Blackaddr Audio

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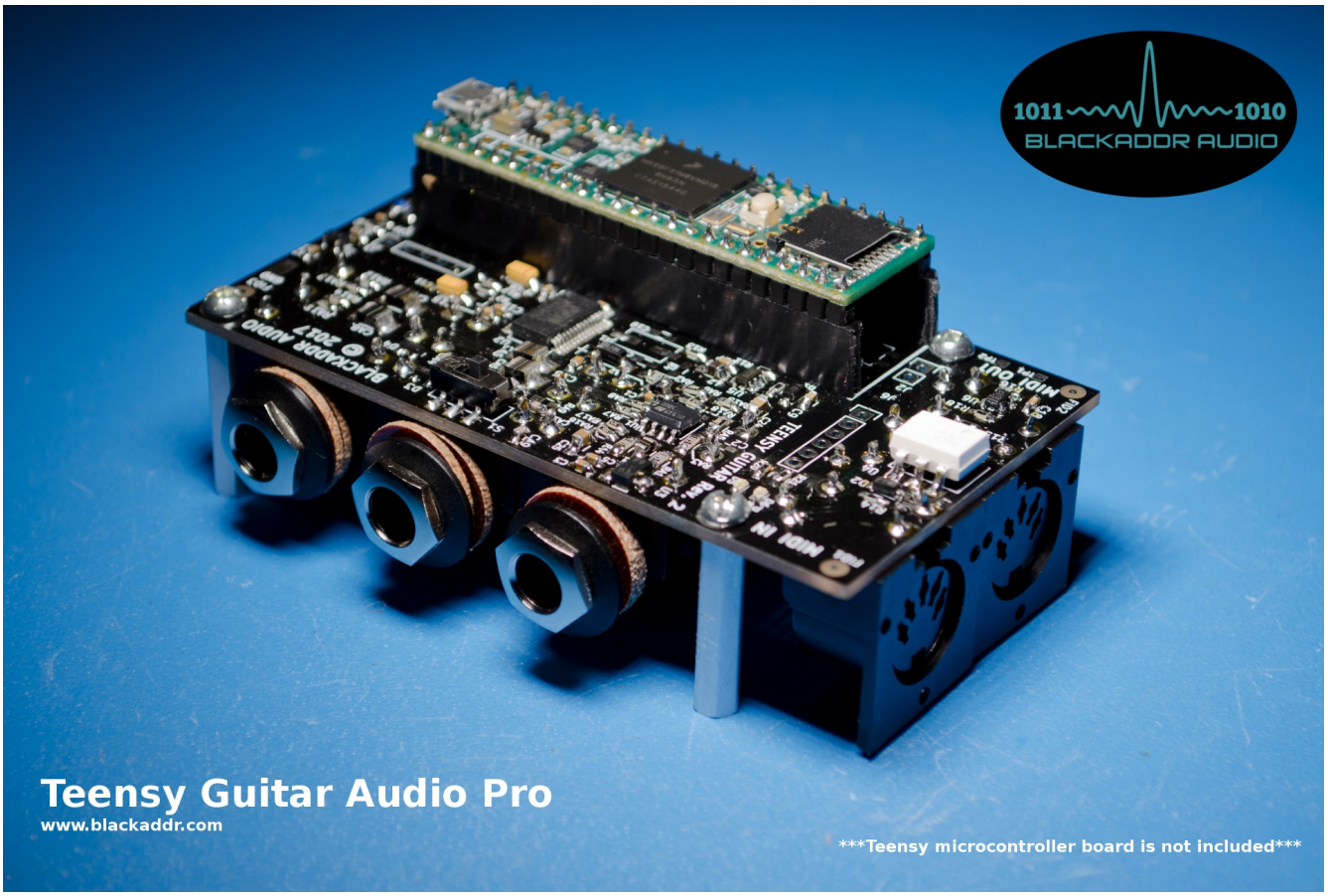
Guitar Teensy Audio Series

GTA Pro

User Guide v1.0



Revision History

V0.9 - 9/17/2017 – Initial Release

v1.0 – 11/01/2017 – Added hints on avoiding ground loop noise

Operating Instructions

WARNING:

The TGA Pro contains electro-static-discharge (ESD) sensitive components, as does the Teensy when installed. Avoid directly touching the electronic components on the board whenevever possible. Always install and touch one of the metal standoffs while handling the board.

