



TDA2003 HI-POWER AMPLIFIER KIT

Almost every ham radio project needs an audio amplifier. Rather than reinventing the wheel every time I've started making a series of modular kits so I can just pull a generic board off the shelf and use it. I am also trying to encourage more hams to build goodies. It isn't that hard - it is actually easier today than it was when I started in the early 1960's.

This is the second kit in the audio series and it uses the TDA-2003 high power audio output chip. Some datasheets list the output power as high as 12 watts but that is with special conditions like 2-ohm speakers. This board will require some power so it's not the best choice for a QRP rig. With an 8-ohm speaker this IC will easily push toward 8 to 10 watts of clean audio, which is LOUD! A large 4 or 8 ohm speaker is a good load for this amplifier.

The TDA2003 is used as the audio output in many ham rigs (the Yaesu FT-920 is one). The audio is also clean with low distortion and a pair of these would make an acceptable stereo amplifier.

The first kit in the series is an LM386 audio amplifier and it was designed for QRP rigs and the like where the power budget is small and headphones are more likely the load rather than a speaker. The LM386 version is 1.25 inches by 1.2 inches so it should fit almost any spot. The TDA2003 board has the same mounting holes and the connections are located in the same place. In order to squeeze everything in the board is slightly bigger, 1.25 by 1.4 inches. I tried to minimize the space requirements and yet leave future expansion possibilities, so this is intentionally a tightly packed board.

The TDA2003 needs a heat sink. The one provided in the kits is a little light to use alone and it would be best if it were attached directly to a metal case but it has proven more than adequate. In the prototype above a very short metal standoff was used to offset the board from the metal case. I included the bass boost components although they aren't necessary for most ham purposes. I also brought all the wires out to an optional connector. In most cases the connector will only add expense and annoyance so it's not included in the kit. It is easier to just solder the wires in the holes - but the connector could be used if desired. Future audio amplifiers will have the mounting holes and the connector in the same locations so they can be interchanged easily. Included on the board are de-coupling (L10, R11, C12, C13) from the power supply to make sure the amplifier and other circuits remains stable.

Note: If powering-up the board without connecting Pin 2 on J11, the input, to a volume control or other signal source you should provide something like a 10K ohm resistor from pin 2 of J11 to ground. Allowing the lead to float may cause the board to oscillate.

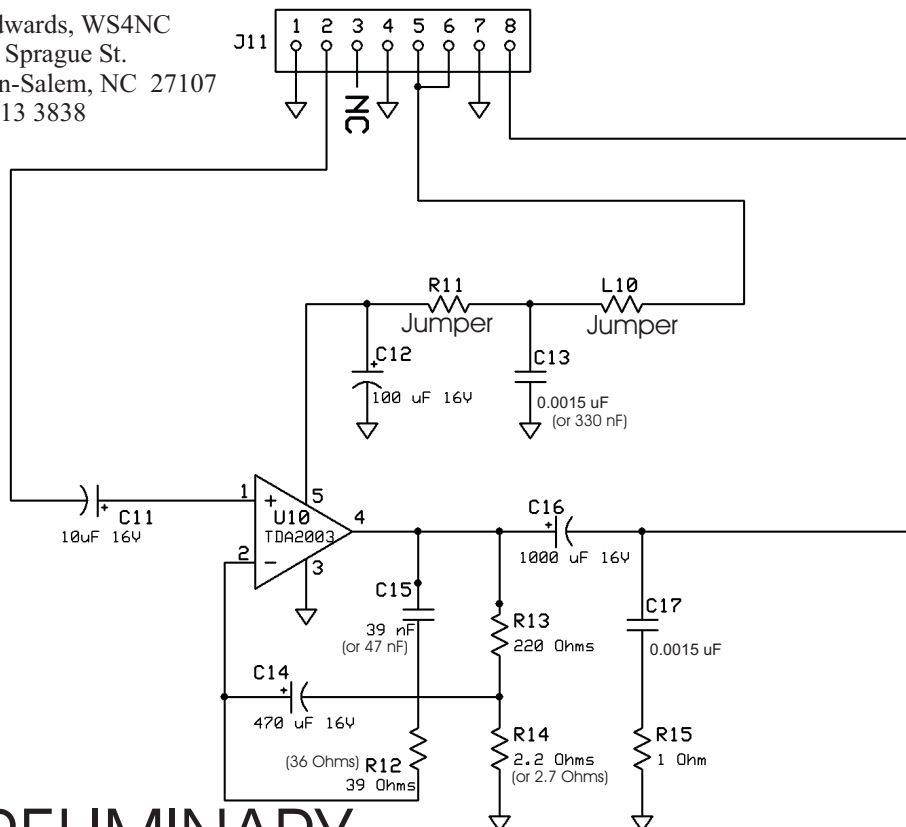
More kits and/or plain circuit boards are available from www.dwepe.com/kits. The latest assembly instructions will also be available for download.

