



## 10 Min Amp

*Design By Erik Vincent*



An incredibly simple pocket-sized amp, capable of up to 7 watts of power! The 10 Min Amp is the perfect first amp build, and suitable for the following types of projects:

- Cigar Box Amps
- Speaker box Amps
- Bedroom Practice Guitar Amp Head

A quick look at some of the features of the 10 Min Amp:

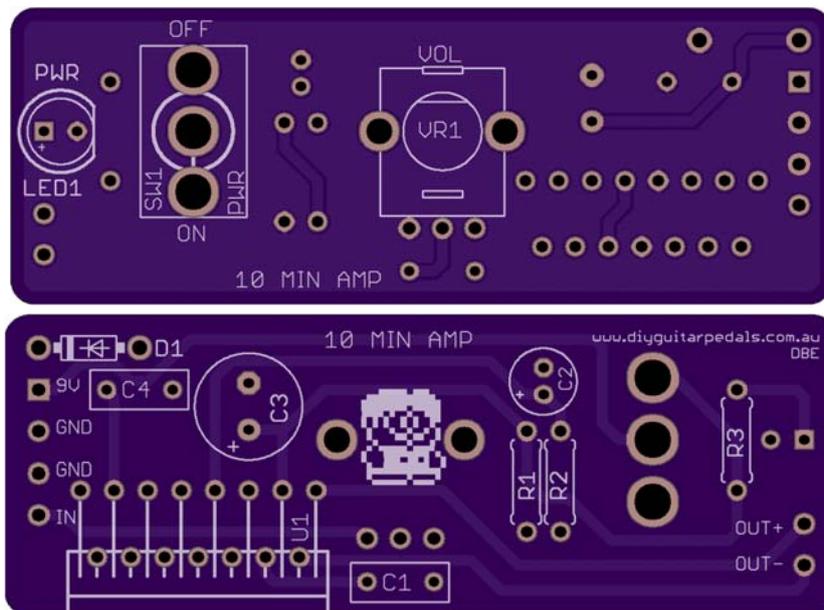
- Simple to assemble
- Incredibly Loud
- No high voltage wiring
- Good cleans and plays well with distortions
- Accepts a wide range of input voltages (battery or dc, 9v - 18v dc)
- Accepts 4 and 8 ohm speaker impedances

Adding a boost circuit and EQ / Tone Control to the front of the amp increases its versatility and volume output significantly and is a recommended addition to your amps input signal chain.

The 10 Min Amp has been designed to fit inside a 1590B enclosure (vertically). Please see the 10 Min Amp Assembly Video for more details.

## Bill of Materials, 10 Minute Amp

Capacitor		Resistor	
<b>C1</b>	10nF (film)	<b>R1</b>	10K
<b>C2</b>	10 $\mu$ F (Electrolytic)	<b>R2</b>	10K
<b>C3</b>	220 $\mu$ F (Electrolytic)	<b>R3</b>	3.3K
<b>C4</b>	10nF (film)	<b>OFFBOARD</b>	47-100 ohm (optional)
<b>Diode</b>		<b>Switch</b>	
<b>D1</b>	1N4001	<b>ON/OFF</b>	SPDT Micro-switch (ON-ON)
<b>LED</b>		<b>Potentiometer</b>	
<b>LED</b>	5mm LED or any off-board LED	<b>Volume</b>	10ka (9mm)
<b>ICs</b>		<b>Jacks</b>	
<b>U1</b>	TDA7266M	<b>Input</b>	Any 6.35mm Jack
		<b>Output</b>	Any insulated 6.35mm Jack
		<b>Power</b>	Any power jack to match supply



### PCB Spacing

The 10 Min Amp PCB is spaced for 1590B sized enclosures or larger

### Pot Spacing

The 10 Min Amp PCB mounted potentiometers are spaced for Alpha 9mm potentiometers

## Modifications

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Following is a couple of worthwhile modifications that can be applied to the 10 Min Amp.

### Capacitors

Changing the values of C1 effects how much bass frequencies are cut from the input signal going into the amplifier. Default value is 10nF. Decreasing the capacitance will cut more of the bass frequencies out, making the tone brighter. Increasing the capacitance will allow more bass frequencies into the input signal, making the tone darker.

