# QUASAR PROJECT # 3139 - 1W Stereo Amplifier with DC Volume Control

This is a 1 watt stereo amplifier module Kit using the TDA 7053A from Philips. It uses a DC voltage to control gain, hence a single gang pot or switch can be used as a volume control with minimal tracking error. It will operate from 4.5 – 18 V DC and requires no heat-sink for normal use.

## TDA 7053A Features

- Short circuit protected
- Thermal protection
- No switch on/off clicks
- Mute mode
- Low power consumption
- Good stability

## Assembly Instructions :

Assembly is very straight forward. Make sure you get the integrated circuit and the electrolytic capacitors the correct way around. The electrolytic capacitors are polarized, they have a + or - marked on them and they must be inserted correctly into the PCB. The IC and socket have a notch at one end, which is marked on the PC board overlay. Solder the socket in place first before installing the IC itself. Leave the potentiometer until last.

Check the supply voltage and polarity before connecting the battery or power supply. If it does not work, recheck all component positions and polarity. Check all solder joints, and all external wiring. The IC itself is quite robust, and there is very little else to go wrong.

Remember when testing, it will not produce full output for more than a short duration because of limited heat dissipation, or with DC input less than 6V.

## Circuit Description :

Since the IC does all the work, there are only a few external components. C1 and C2 provide power supply decoupling or filtering. C3 and C4 are the input coupling capacitors, which block any DC that might be present on the input. R1 and R2 provide a DC ground reference for the input signals. VR1 adjusts the IC gain level. This can be used as a volume control. R3 sets the maximum DC voltage on VR1, and C5 bypasses AC signals from the DC gain control to prevent gain fluctuations.

You may need to adjust R3 so that VR1 will operate across it's full travel. Since the IC requires approximately 1.2V control voltage for full gain, you should increase the value of R3 for supply voltages greater than 6V. A value of 47k for 9V, and 68k for a 12V supply, will provide a better potentiometer range.

The maximum gain is internally set to 40 dB, and the DC volume control will provide a proper logarithmic gain characteristic from - 33dB to + 40dB. The IC will automatically switch to mute mode when the control voltage falls below 0.4V.

Since the I.C. operates in BTL (bridge tied load) configuration, the outputs are floating with respect to ground. Therefore **no output leads should be connected to ground.**

The Philips data sheet contains all the necessary information about the TDA7053A. You may download it from the software download page on our website at :