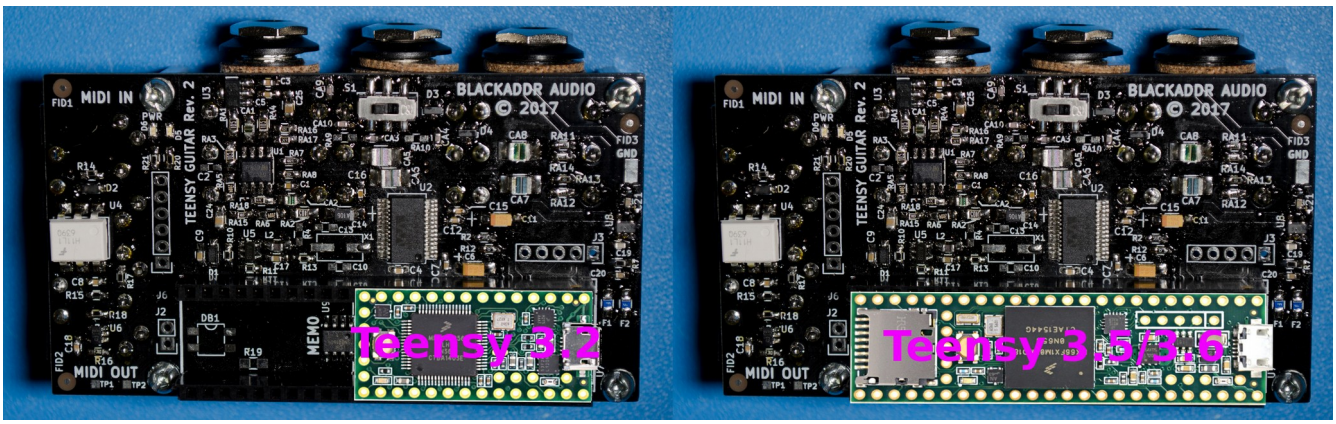
TIPS FOR OPTIMAL AUDIO QUALITY

The TGA Pro is designed to prevent digital signals generated on the board from coupling into the analog signals. However, it is not easy to prevent ground noise from other equipment from getting into the analog ground. This usually happens through ground loops caused by the common ground in household wiring. This is why audio equipment with balanced line-level signals include a ground lift button.

The following tips can be used to reduce noise in audio equipment using unbalanced signals such as guitar pedals, amps and the TGA Pro.

- Plug all audio gear into the same outlet/power bar as the computer providing the USB connection to your Teensy. Using different wall outlets for the computer and your guitar gear can create large ground loops.
- When programming/debugging your Teensy programs, connect the Teensy to the PC or laptop host. Once programmed, power the Teensy with a micro-USB cellphone charger to avoid ground noise caused by the computer.
- If using a laptop with your Teensy, disconnect the laptop battery charger and run the laptop on it’s own battery. This will also reduce ground loops within the household wiring.