### Resistors

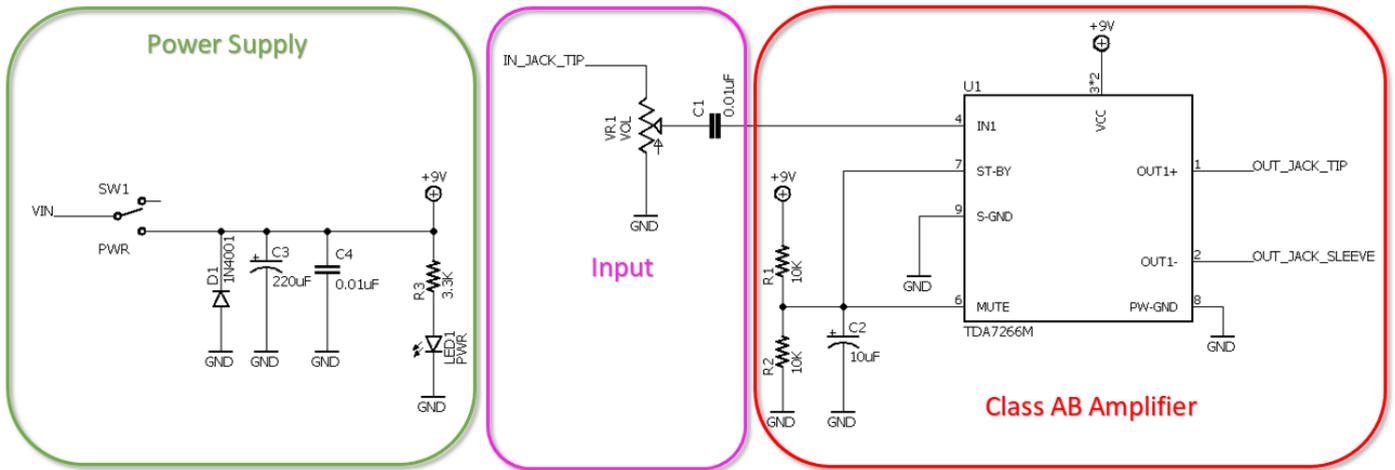
The value for R3 is by default, 3.3K as the 10 Minute Amp can use a maximum input power supply of 18V. If you are using a lower input voltage, like 12V, using a 1.5K resistor for R3 would be acceptable, and for 9V input, a 1K resistor would be sufficient.

Off-board in series resistor for optional headphone jack should be 15 ohms to 1K ohms to prevent damage to head phones and hearing. The lower the value, the louder it will be. The higher the value, the quieter it will be, as well as cutting more and more of the bass content of the sound. At 100 ohms, almost all bass content is preserved and even with a lot of gain from a high gain fuzz pedal, it shouldn't destroy the headphones (although, maybe your ears, at max volume, will still suffer). At 15 ohms, just the amp (no pedals or pre-amps), at full volume will not blow the headphones, but any lower resistance would risk damage to headphones. 47-100 ohms are the recommended values.

# 10 Min Amp Circuit Analysis for modifying purposes.

## 1. 10 Min Amp Circuit.

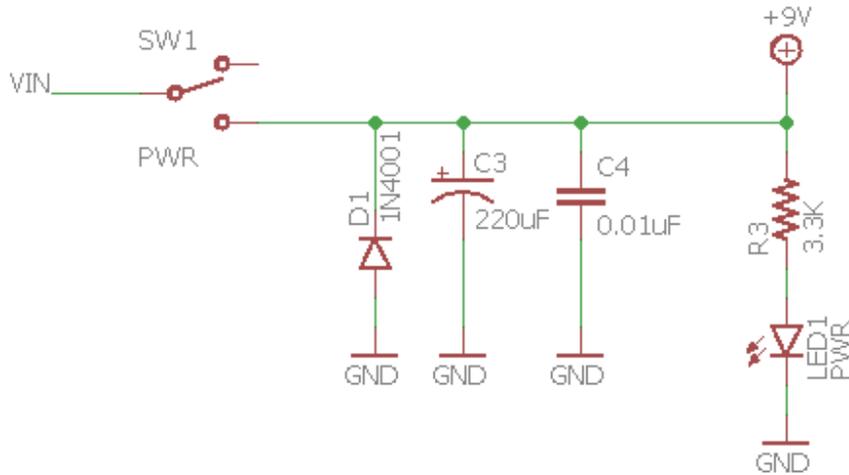
The 10 Min Amp schematic can be broken down into some simpler blocks: Power Supply, Input, and Class AB Amplifier.



