Re: Current source design (tricky?)

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2005−03/2079.html

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From: Terry Given (*my_name_at_ieee.org*)
Date: 03/12/05

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Date: Sat, 12 Mar 2005 13:32:07 +1300
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Larry Brasfield wrote:
> "Terry Given" <my_name@ieee.org> wrote in message
> news:qypYd.8841$1S4.942601@news.xtra.co.nz...
>
>>Larry Brasfield wrote:
>
> ...
>
>>>A number of op−amps on the market today are
>>>very tolerant of capacitive loading because they
>>>have a feature whereby that loading causes the
>>>gain−bandwidth of the part to drop, almost in
>>>proportion to the loading, such that the extra
>>>pole remains far enough above the unity gain
>>>crossover frequency that stability is preserved.
>>>The LM8261 suggested by Mr. Hill is a good
>>>example of this class.
>>
>>I have been bitten quite badly by a similar "feature" in
>>the LM6134 (its a slew−rate modification).
>
>
> The feature I mentioned above works by causing the
> effective value of an internal capacitance to increase.
> So it changes both the linear small−signal response
> (less GBW) and the slew limiting (slower).
>
> The adaptive slewing feature that National (sort
> of) describes in the LM6134 datasheet is not the
> same thing at all. It operates by increasing the
> amount of current available for slewing under
> certain large signal input conditions.

Yeah. Your previous comment made me have a look again, and it was clearly a different beast altogether from what you described (hence my clever use of weasel−words eg "similar").
>
> As for the problem you had with it, I would not

> *deem it a biting feature so much as a reason to*
> *not use it without understanding it better. I will*
> *say, however, that mode changing circuitry for*
> *the alleged benefit of large signal conditions is*
> *something that usually gives me the willys.*
>

It seriously put the shits up my HPF. replacing the opamp with a TLV274ACD solved the problem completely, and said problem hadn't existed before I tried the LM6134. I didn't investigate too thoroughly exactly why it was screwing up the circuit, merely confirmed that it did.

Originally I used TL074s, and it worked very well except for power consumption. I wanted a little more gain and lower power, so tried the LM6134. During the ensuing unpleasant experience I improved my analytic model for the HPF to explicitly include GBW. For GBW to make the LM6134 oscillate it needed to drop to about 1MHz c.f. the nominal 10MHz of the part. When I switched to the TLV274, I had a sufficiently accurate model that I could push the gain at Fc as high as I needed to whilst still controlling phase margin (and hence stability).

We have quite a few LM6134s kicking around now. I did read the datasheet first, but as part of the purpose of this "feature" is to drive capacitive loads, I assumed we would be OK. My purchasing guy hates me now though :)

In terms of understanding it better, thats a fairly neat trick based on the datasheet alone − they have a brief waffly story, but thats about it. If I was in the US I'd have rung NS and talked to an apps engineer, but I'm not so I didn't. I did a brief search at NS but didn't find any more info. It is also interesting that, unlike many opamp data sheets, active filter circuits are *not* shown for the LM6134. I think I know why.....

BTW Fo = 100kHz, Go = 6 for the HPF in question.

Cheers
Terry