

## Re: V/F converter: Lm331

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*Source:* <http://sci.tech-archive.net/Archive/sci.electronics.design/2006-04/msg04633.html>

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- *From:* "Supreme Lord of All Assholes, Ha!" <[re\\_colossale@xxxxxxxxx](mailto:re_colossale@xxxxxxxxx)>
  - *Date:* 30 Apr 2006 12:26:07 -0700
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DaveM wrote:

I don't know which datasheet you're looking at, but the one I downloaded from national.com has some great examples of a voltage-frequency converter, and includes the design equations. Specifically what are you having trouble with? You might post a copy of your schematic here (ASCII art) or on alt.binaries.schematics.electronic (PDF/GIF/JPG images). You'll have a much better chance of getting good advice if we know what your circuit is.

Hi.

First of all, thank you for your interest, I'm in real trouble and knowing that out there someone has some knowledge of what I'm dealing with makes me feel really better :-)

I downloaded this datasheet: <http://www.national.com/ds/LM/LM231.pdf>

And this AN: [www.itiomar.it/pubblica/Telecomunicaz/applic\\_notes/an\\_LM331-6.pdf](http://www.itiomar.it/pubblica/Telecomunicaz/applic_notes/an_LM331-6.pdf)

I chose to try the schematic on page 2 of the AN ("Precision Relaxation Oscillator") because it seemed quite clear, simple and made up of few components.

Now, I wanted something which could go from about 0 to a thousand Hz, so I chose

1V = 220Hz (good old A2 :-)

5V = 1100 Hz

Then, I could determine the scale factor K in  $F = KV_i$  as 220.

The AN say  $f_{out} = V_i/V_r * R_s/R_l * 1/1,1 * R_t * C_t$

So,  $f_{out} = V_i * K$ , then  $K = 1/V_r * R_s/R_l * 1/1,1 * R_t * C_t$

The AN advices to use 1,9V as  $V_{ref}$ , so

$K = 220 = 1/1,9 * R_s/R_l * 1/1,1 * R_t * C_t$

$K = 220 = R_s/(2,09 * R_l * R_t * C_t)$

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I chose  $10 \cdot 10^{-9} = 10\text{nF}$  as  $C_t$  and  $10 \cdot 10^3 = 10\text{K}$  as  $R_l$  and  $R_t$ , thus having

$$K = 220 = R_s / (2,09 \cdot 10 \cdot 10^3 \cdot 10 \cdot 10^3 \cdot 10 \cdot 10^{-9})$$

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Simplified as

$$K = 220 = R_s / (2,09)$$

$$\text{So, } R_s = 220 \cdot 2,09 = 459 \text{ ohm.}$$

Now, I don't have a 459 ohm resistor, but I do have a shiny 470 one, plus a cookie tin box full of trimmers which can be put in parallel with the 470R :-)

The AN doesn't say anything about  $C_l$ , so I decided to use another 10n.

So:

$$K = 220$$

$$R_s = \text{circa } 459 = 470 // \text{Trimmer}$$

$$R_l = 10\text{K}$$

$$R_t = 10\text{K}$$

$$C_t = 10\text{n}$$

$$C_l = 10\text{n}$$

$$V_{\text{ref}} = 1,9$$

I grabbed the components and started to breadboard it.

I omitted the trimmer in parallel to the 470 ohms, because at this stage accuracy is the last of my problems.

Picture of the circuit:

<http://img250.imageshack.us/img250/5208/sany16738si.jpg>

I plugged in my rusty Meterman pocket meter and started to measure frequencies.

Here's what i got:

$$0,5\text{V} \Rightarrow 2,22 \text{ Khz}$$

$$1\text{V} \Rightarrow 2,86 \text{ Khz}$$

$$2\text{V} \Rightarrow 3,92 \text{ Khz}$$

I double-checked everything, but It didn't help.

Then, *that* hateful little voice started to whisper *you're wrong!* *you're wrong!* you can't even get a cookbook-like application note to work! hahaha! loser!\*

So, I would be happy if someone helped me to make the voice shut up.

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With violence, if necessary.

A giant thank you in advance, any advice useful to get out of this s\*\*t is welcome!

Some days you're the dog, some days the hydrant.

:~)

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Me.

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