The design is based on a simple dual bridge, class AB amplifier.

## 2. Power Supply.

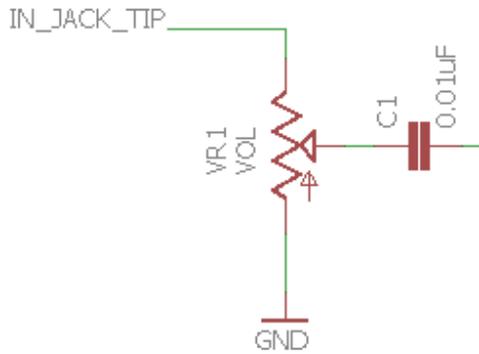
The Power Supply Stage provides the electrical power to all the circuitry, the whole power consumption is low.



- This amplifier can handle voltages between 3V to 18V. Typical current at 9V is 28mA. Typical current draw at 12V is 34mA. Typical current draw at 18V is 50mA. Maximum current draw is 70mA.
- The diode D1 protects the pedal against adapter reverse polarity connections.
- C3 is a large value capacitor of 220uF used to decouple to ground to help filter noise, but also helps with the bass response from within the TDA7266M, especially when driving large speakers. Values between 220uF and 470uF are recommended.
- C4 is a small value capacitor of 10nF used to decouple to ground to help filter high frequency noise that a power supply might be trying to inject.
- SW1 is a simple switch to apply power to the circuit.
- R3 is a current limiting resistor to drive LED1. Depending on input power voltages, R3 can range from 1K to 10K which in turn will vary the brightness.

### 3. Input Stage.

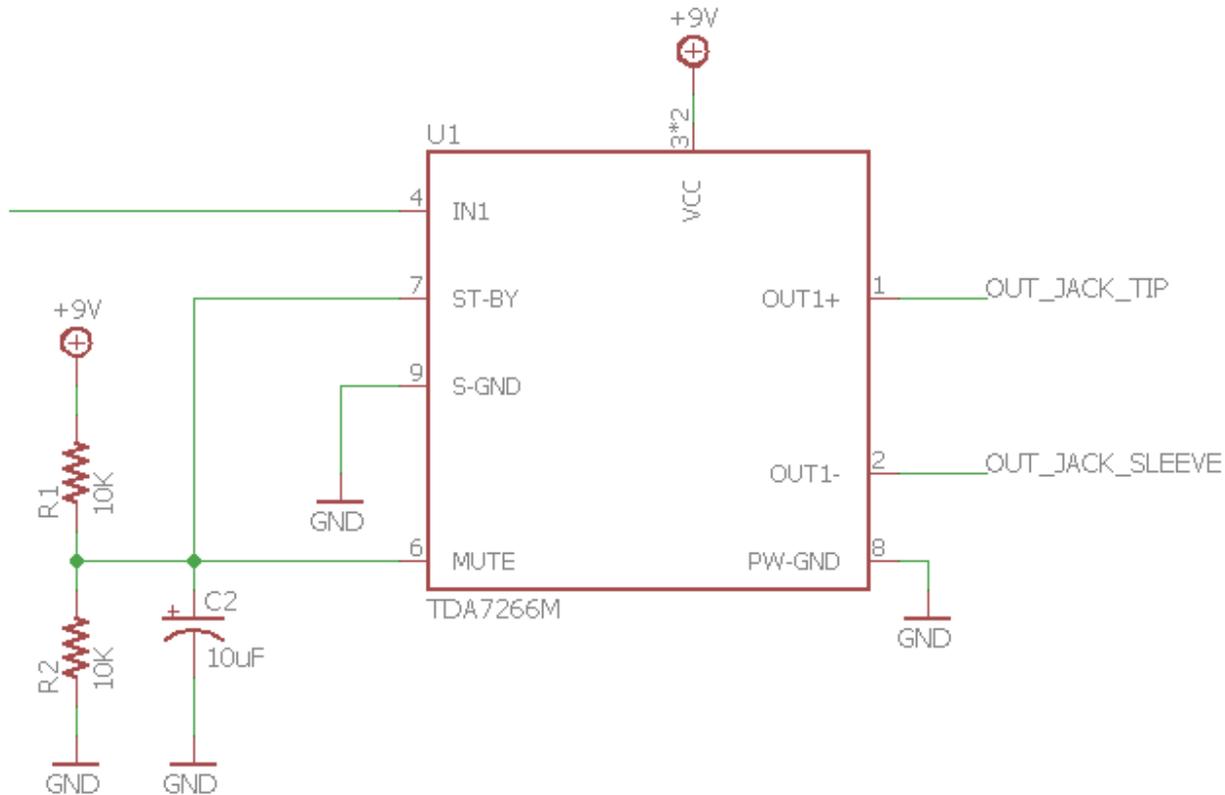
The 10 Min Amp uses a single volume pot to bleed signal to ground to cut volume.