**http://www.quasarelectronics.com/ds.htm**

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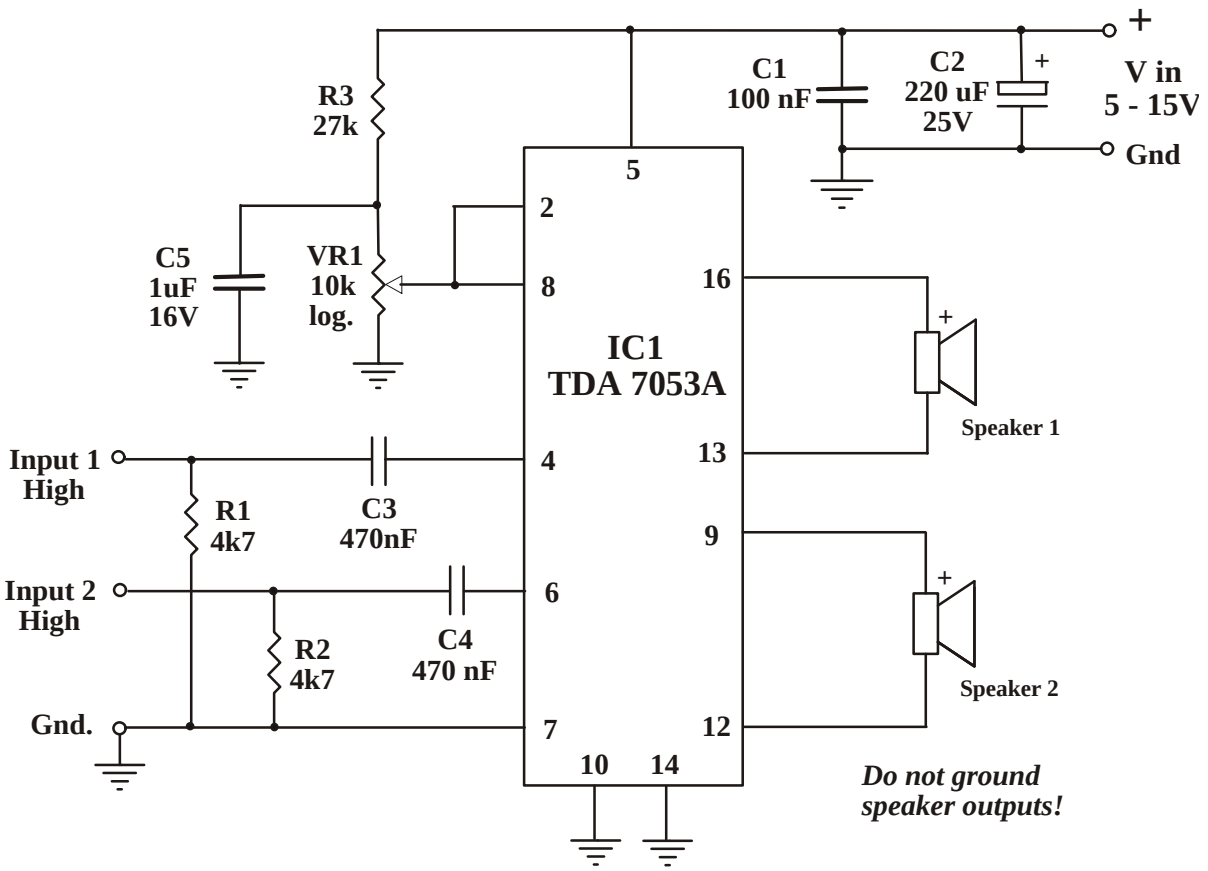
**Circuit Diagram**




## Specifications :

| | |
|---|---|
| D.C. input : | 4.5 – 18 V at > 0.5 - 1A. |
| Idle current | < 25 mA |
| Power output | > 4W (inst.) @ 8 ohm, 12V D.C. |
| | > 1 Watt @ 4 - 16 ohms, 12V |
| | > 0.5 Watt @ 8 ohm, 6V |
| | > 0.25 Watt RMS continuous |
| Freq. Resp. | < 20 Hz to > 100 kHz, – 3dB |
| THD | < 1 % @ 0.5W, 8 ohm |
| S/N ratio | > 60 dBA, G = 40 dB |
| Gain | 40 dB maximum. |
| Input Z | ~ 4.7 k ohm. |
| Size | 43 mm * 40 mm |

## Components :

**Resistors**

| | | |
|---|---|---|
| 4K7 (yellow, violet, red) | R1, R2 | 2 |
| 27k (red, violet, orange) | R3 | 1 |

