

Re: Transimpedance amplifier for POF photodiode

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FWIW:

Last week I built a transimpedance amp with a theoretical gain of 1000V/uA (0.5V/nW). It is based on the circuit on page 7 (figure 7) of the TI OPA129 datasheet, with the following changes:

I used a Perkin-Elmer VTP1188S photodiode.

A 0.1uF capacitor is in series with the input to the amplifier (AC-coupled).

I did not use a small gain peaking prevention capacitor.

I used two 9V batteries instead of the +/-15V supplies.

I did not use a guard.

Yes, I did not use a guard trace around the inputs to prevent leakage currents. Instead, I built the circuit with the OPA129 in the 'dead bug' position (leads in the air). I put the gain resistor about .005 inches off the surface of the bottom of the OPA129. I think this will reduce leakage currents as well as or even better than a guard trace, as the only paths to non-input level voltages are through the air. To connect things together I used uninsulated 30 gauge solid wire. I put the whole thing on a 1" square piece of copper clad circuit board. I made a few 'traces' on the circuit board for input, output, power, ground, and the photodiode and used those connections to actually hold the whole deal in place. All parts were samples ordered from Ohmcraft, Texas Instruments, and Perkin-Elmer. Everything was cleaned very well with alcohol after assembly. I put the circuit in a small aluminum enclosure with a BNC for output and a hole for the photodiode to see out of. The batteries went in the enclosure and the enclosure was tied to ground.

I was amazed how sensitive it was, I had to cover the whole thing in a cardboard box with a big shroud of 5mil black plastic to shield out 60/120Hz light. I was able to pick up modulated light up to a few khz. There was gain peaking at around 900Hz. The capacitance across the feedback resistor is probably very low, a gain peaking prevention capacitor might help here.

I haven't yet actually tested its sensitivity because I haven't had the time to setup a known output power light source and measure it.

I had to add the input capacitor because the circuit would saturate without it.

I didn't expect the input capacitor to work without some kind of additional resistor to drain it, but it does! I think its because the input bias current of the OPA129 is 30fA, and that would take 30 million seconds to charge 0.1uF to 1V.

The circuit is unusable in any kind of ambient light, its just too sensitive. Even the slightest bit of 60Hz light causes it to go rail to rail clipping. I havent tried DC light yet, but I think its safe to say you cant use this in sunlight.

Does anyone know how I could cause the circuit to ignore DC light without compromising its high sensitivity of 1000V/uA? I was thinking an inductor in the feedback loop but any inductor will have much lower than 1Gohm impedance at low frequencies where this circuit operates (not to mention large capacitance).

Asa

news:<760870b.0409300752.169c9634@posting.google.com>...

> *Hello everybody..*

>

> *I'm trying to built a simple transimpedance amplifier for a Plastic*

> *Optical Fibre (POF) photodiode (E05 EM PIN ST 001). I'm using an*

> *OPA2277 operational amplifier (+15 -15 as power supply) and a 1Mohm*

> *resistance as feedback. This should give me a transimpedance of app.*

> *1V/uA.*

> *The diode is biased at 7.5V and is connected between ground and the*

> *non-inverting op. amp node.*

> *The source power I'm trying to detect is very small (nWatt app.) and*

> *the diode sensitivity should be around 0.5A/W.*

> *I should see something like some mV at the output (too small signal).*

> *Any Idea to make things run better????*

>

> *Thanks a lot...*

>

> *Nicola*