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PRELIMINARY

Parts List

C11	10uF 16V
C12	100 uF 16V
C13	0.0015 uF
C14	470 uF 16V
C15	0.047 uF
C16	1000 uF 16V
C17	0.330 uF
J11	Optional
L10	Optional (Jumper)
R11	ZERO Ohms (Jumper)
R12	36 Ohms
R13	220 Ohms
R14	2.7 Ohms
R15	1 Ohm
U10	TDA2003*

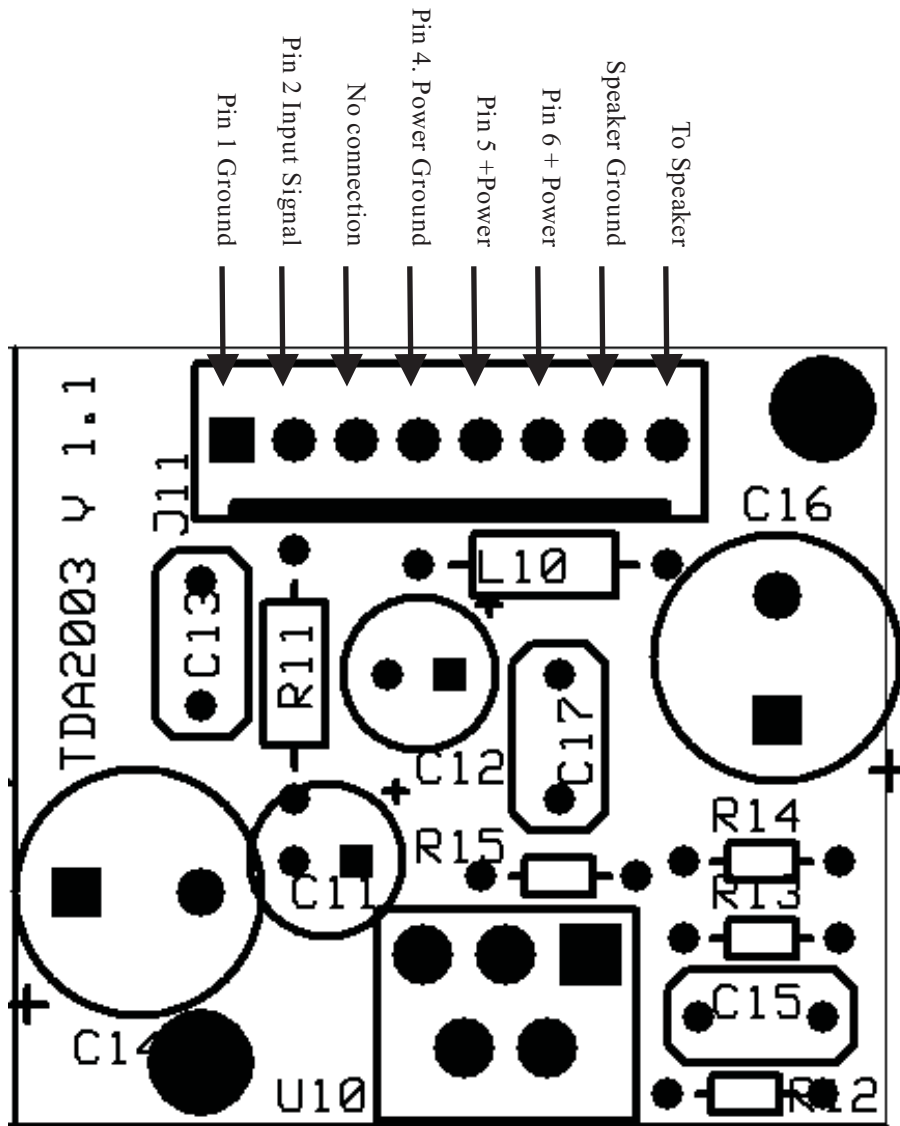


*The TDA2003 is available in two versions, the horizontal version as shown in the prototype picture, and a vertical version. Although the legs are optimized for each version the legs can be bent on either to change the orientation - probably just once. They may break if flexed more than