

USBSID-Pico PCB firmware manual

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Disclaimer

I do this stuff in my free time for my enjoyment. Since I like to share my joy in creating this with everyone I try my best to provide a working PCB and Firmware. I am in no way an electronics engineer and can give ***no guarantees*** that this stuff does not break or damage your hardware, computer, phone, or whatever you try to hook it up to. Be sure to take great care when inserting any real MOS SID chips into the board. While everything has been tested with real chips, this is in no way a guarantee that nothing could go wrong. Use of this board and firmware at your own risk! I am in no way responsible for your damaged hardware. That being said, have fun!

Firmware types



Each PCB revision is the firmware designator, please check your PCB revision, this is under the MOS logo and next to **USBSID-Pico** on your PCB.

Firmware filenames contain the PCB revision number e.g. `usbsidpico-rgb-v1.X.uf2` is for PCB revision **v1.0** and for use with a black clone Pico containing an RGB LED.

Firmware naming

Below are the filenames used for each Pico and board type, take great care in selecting the correct file for your Pico!

WARNING! Do *NOT* use the **RGB** firmware for any of the (non black) rp2040 or (non black) rp2350 Pico boards that do not contain an RGB LED, this can break your Pico!

Board revision

The 1.X in each filename equals for the PCB revision as mentioned under firmware types. Don't worry if you flash a firmware for the incorrect PCB revision, this causes no harm.

Firmwares for the rp2040 Pico1

Firmware naming suited for the pico 1 always start with `usbsidpico-`
`usbsidpico-v1.X.uf2` for regular green rp2040 Pico boards.

`usbsidpico-rgb-v1.X.uf2` for black clone rp2040 Pico boards with RGB LED onboard.

`usbsidpico_w-v1.X.uf2` for regular green rp2040 PicoW boards.

Firmwares for the rp2350 Pico2

Firmware naming suited for the pico 2 always start with `usbsidpico2-`

[usbsidpico2-v1.X.uf2](#) for regular green rp2350 Pico2 boards.

[usbsidpico2-rgb-v1.X.uf2](#) for black clone rp2350 Pico2 boards with RGB LED onboard.

[usbsidpico2_w-v1.X.uf2](#) for regular green rp2350 Pico2W boards.

Firmwares with Cynthcart embedded

Starting with firmware version v0.6.0-BETA firmwares ending with [_em](#) have an embedded emulator running Cynthcart.

For example [usbsidpico-v1.0_em.uf2](#) or [usbsidpico2-rgb-v1.3_em.uf2](#)

See the [USBSID-Pico-Cynthcart-manual](#) file for more information.

Firmwares with embedded USBSID-Player

Starting with firmware version v0.6.0-BETA firmwares ending with [_sp](#) have an embedded emulator that can play PSID and RSID tunes and PSID64 PRG/P00 files.

For example [usbsidpico2-v1.0_sp.uf2](#) or [usbsidpico2-v1.3-rgb_sp.uf2](#)

This USBSID-Player is still in active development and some tunes might not work or play at all.

The embedded USBSID-Player requires more than 256KB RAM and an overclocked CPU which makes this firmware only available for rp2350 Pico2 boards.

See the [USBSID-Player-manual](#) file for more information.

How to flash your Pico

NOTE:

When flashing a new firmware version, all previously configured settings will be reset to default.

Use the commandline configtool to save your current settings to a [ini](#) file if you want to save them!

A Raspberry Pi Pico board is incredibly easy to flash, as it comes with a built in bootloader for flashing new firmwares in the [uf2](#) format.

In order to flash a new firmware to your USBSID-Pico you will need to put the Pico into bootloader mode.

This can be done in multiple ways:

With the cable already plugged into your computer and Pico and seated on the board (using buttons):

- Press and hold the [BOOTSEL](#) button on the Pico.
- Press and release the [RST](#) button on the USBSID-Pico board.
- Now release the [BOOTSEL](#) button.
- A new drive should appear on your computer called [RPI-RP2](#) or [RP2350](#) depending on your Pico type.
- Copy the correct [uf2](#) firmware file to this directory.
- After copying the Pico will reboot and your Pico is flashed.