Compatability



The TGA Pro is designed to work with the following boards from PJRC (www.pjr.com)

- Teensy 3.2
- Teensy 3.5
- Teensy 3.6

Software

The BAGuitar Library used to control and configure the GTA Pro can be downloaded from:

https://github.com/Blackaddr/BAGuitar

Installing the Teensy PCB onto the GTA Pro

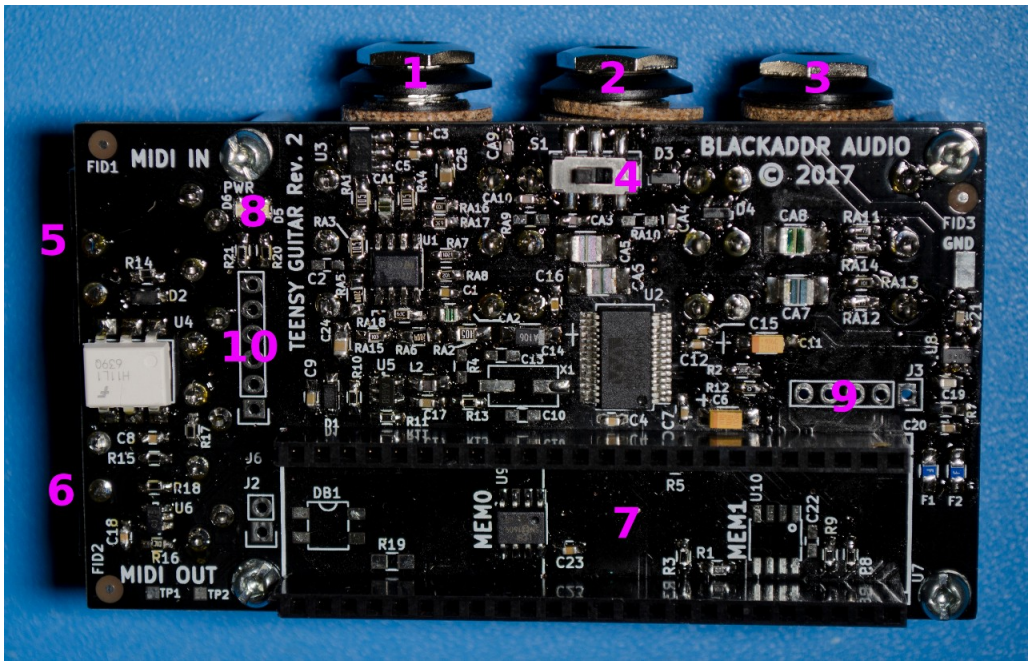
Get to know your GTA Pro before installing a Teensy board.

Install your Teensy microcontroller board into the socket. The Teensy board must have square shaped, 0.1” male pins to insert correctly. It is very important to make sure the Teensy PCB is aligned correctly. **Failure to align the pins correctly (accidentally shifted to the right or the left) can cause permanent damge to both the Teensy PCB and the TGA Pro**. The Teensy should be installed by aligning the rightmost pins on the Teensy board with the right most socket pins when the USB connector is on the side shown below.

GTA Pro Legend

Get to know your GTA Pro!

1. Audio Input
2. Dry Output
3. Audio Output
4. Preamp Gain Switch
5. MIDI Input
6. MIDI Output
7. Teensy Socket
8. LEDs
9. J3 GPIO Header
10. J6 GPIO Header



1. Audio Input

Stereo TRS, unbalanced input. Plug your guitar in to this jack. Also will work with line-level sources. When no plug is inserted, both channel inputs are grounded automatically.

Input impedance: ~ 1M

Voltage Max: 9V peak-to-peak

2. Dry Output - Instrument

Stereo TRS, unbalanced output. This is the output of the analog preamp before going to the CODEC, but after the first-stage anti-aliasing filter. The preamp is is powered by +9V, just like a guitar pedal, and is capable of achieving approximately 6 Vpp. *This output is safe to drive guitar pedals and guitar amps, but should only be connected to line-level inputs if a line-level device is connected to the Audio Input jack.*

Output impedance: ~ 1K

Voltage Range: ~6V peak-to-peak maximum

3. Audio Output

Stereo TRS, unbalanced output. This is the analog output of the stereo codec's digital-to-analog coverter (DAC). It is suitable to drive line-level, guitar pedal, or guitar amp inputs.

