USBSID-Pico PCB firmware manual

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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 board type, take great care in selecting the correct file for you Pico!

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

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

`usbsidpico-v1.X.uf2` for Pico1 regular green rp2040 Pico boards.

`usbsidpico-rgb-v1.X.uf2` for Pico1 black clone rp2040 Pico boards with RGB LED onboard.

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

`usbsidpico2-v1.X.uf2` for Pico2 regular green rp2350 Pico2 boards.

`usbsidpico2_w-v1.X.uf2` for Pico2W regular green rp2350 Pico2W boards.

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 and 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 (linux) 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. At this point in time you can change the settings to your liking by using the configuration webpage or the CLI config tool for linux.
webpage: usbsid.loudai.nl/index.html?player=webusb&debug=usbsidpico

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, FMOpl

Socket One/Two SID 2 type

This config setting is intended for future use Available options are:
Unknown, N/A, MOS8580, MOS6581, FMOpl

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`

Config tools

t.b.d.

Configuration web page

t.b.d.

CLI Configuration tool (linux)

t.b.d.

CLI Configuration tool (Windows)

t.b.d.

Multiplatform Configuration GUI

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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!

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