once. The best orientation depends on your particular application. In both cases the TDA2003 should be secured to the largest heat sink available.

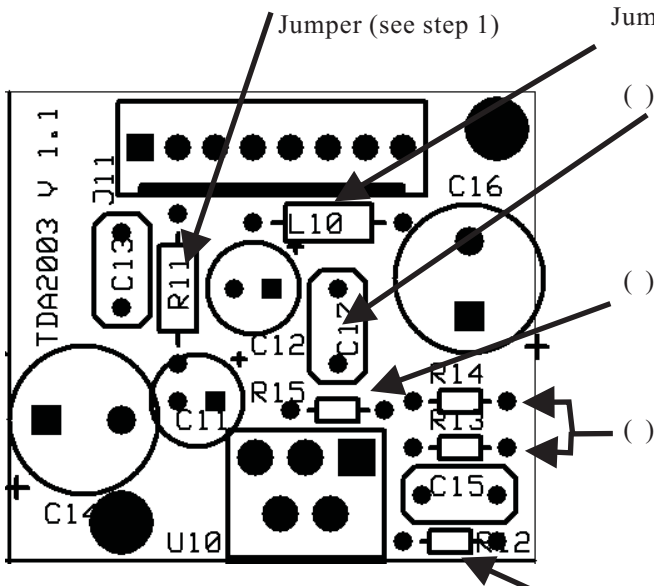
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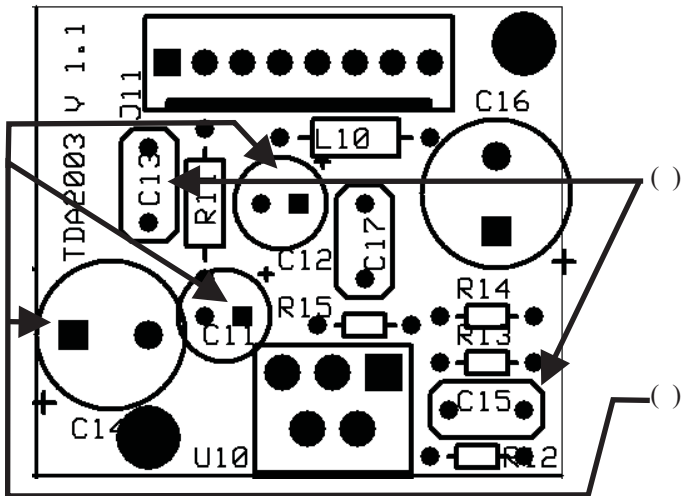


Step 1. Install the 0.1 uF capacitor. It is a small round yellowish axial-lead capacitor. Save the cut-off leads to install as jumpers for R11 and L10. R11 and L10 were provided in the layout in the event that heavy current draw might cause voltage drops to other circuits. They haven't proven necessary but it was safer to plan for them on the board.