Output impedance: ~ 100Ohm

Voltage Range: 1.0V RMS

4. Preamp Gain Switch

This switch selects the gain of the high-impedance preamp. Preamp gain is either 0dB (unity) or +12dB gain.

5. MIDI Input

This jack is a MIDI compliant 5-pin jack. The on-board MIDI phy converts MIDI signals to the correctly levels to be received by the Teensy UART. The Teensy software library has built in MIDI support though this port. See the BAGuitar Library demos for more details.

6. MIDI Output

This jack is operated at 3.3V, and is designed to be compliant with MIDI outputs using the voltage level. It is safe to connect to any MIDI input, regardless of whether that circuit operates at 3.3V (modern) or 5V (vintage). The MIDI output phy is driven by the Teensy UART. The Teensy software library has built in MIDI support through this port. See the BAGuitar Library demos for more details.

7. Teensy Socket

Install your Teensy microcontroller board in this socket. The board must have square shaped, 0.1" male pins to insert correctly. It is very important to make sure the Teensy PCB is aligned correctly. Failure to

align the pins correctly (accidentally shifted to the right or the left) can cause permanent damge to both the Teensy PCB and the TGA Pro. Use the images below as a guidelines.

8. LEDs

Two LEDs are installed on the TGA Pro. One is BLUE, and will illuminate whenever 3.3V power is received from the Teensy board. The other is GREEN, and is user controllabe by software running the Teensy. See the GTA Pro schematic, and BAGuitar Library for more details.

9. J3 GPIO Header

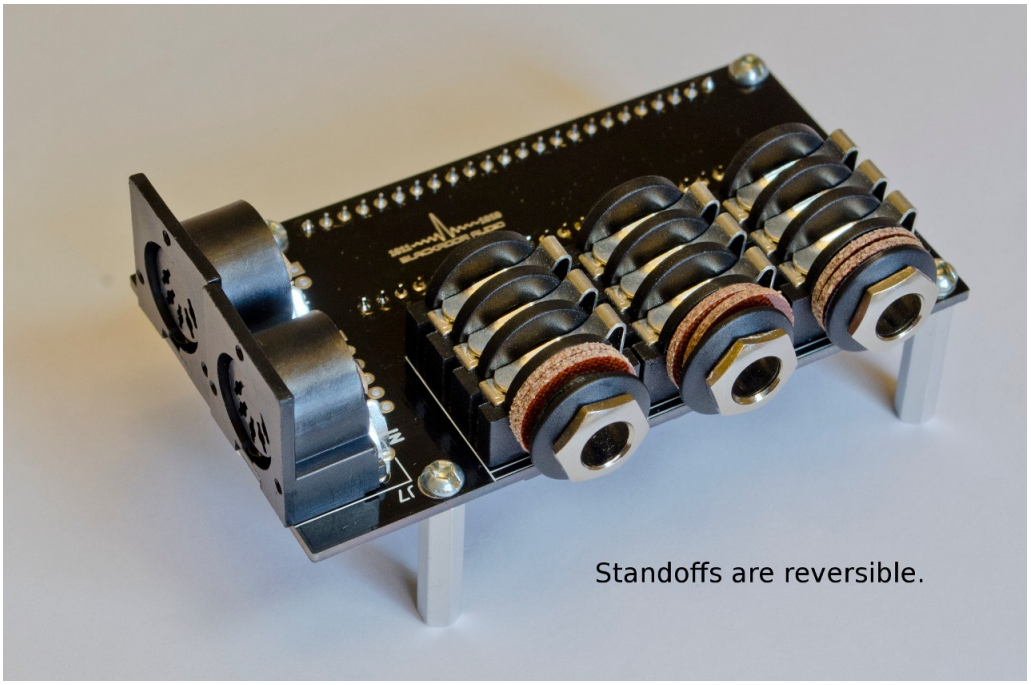
Contains 4-user controllable pins from the Teensy. See the GTA Pro Schematic for details. This pins operate at 3.3V.

