’.
- When set to on, press and hold the ‘Next Track Button’ to turn Ambient Mode on or off.
- The ‘Ambient Shortcut Key’ is only available during playback.
[Factory Reset]

- Press & hold vol+ / vol- / track<< / track>> 4 buttons together and then make USB connection while still holding the 4 buttons.
  - Unlike normal reset state, GREEN LED comes first and then blinks.

- Disconnect and then reconnect EarStudio with USB.
  - As in normal reset state, BLUE LED comes first and then GREEN LED blinks.
[Device Firmware Upgrade]

※ DFU is a feature to update ES100's firmware. The latest firmware can be downloaded from https://www.radsone.com/earstudio. For more detailed firmware update procedure including the description below, please refer to a document in the "DFU user's guide" folder.

※ Please check the USB cable
- The USB cable must support data communication.
- If you connect ES100 to any PC through proper USB data cable in normal mode (not in DFU mode), you should see ‘EarStudio USB DAC’ in the device list. Otherwise, the USB cable does not support USB Data communication.

[Windows]

1. ES100 DFU Prepare
   - Download and unzip on local hard drive the latest update archive for EarStudio.
     - Package
       ES100_Firmware.bin (firmware)
       ES100_DeviceFirmwareUpgrade (macOS tool)
       run_macOS.sh (macOS tool)
       ES100_DeviceFirmwareUpgrade_win32.exe (windows tool)
       ES100_DeviceFirmwareUpgrade_win64.exe (windows tool)
       run_win32.bat (windows tool)
       run_win64.bat (windows tool)

2. Entering DFU mode
   - While press-and-holding the Power Button, connect EarStudio to PC through the USB data cable.
- LED will be off, if entered DFU mode successfully.

3. Run batch file
   - Run "run_win32.bat" or "run_win64.bat"
     - Press "Enter" key and “Found device” should be displayed.
     - Enter "y"
     - Wait while DFU is in progress.

   EarStudio will reset automatically when DFU is finished.
   - Keep the device connected until getting the message: “Firmware update completed / Device restarting”

[macOS]

1. Install Homebrew
   - Homebrew is a package manager for macOS for installing libusb easily.
   - Open terminal, copy and paste below:
2. Install libusb

- Once you have home-brew installed successfully on your Mac, you can install libusb with a single instruction.
- Copy and paste below:
  - brew install libusb

3. ES100 DFU Prepare

- Download and unzip on local hard drive the latest update archive for EarStudio.
  - Package
    - ES100_Firmware.bin (firmware)
    - ES100_DeviceFirmwareUpgrade (macOS tool)
    - run_macOS.sh (macOS tool)
    - ES100_DeviceFirmwareUpgrade_win32.exe (windows tool)
    - ES100_DeviceFirmwareUpgrade_win64.exe (windows tool)
    - run_win32.bat (windows tool)
    - run_win64.bat (windows tool)

4. Entering DFU mode

- While press-and-holding the Power Button, connect EarStudio to PC through the USB data cable.
  - LED will be off, if entered DFU mode successfully.

5. Run shell script file

- Open terminal and go to the unzipped ES100 DFU folder.
  - cd [Folder path]
  - ex) cd Downloads/v1.x.x

- Execute "/run_macOS.sh"
  - Press "Enter" key and **Found device** should be displayed.
  - Enter "y"
- Wait while DFU is in progress.

How to enter DFU Update mode through USB.
- Press and hold Power button and ,
- Connect EarStudio to Windows PC through USB data cable.
- LED will be off, if entered DFU mode successfully.
Press ENTER to continue

- EarStudio will reset automatically when DFU is finished.
- Keep the device connected until getting the message: “Firmware update completed / Device restarting”