Step 2. Install R15 a 1 Ohm resistor. (Brown-Black-Gold-Gold). The resistors layout is for 1/10 watt resistors but 1/4-watt resistors may be provided. The 1/4-Watt resistors will need to stand on one end. It is a nice touch if all the resistors and other parts are all turned so that they read in the same direction - but it is not mandatory.

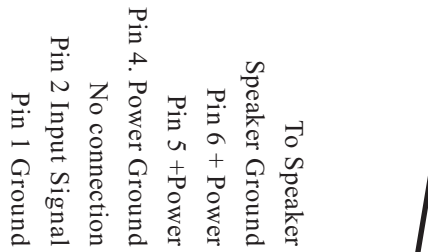
Step 3. Install R14 2.7 Ohms (red-violet-gold-gold) and R13 220 Ohms (Red-Red-Brown-Gold). Be very careful not to confuse the two. Double check before soldering.

Step 4. Install R12 36 Ohms (orange-blue-black-gold). Clip the leads of all the resistors if you haven't already done so.

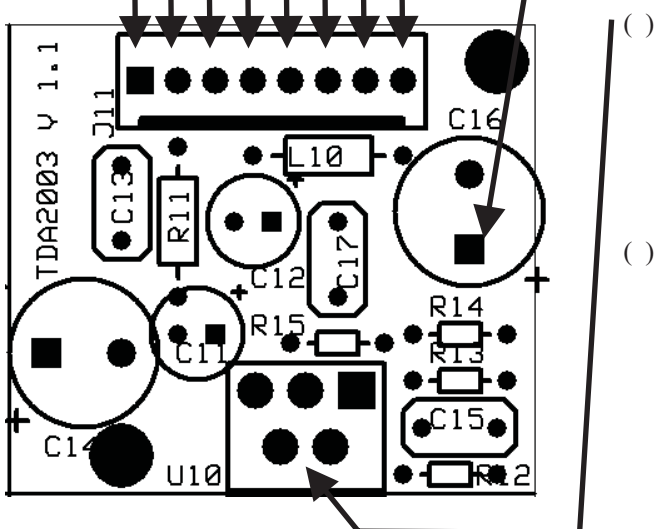


Step 5. C13 is the larger of the two rectangular yellow capacitors. It will be marked 330nK 63. C15 is the smaller of the two yellow rectangular caps. It will be marked 47nK 63.

Step 6. Be very careful to get the polarity of these capacitors correct. The negative lead will always have a line down that side of the capacitor marked with minus signs and it will go into the hole with the ROUND pad. The positive lead on long lead capacitors will be longer (some are cut equal) and the SQUARE pad is positive. C12 is a 100 uF capacitor and is a bit big for the space. C11 is a 10 uF capacitor and is the smallest cap in this group. C14 is 470 uF and is the second biggest on the board. Double check polarity before you solder.



Step 7. C16 is the big blue capacitor. Make certain that the polarity is correct before soldering. The leads on the cap are a little wide but you should be able to bend them slightly and then push the cap down onto the board. The layout was for a smaller footprint but I happen to have 1000's of these and they do fit although a little snugly.



Step 8. Mount the IC. The layout will accept either the horizontal or the vertical versions but the horizontal version is the one I usually prefer. The board should be mounted on short standoffs with 2-56 screws and the same size standoff will fit under the IC with the heatsink between the IC and the standoff. Use heatsink grease if you have some - but I've found very little heat is generated and I've seriously abused some of these IC. They are very tough.

Step 9. That completes the board. Please double check your solder connections and make certain that the caps are inserted correctly. On J1 Pin 1 is the square hole. Pins 1 and 2 should go to your volume control, with pin 2 being the wiper and Pin 1 is ground. The high side of the volume control should go to whatever your signal source is. Pin 4 should go to the minus side of the power supply. Either pin 5 or 6 (they connect together) needs to connect to your power source. The speaker will connect to pins 8 (ground) and 9 (output). That's it!