

Re: Amplify 1.5v DC to 5v DC?

Source: <http://sci.tech-archive.net/Archive/sci.electronics.basics/2004-10/1046.html>

From: Jonathan Kirwan (jkirwan_at_easystreet.com)

Date: 10/20/04

Date: Wed, 20 Oct 2004 16:59:33 GMT

On 20 Oct 2004 06:23:23 -0700, kianmeng.tey@gmail.com (KM) wrote:

*>When the digital line is logic low at 0 volt the transistor turn on
>and current flow via the resistor R2. (choose R1 & R2 to be loage
>value eg. 47k not to stress the IC sink cabability) and when the the
>line turn to high the transistor turn off.*

Thanks! After my first post on this (where I'd entirely forgotten to mention the method), I decided to dance around your posted circuit in my second post but to hold back from actually posting it until a third addition I wanted to make today, wondering if someone would mention this exact alternative! Now, no need.

Some hobbyist thoughts:

A fair design might use a 220k in the base, planning a current gain of only 25 for reasonable saturation, $((5-.2)/47k)/((1.5-.6)/220k)$, and not much increase in drive current over what's already needed. However, it's speed tops out at about 50kHz or so, while still pulling 100uA drive current when low. My first posted example design (using 1/2 sized R1 and R2 of what I posted) is also good to about 50kHz, but by comparison pulls only tens of nanoamps of drive current. Also, my second post which includes the circuit quite similar to yours, but with the base resistor removed and an emitter resistor added, and designing it for about the same 100uA drive current and similar output impedance yields a top speed of about 500kHz — 10 times better. The output swing is a little less, 4V instead of 5V, but that's not enough to account for the difference. Why then?

Jon