- Much like pedals such as the Rangemaster, basic tone control is applied by the capacitor C1. The capacitance along with the internal resistances inside the TDA7266M create a high-pass filter. Values between 470pF to 220nF would be recommended here. The smaller the capacitance, the less bass that is allowed into the amplifier, creating a brighter tone. The larger the capacitance, the more bass is allowed, creating a darker tone. 10nF seems to be a good spot in the middle.
- The volume pot is a 10K logarithmic potentiometer. Increasing its value to 100K or even 1M may help with input impedance.

## 4. Class A-B Amplifier

The TDA7266M is the core of the circuit which is made of a class A-B amplifier IC.



### 4.1 Jacks

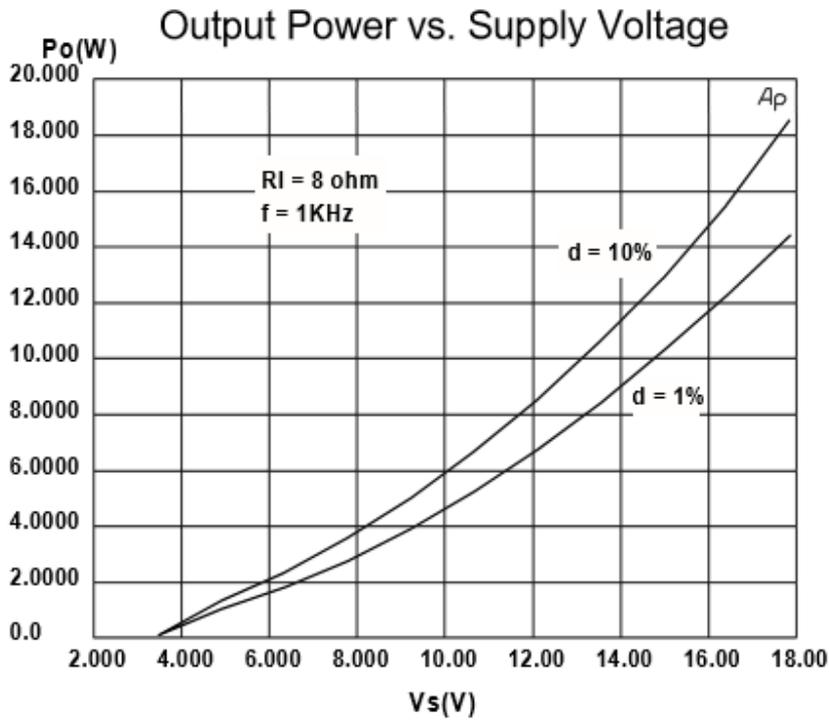
Like most guitar pedals, typical 6.35mm jacks have metal washers and sleeve jacks, connecting the ground of the jacks to the enclosure. This in turn makes the whole enclosure grounded. This becomes a problem when the output jack's sleeve, which is not ground. What this means is that the output 6.35mm jack cannot have a sleeve that is connected to ground in any way, which in turn means the jack must be insulated or plastic tipped so that it doesn't conduct on the wall of the enclosure.

### 4.2 Thermal Heatsink.

The TDA7266M has a large tab in which a heatsink can be applied. The large tab is connected to the ground pin of the TDA7266M. At 9V, at full volume, with a 2x12 Celestion Vintage 30's cabinet at 8 ohms, the tab will get warm, but probably not hot, so a heatsink may not even be necessary. However, if attempting to increase the voltage from 9V to 12V all the way up to 18V, a heatsink becomes more and more necessary. Either applying a standard heatsink via a screw and nut or even using the inside of the enclosure of the pedal and use a screw and nut to fasten the 10 Min Amp to the inside of the enclosure, will work in keeping the TDA7266M cool.