With the cable not plugged in to your computer and Pico and also not seated on the board (using buttons):

- Plug in the USB cable to your Pico and not into your computer.
- While holding the **BOOTSEL** button on the Pico plugin the other end of the USB cable into your computer.
- Now release the **BOOTSEL** button.
- A new drive should appear on your computer called **RPI-RP2** or **RP2350** depending on your Pico type.
- Copy the correct **uf2** firmware file to this directory.
- After copying the Pico will reboot and your Pico is flashed.

With the cable already plugged into your computer and Pico seated on the board (using software):

- Go to the config webpage (usbsid.loudai.nl/index.html?player=webusb&debug=usbsidpico):
- Connect to the board using **WebUSB (Hermit)** as emulator
- Click on **Open config**
- Scroll to the bottom of the page and click on **Bootloader** in the box marked **other**
- A new drive should appear on your computer called **RPI-RP2** or **RP2350** depending on your Pico type.
- Copy the correct **uf2** firmware file to this directory.
- After copying the Pico will reboot and your Pico is flashed.

or

- With the CLI config tool command in your **PATH** variable
- Type **cfg_usbsid -boot** to send the reboot to bootloader command
- A new drive should appear on your computer called **RPI-RP2** or **RP2350** depending on your Pico type.
- Copy the correct **uf2** firmware file to this directory.
- After copying the Pico will reboot and your Pico is flashed.

Firmware configuration

USBSID-Pico has an extensive set of configuration options that expands with each firmware release.

Configuration tool

You can configurate your board by using the commandline config-tool or together with the Python Configuration GUI by ISL/Samar if you prefer a GUI.

GUI downloads

[Download script](#)

Python3 → [Download](#)

TkInter → [Installation guide](#)

And either one of the Linux or Windows CLI downloads below

Linux / Windows downloads

The latest version of the config tool is available in a zip file called [tools.zip](#) from release v0.6.0-BETA and up

Windows downloads

If the DLL's are missing from the zip file you can always download them from here:

[Download DLL 1](#)

[Download DLL 2](#)

Configuration web page (for Chrome/Edge based browsers using webusb)

[USBSID web configuration tool](#) (requires a Chrome based browser).

If needed you can change your USBSID configuration after selecting WebUSB and clicking on [Open config](#).

The player is set up with borrowed code from Deepsid using Hermit's JsSID implementation.

Debug functions

For additional testing there are some debug functions available on the [usbsid.loudai.nl/?player=webusb&debug=usbsidpicoUSBSID](#) Debug site (requires a Chrome based browser).

Default configuration

Each firmware version comes with the same default configuration.

An explanation for these settings can be found further on in this document.

Board clock rate: **1000000Hz**

Clock rate locked: **False**

Audio mode: **Mono**

Socket One Enabled: **True**

Socket One Dualsid enabled: **False**

Socket One Chiptype: **Real**

Socket One Clonetype: **Disabled**

Socket One SID 1 type: **UNKNOWN**

Socket One SID 1 type: **N/A**

Socket Two Enabled: **True**

Socket Two Dualsid enabled: **False**

Socket Two Chiptype: **Real**

Socket Two Clonetype: **Disabled**

Socket Two SID 1 type: **UNKNOWN**

Socket Two SID 1 type: **N/A**

Socket Two Act as One: **False**

LED Enabled: **True**

LED Idle breathe enabled: **True**

RGBLED Enabled: **False** (True for RGB Pico's)

RGBLED Idle breathe enabled: **False** (True for RGB Pico's)

RGBLED Brightness: **0** (127 for RGB Pico's)

RGBLED SID to use: **-1** (1 for RGB Pico's)

CDC Enabled: **True**

WebUSB Enabled: **True**

Asid Enabled: **True**

Midi Enabled: **True**

FMOpl Enabled: **False**

FMOpl SID no: **0**

Board clock rate

The Commodore64 has different clockrates depending on where you live, USBSID-Pico supports these different clock rates as configuration setting.