**Capacitors**

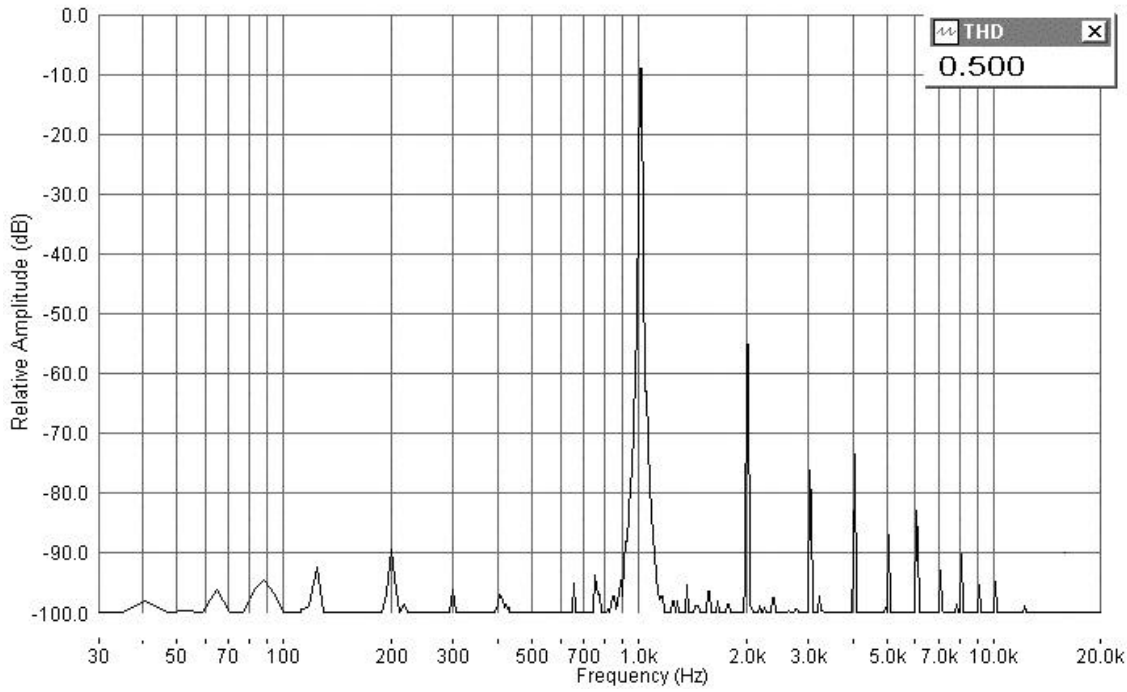
| | | |
|---|---|---|
| 100nF (104) monoblock | C1 | 1 |
| 220uF 25V ecap | C2 | 1 |
| 470nF (474) polyester | C3, C4 | 2 |
| 1uF 16V ecap | C5 | 1 |