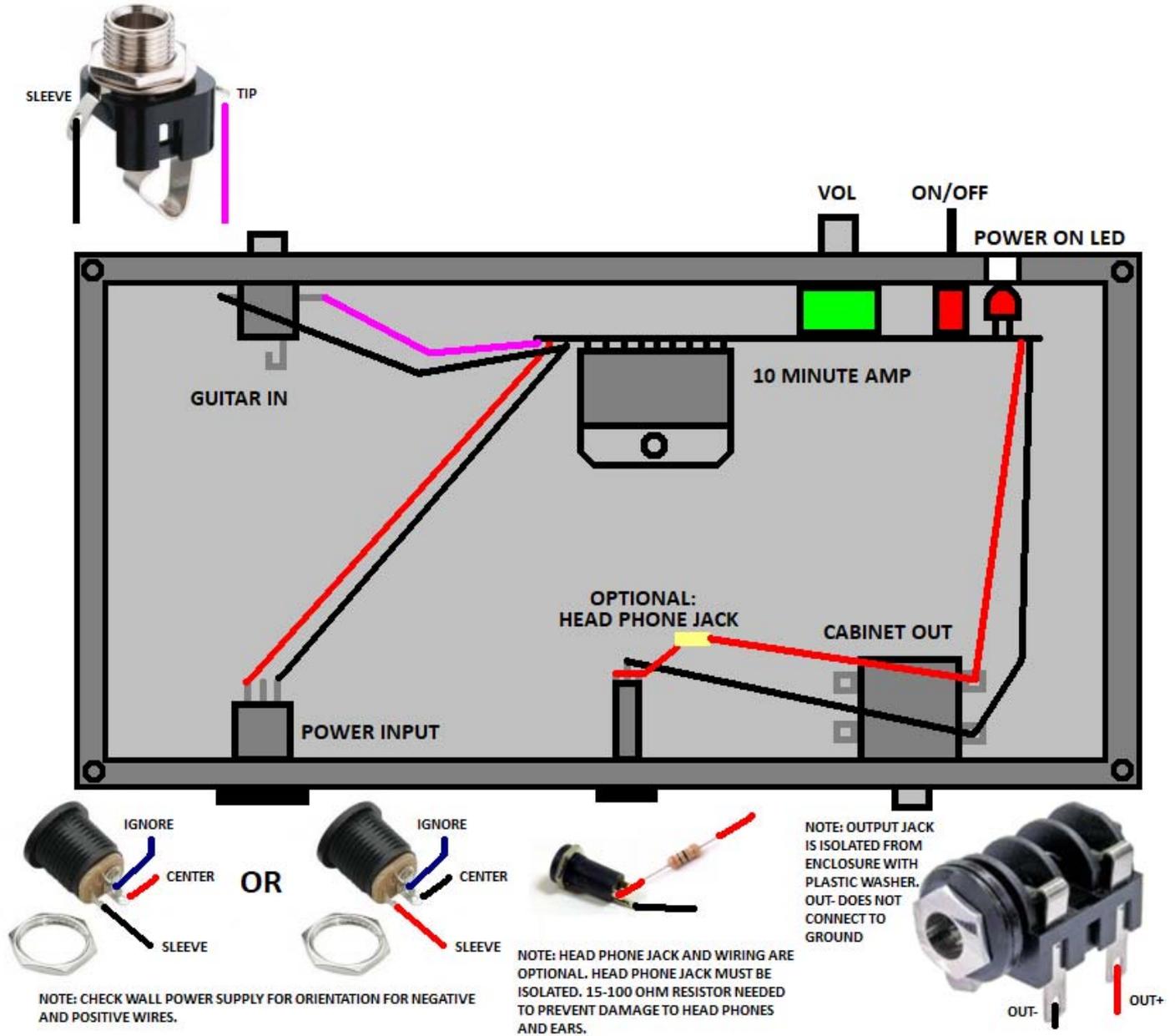
### 4.3 Wattage.