Supported SID players will automatically send a new clock rate request to the board to switch to.

Available options are:

DEFAULT 1000000Hz, PAL 985248Hz, NTSC 1022727, DREAN 1023440, NTSC2 1022730

Clock rate locked

Some players start sending data directly after the clockrate is changed. While in most cases this is no issue, some SID clones need some time to start up. This causes issues when the clock rate is changed on the fly.

Also changing the clock rate multiple times after another can cause data corruption to the SID which causes garbled sound.

To overcome this it is possible to lock the clockrate to the current setting it is set to. This blocks the ability for on the fly change requests.

Available options are:

`False`, `True`

Audio mode

PCB revision v1.3 only

Sets the audio mode for the headphone jack and audio out pins.

When set to `Mono` the audio of both SID sockets will be combined to mono.

When set to `Stereo` the audio of both SID sockets will be separated into left for `SID1` and right for `SID2`

Available options are:

`Mono`, `Stereo`

Socket settings

Each socket comes with its own set of configurable options.

Socket One/Two Enabled

Enable or disable the use of this socket.

Available options are:

`False`, `True`

Socket One/Two Dualsid enabled

Enable or disable dualsid for this socket.

This requires the `Chiptype` for this socket to be set to `Clone` and ofcourse a dual SID supporting SID clone with support of connecting the A5 address line.

Available options are:

`False`, `True`

Socket One/Two Chiptype

Set the type of SID chip for this socket.

Available options are:

`Real`, `Clone`, `Unknown`

Socket One/Two Clonetype

This config setting is intended for future use Available options are:

`Disabled`, `Other`, `SKPico`, `ARMSID`, `FPGASID`, `RedipSID`

Socket One/Two SID 1 type

This config setting is intended for future use Available options are:

`Unknown`, `N/A`, `MOS8580`, `MOS6581`, `FMOp1`

Socket One/Two SID 2 type

This config setting is intended for future use Available options are:

Unknown, N/A, MOS8580, MOS6581, FM0p1

Socket Two Act as One

When enabled, this will disable other Socket Two settings and this socket will receive all writes from Socket One as it were mirrored.

Available options are:

False, True

LED Enabled

Disable or enable the use of the onboard LED.

When enabled this automatically enables the LED as Vu meter for the voices of **SID1**.

Available options are:

False, True

LED Idle breathe enabled

Disable or enable the idle breathing effect for the onboard LED.

Available options are:

False, True

RGBLED Enabled

Only for black Pico clones with onboard RGB LED

Disable or enable the use of the onboard RGBLED.

When enabled this automatically enables the RGBLED as Vu meter.

Available options are:

False, True

RGBLED Idle breathe enabled

Only for black Pico clones with onboard RGB LED

Disable or enable the idle breathing effect for the onboard RGBLED.

Available options are:

False, True

RGBLED Brightness

Only for black Pico clones with onboard RGB LED

Set the maximum brightness of the onboard RGBLED.

Available range is:

0 to 255

RGBLED SID to use

Only for black Pico clones with onboard RGB LED

Set the SID of which to use the voices for the Vu meter.

Available options are (depending on your SID configuration):

-1 off, 0 off, 1 SID1, 2 SID2, 3 SID3, 4 SID4

FMOpl Enabled

Requires a SID clone with FMOpl capabilities, the socket `Chip type` set to `Clone` and `SID type` set to `FMOpl` before activation!

Available options are:

`False`, `True`

FMOpl SID number

This setting cannot be changed manually This setting will automatically be set to the correct SID number when all requirements are met as described under [FMOpl Enabled](#)

CDC Enabled

This config setting is intended for future use Available options are:

`False`, `True`

WebUSB Enabled

This config setting is intended for future use Available options are:

`False`, `True`

Asid Enabled

This config setting is intended for future use Available options are:

`False`, `True`

Midi Enabled

This config setting is intended for future use Available options are:

`False`, `True`

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