TDA7052A Audio Amp with AGC and Mute

Update Dec 2014 - read the comments section below for some tips on getting the circuit working and ideas for improvement.

Here's a nifty circuit I came up with this morning. I've been looking for alternatives to the LM386 as a general purpose audio amp for radio projects. The LM386 is very popular in amateur radio circuits but it really is a POS - prone to oscillation and very noisy. I figured there had to be something better out there and the NXP TDA7052A looks very promising. These are available from Digikey or Kits n' parts:

http://www.kitsandparts.com/parts.php [http://www.kitsandparts.com/parts.php]

The TDA7052A has a DC volume control and puts out about a watt which is way overkill for headphones. Its a bridged amp so it needs no output coupling caps. I figured the DC volume control could be used for AGC. I used a circuit I came up with a couple years ago to fix the AGC in the Elecraft KX1 and it works like a champ with the 7052A.

The key is to run the 7052A off a regulated 5V supply which biases the two outputs at very close to 2.5v when the amp is idle. 5V is plenty to drive headphones or a small speaker. A white LED is connected from one of the outputs to the base of a garden variety NPN transistor. A white led has a forward bias voltage of over 3V so with no input to the amplifier the LED and the transistor are both off. Once the output level increases to about 3.25V or so the LED starts to conduct on the positive half of the output waveform which biases the transistor on. This pulls down the voltage on the cap which reduces the gain of the amp.

It works beautifully - as the input signal rises the output of the amp rises to about 1Vpp and it stays there until the amp clips at 1Vpp or so at its input. The gain of the amp is around 25db which translates to an AGC range of 25db (when input = output thats 0db). You can increase the gain of the amp somewhat by pulling pin 4 up with a 10k to 5V.

The mute works by forcing the transistor on which pulls the gain control pin to gnd (minimum gain). There is a bit of a click when it mutes - this could be fixed by putting a resistor between the collector and pin 4 to slow the transition down a bit.
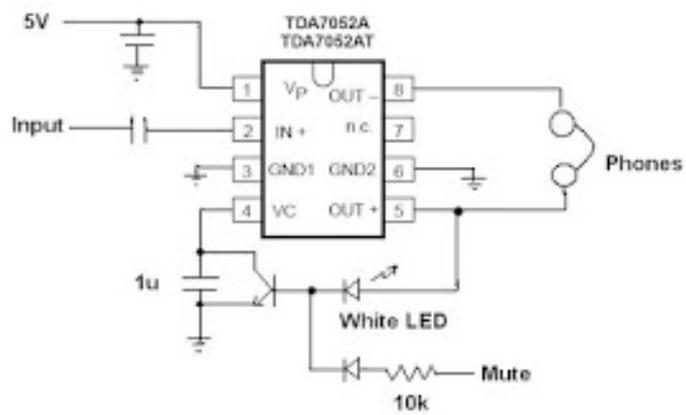
TDA7052A Audio Amp/AGC/Mute
By VE3MKC

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p.JPG]

I haven't optimized the circuit yet, it probably needs some tweeking to get the right attack and hold times for CW or voice. The output of the amp is actually too loud for my headphones. You could insert a pot in series with the phones or maybe use just one side of the bridge with a coupling cap.

Its a nice little building block for radio circuits. I have an idea for using this block as part of a simple DSB rig. I'll have to cover that in another post...

Posted 23rd April 2012 by rheslip

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Tsuki 25 February 2013 at 23:44

Just would like to enquire, for your transistor wise, do u use a specific transistor or just any random transistor will do?

Reply

▼ Replies

rheslip 28 February 2013 at 15:58

I would think almost any NPN transistor will work. Only audio frequency here and not a lot of gain is needed. It has to handle discharging the 1u cap but most bipolar transistors have the current carrying ability for that.

Reply

rheslip 27 December 2014 at 15:23

I had some feedback from Steve, AB2EW which may help others with the TDA7052A AGC circuit:

I built the circuit exactly as you specified, but I was unable to see AGC action. The DC voltage at the anode of the white LED seems to remain constant regardless of input signal level.

Have I missed something? I would greatly appreciate any further insight you might be able to provide.

My reply:

What you should see is that as the input signal increases the voltage on pin 4 decreases. When the circuit has no input signal the LED should be off or at most a very faint glow if you look at it in a darkened room. On signal peaks the LED will get brighter. The TDA7052A should be running on 5V to get the proper LED bias and you may have to try a couple of LEDS to get one that is off with no signal. If the LED is noticeably on when there is no signal, the circuit won't work.

I have since found a variation that works on voltages above 5V - not quite as good AGC but it works OK. Put a 10uf or so electrolytic between the TDA7052A output and the LED anode to block the DC and put a 1N4148 cathode to the transistor base and anode to ground. The IN4148 acts as a clamp so the voltage on the transistor base has a positive DC bias. This variation takes more signal to start the AGC action because of the 1N4148 threshold voltage. A schottky diode would reduce this effect.

Its also possible one of your parts is bad. Make sure you are using the TDA7052A - the TDA7052 will not work.

In the meantime Steve had already figured it out and improved the circuit:

I got your circuit working. I finally observed some AGC behavior when I more carefully adjusted the power supply voltage. Even better performance was observed when I added a 22uF capacitor in parallel with a 22k resistor from the transistor base to ground. Thank you for sharing your ingenious AGC idea.

Thanks for your suggestion Steve!

Reply

co6bg 5 April 2015 at 14:04

http://www.ozqrp.com/docs/MST2_big.pdf
Check this link you can see a TDA7052 used

Reply

▼ Replies

rheslip 6 April 2015 at 19:42

Yep - looks like a minor variation of this AGC circuit!

Fisher 25 March 2016 at 21:18

Hey,

I'll just go ahead and ask. I'm trying to use this as AGC to boost the input towards my LM3914, with some sort of top limit (so when volume is 100% LM doesn't go haywire). The issue I'm having is I'm a beginner and I can't for the life of me figure out:

1) What capacitor is tied to pin 1?
2) What on earth is a white LED doing there?
3) What diode is that, right below it?
4) Would I have to make major modifications to run this at 12V?

Thanks a lot,
Have a great day!

▼ Replies

rheslip 27 March 2016 at 07:04

The cap on pin 1 is a bypass cap, typically .1u but check the data sheet for recommendations. This is to keep the power to the chip clean and stable. It should be placed right across the chip power and ground.

The white led works like a zener diode in this circuit - it conducts only after there is around 3.5V across it. This allows the amp to be linear up to a point and then it starts the AGC action.

The diode below it is a garden variety silicon 1n914 or similar. It allows an external mute signal to force the transistor on which reduces the amp gain to almost zero. This is useful in radio applications. The diode is there so the mute signal doesn't change the AGC circuit behaviour except when muting.

The circuit should work at 12V if you put 2 white leds in there which sets the turn on threshold around 7V. It should also work if you just put a 10u or so cap in place of the LED but the AGC action won't be as good.

Hope that helps, Rich
VE3MKC

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