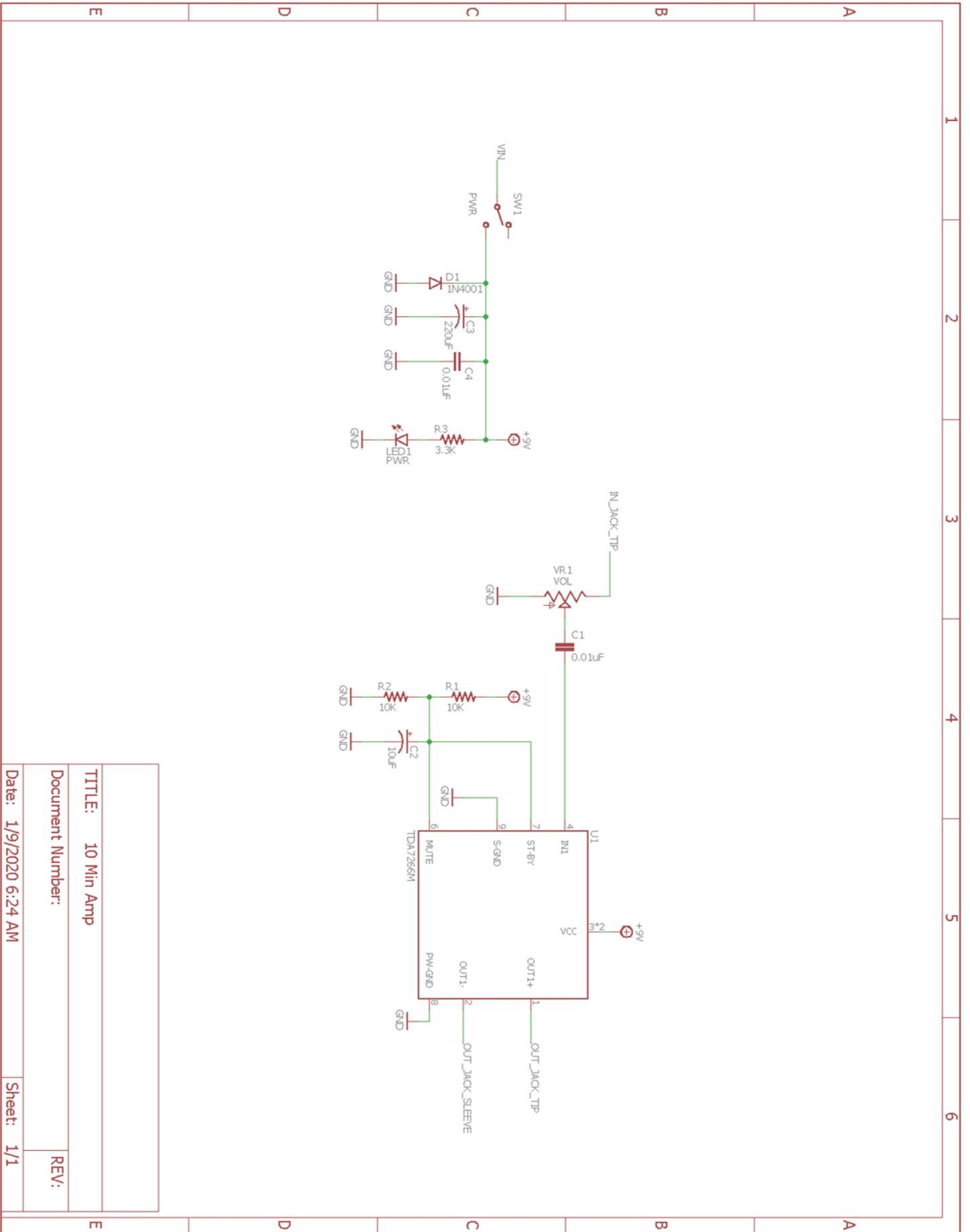
The TDA7266M is capable of doing 7W as a class A-B amplifier. However, this is dependent on several variables, such as frequency of sound, speakers, resistance of the output, and most importantly, the voltage. The below chart shows the ratio of wattage to voltage off the datasheet for the TDA7266M. At 9V, it can output a maximum of around 3W.



# Off Board Wiring Diagram

Using a DC Jack, Mono Jack, and Isolated Mono Output Jack. Optional wiring for isolated stereo headphone jack shown.





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