10. J6 GPIO Header.

Contains 4-user controllable pins from the Teensy. See the GTA Pro Schematic for details. This pins operate at 3.3V.

Using your GTA Pro

It is recommended to install the standoffs such that the ESD sensitive components are hidden underneath. This makes handling easier when inserting and removing plugs.



*** If you wish to have full control over the TGA Pro, install the BAGuitar Library by downloading it from the Github link at installing it into your Arudino IDE as an ‘additional Library’ by importing a ZIP file.

https://www.arduino.cc/en/Guide/Libraries

1. Insert the Teensy PCB as shown previously in this User Guide.

2. Plug a USB cable into the Teensy PCB.

3. Plug the other end of the USB into your computer.

4. Launch the Arduino IDE and program. If you installed the BA Guitar Library you can access the provided examples from with the IDE. Additional Libraries will be found at the very bottom of the list.

Help & Troubleshooting

Help with the Arduino IDE and Teensy PCB programming can be obtained from the PJRC Forums.

https://forum.pjrc.com/

Contact

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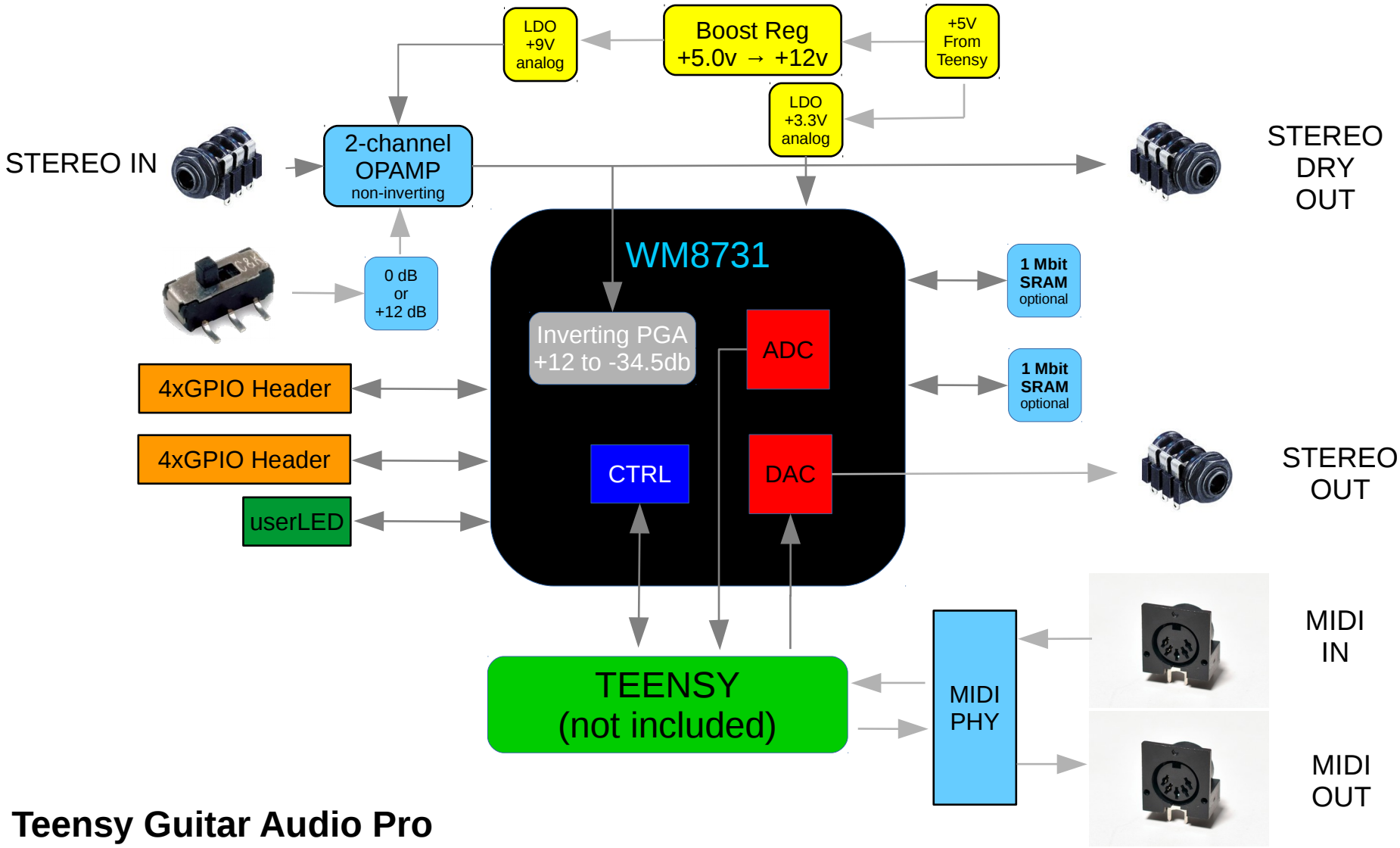