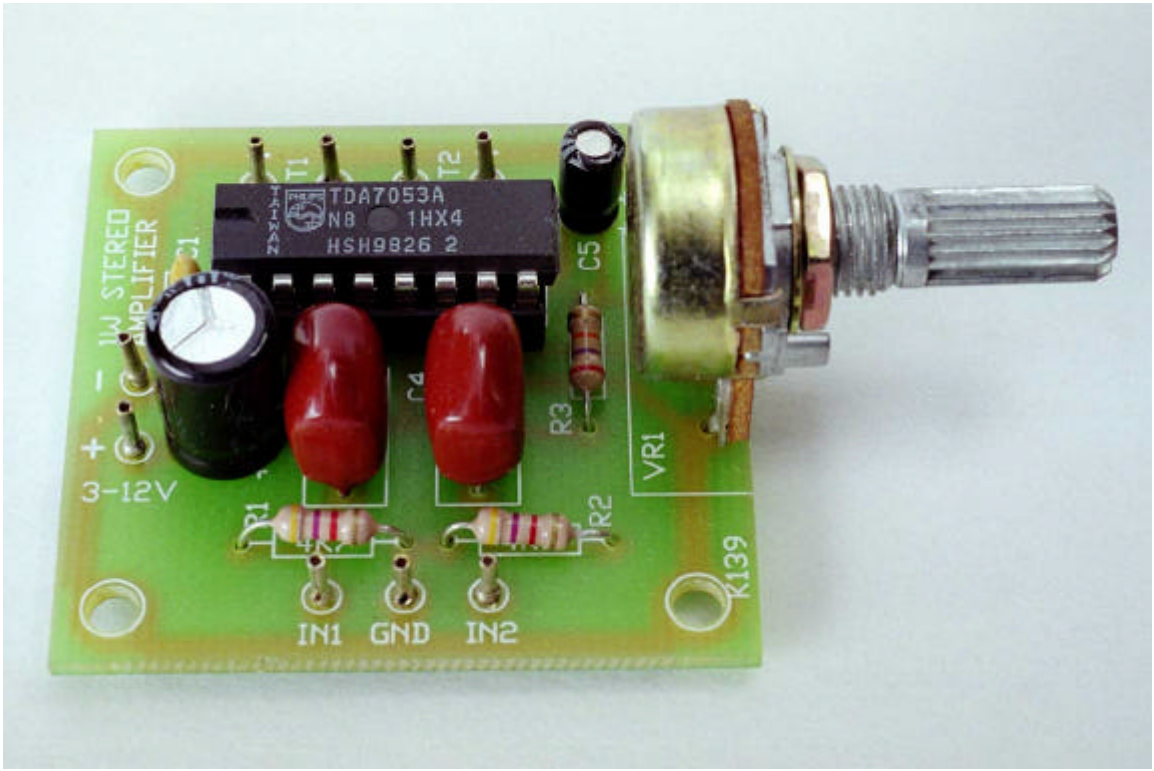
**Misc.**

| | | |
|---|---|---|
| TDA7053A | IC1 | 1 |
| 10K ohm log. pot. | VR1 | 1 |
| 3139 Printed Circuit Board | | 1 |
| 16 pin IC socket | | 1 |

# QUASAR PROJECT # 3139 - 1W Stereo Amplifier with DC Volume Control

**Harmonic Distortion at 1 kHz.**
**0.5 W output, 8 ohm load,**
**12V DC supply.**



# QUASAR ELECTRONICS - What's Watt

To the beginner in the audio world there is nothing more confusing than the definition of a 'watt'. You do not have to read too many magazine articles or talk to many audio salesman before you realize that there are many types of 'watts' output and that each commercial group quotes the highest numerical 'watt' value which suits their aims. Let's see: there is Peak Music Power, Total Music Power, average power, RMS power, etc. Let's see if we can make some sense from all this!

Power is defined as the rate of doing work and is measured in *watts*. Electrical power can also be defined as the rate at which electrical energy is transformed into other forms of energy (heat, sound, etc).

To measure electrical power (P), the voltage (E) and current (I) must be known. Power is then calculated by the following formula:

$$\mathbf{P = E \times I}$$

Using Ohm's Law, we know that **E = I x R**. By substituting this equation in to the formula above, we can also caluclate power by:

$$\mathbf{P = I^2 \times R} \quad \text{and} \quad \mathbf{P = E^2 / R}$$

These three power formulas apply to both direct current (DC) and alternating current (AC) circuits. However, during each cycle, an AC voltage (or current) passes through a large range of values from zero to maximum. Therefore, there are three values generally associated with measuring AC voltages and currents.

1. **Peak or Maximum Value.** This is the maximum instantaneous value occurring during one cycle. The peak value is not used as an indication of the effectiveness of an AC waveform because this value occurs at only two instants during each cycle.

   The difference between the peaks of positive and negative values is called the peak-to-peak value. This is twice the peak value.

2. **Effective or RMS Value.** This is the value which produces the same heating effect as a continuous (DC) current of the same amount. An AC current of 10 amps (RMS) has the same heating effect as 10 amps DC.

   The RMS value is the one usually used to express AC voltages and currents. Most measuring instruments are calibrated to read this value.

   For a sine wave,

   **Peak Value = 1.414 x RMS Value**
   **RMS Value = 0.707 Peak Value**

3. **Average Value.** The average value is the average of all the instantaneous values of an AC waveform for one half cycle.

   For a sine wave,

   **Average Value = 0.637 Peak Value**

The following table can be used to convert sinusoidal voltage (or current) from one value to another.

| | | ( Multiply by ) | | | |
|---|---|---|---|---|---|
| **From** | **To:** | **RMS** | **Average** | **Peak** | **Peak-to-Peak** |
| RMS | | 1.0 | 0.9 | 1.414 | 2.828 |
| Average | | 1.11 | 1.0 | 1.1.57 | 3.14 |
| Peak | | 0.707 | 0.637 | 1.0 | 2.0 |
| Peak-to-Peak | | 0.3535 | 0.3185 | 0.5 | 1.0 |

As we said before, there are many methods of expressing the power rating of audio amplifiers. The only meaningful one is "RMS power per channel". This gives the EFFECTIVE power rating on a per channel basis. The load value should also be known.

For example: "10 watts RMS per channel into 8 ohms" means that the amplifier is capable of delivering 10 watts of effective (RMS) power into an 8 ohm load, usually speakers.

The other methods of measuring power are usually used to make amplifier specifications appear better than they really are!