Teensy Guitar Audio Pro

- can run entirely off Teensy USB power (preamp runs off clean 9V LDO)
- Neutrik 1/4” jacks
- 2 channel input, 2 channel output
- 2 channel buffered analog (dry) out
- 8 GPIOs via headers
- 1 user controllabled LED
- Preamp (opamp) with dual gain (0dB or +12dB)
- Overal analog gain +24dB to -34.5dB
- External MIDI via DIN jacks

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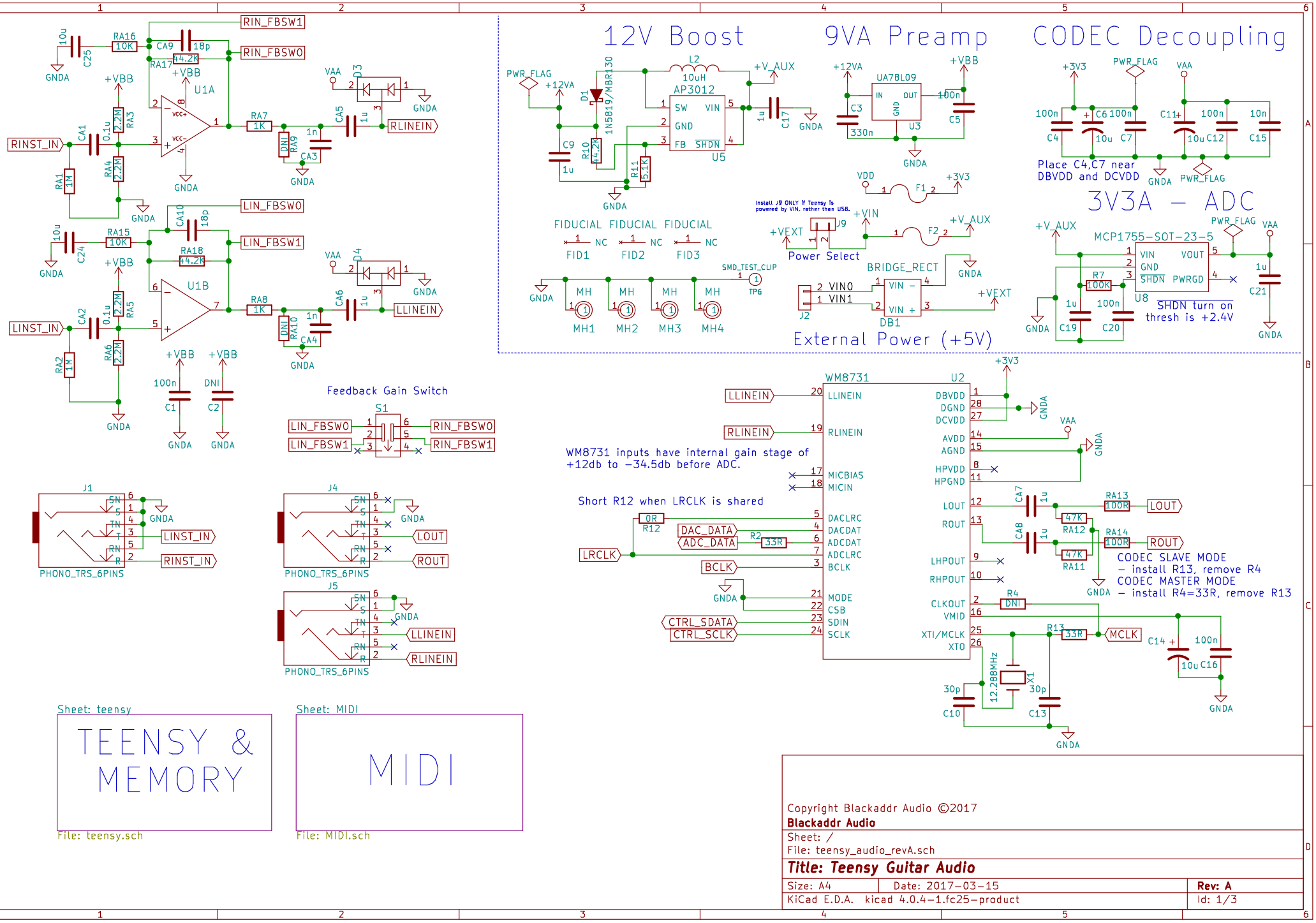
12V Boost
9VA Preamp
CODEC Decoupling
3V3A – ADC
External Power (+5V)
Feedback Gain Switch
WM8731 inputs have internal gain stage of +12db to −34.5db before ADC.
Short R12 when LRCLK is shared
CODEC SLAVE MODE
– install R13, remove R4
CODEC MASTER MODE
– install R4=33R, remove R13
Place C4,C7 near DBVDD and DCVDD
SHDN turn on thresh is +2.4V
Power Select
Sheet: teensy
TEENSY & MEMORY
File: teensy.sch
Sheet: MIDI
MIDI
File: MIDI.sch
Copyright Blackaddr Audio ©2017
Blackaddr Audio
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File: teensy_audio_revA.sch
Title: Teensy Guitar Audio
Size: A4
Date: 2017-03-15
Rev: A
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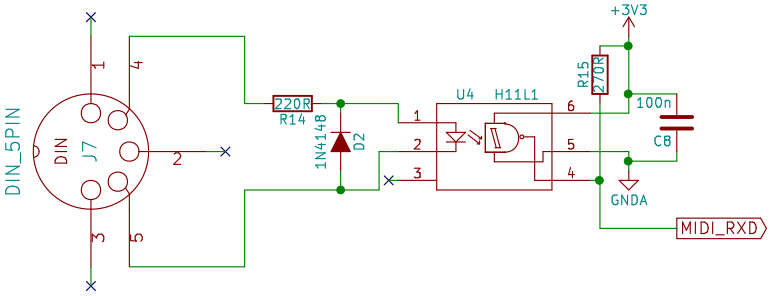
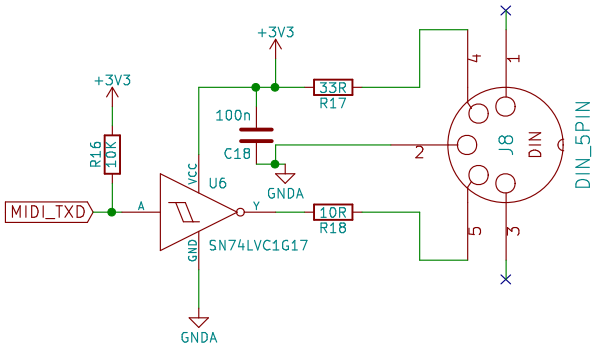
Id: 1/3

MIDI_IN



MIDI_OUT



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Title: Teensy Guitar Audio

Size: A4	Date: 2017-03-15	**Rev: 1**
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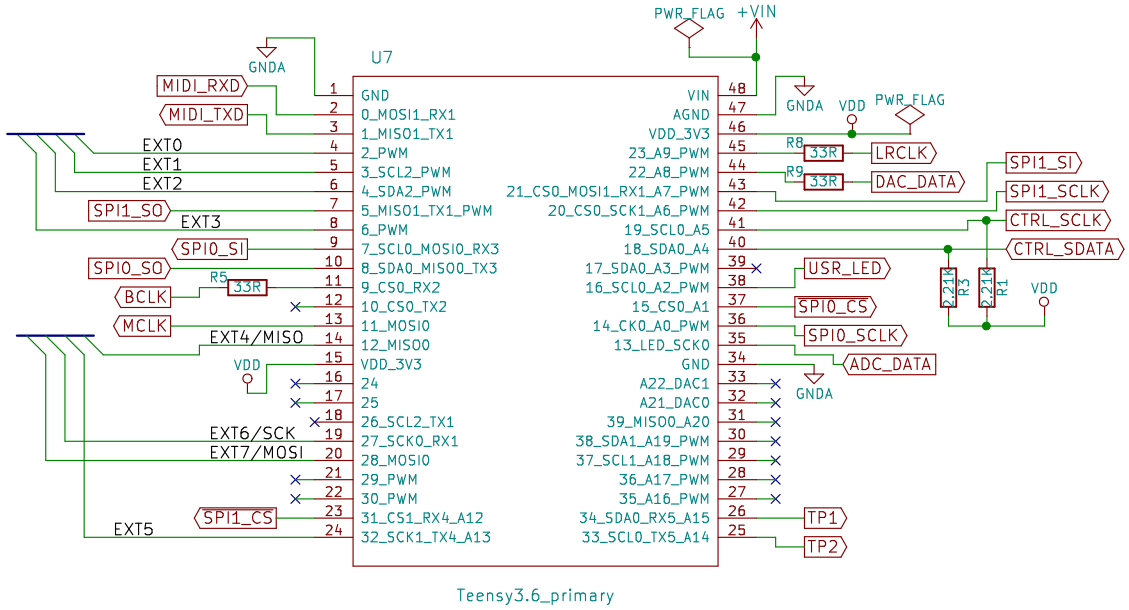
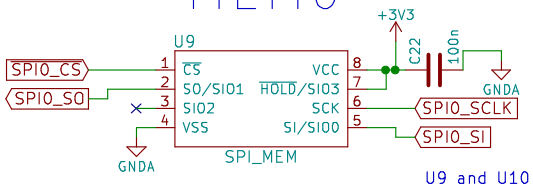
TEENSY 3.6



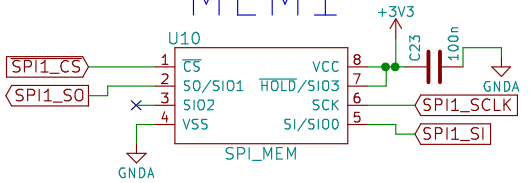
Teensy3.6_primary

MEMO

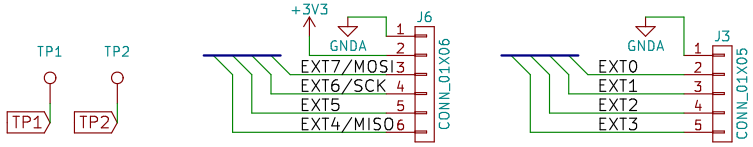


U9 and U10 are only installed if ordered.

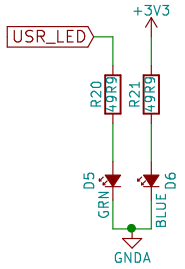
MEM1



EXTERNAL IO / SPI



LEDS



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Title: Teensy Guitar Audio

Size: A4	Date: 2017-03-15	**Rev: 1**
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