

Re: Looking for two-input comparator with hysteresis

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- *From:* Jim Thompson <[To-Email-Use-The-Envelope-Icon@xxxxxxxxxxxxxxxxx](mailto:To-Email-Use-The-Envelope-Icon@xxxxxxxxxxxxxxxxx)>
  - *Date:* Thu, 25 May 2006 09:40:53 -0700
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On Thu, 25 May 2006 09:37:04 -0700, John Larkin  
<[jjlarkin@xx](mailto:jjlarkin@xx)> wrote:

On Thu, 25 May 2006 07:57:02 -0700, Jim Thompson  
<[To-Email-Use-The-Envelope-Icon@xxxxxxxxxxxxxxxxx](mailto:To-Email-Use-The-Envelope-Icon@xxxxxxxxxxxxxxxxx)> wrote:

On Wed, 24 May 2006 22:05:02 -0700, John Larkin  
<[jjlarkin@xx](mailto:jjlarkin@xx)> wrote:

On Wed, 24 May 2006 23:21:16 -0400, krw  
<[krw@xxxxxxxxx](mailto:krw@xxxxxxxxx)> wrote:

Some day I'll explain ESD  
diodes to you, if you ask  
real nice.

...and why you *\*really\** don't want to use  
them as part of your  
circuit, I presume.

OK, why not? I's been a couple of decades since people  
figured out  
CMOS latchup and took suitable precautions. Modern HC  
parts are spec'd  
to handle numbers like 50 mA without problems.

John

The "suitable precautions" only prevent frying. They don't prevent  
copious amounts of substrate current flow... substantially more than

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you inserted, due to PNP action.

The "diodes" (they're actually isolation tubs that, with the adjacent diffusions, can act as bipolar transistors) are only rated for transient ESD events, NOT for clamping slow signals.

But go ahead and use them as clamps... I certainly don't care if your circuits up and fry for "magical" reasons.

I NEVER rely on ESD diodes for clamping... VERY BAD engineering practice.

...Jim Thompson

The only "bad engineering practice" is doing something that doesn't work. But usually BEP means "something I don't like."

Suppose I set up an HC14 and provide for measuring  $I_{cc}$ . Now I force a range of + and - currents into one input. Things that might happen are...

1. Some parasitic transistor is turned on and  $I_{cc}$  increases.
2. Some parasitic SCR turns on and the whole chip latches.
3. Some other phenom that I can't predict.
4. One of the above, plus the output level gets wrong.
5. None of the above, the diodes act like diodes.

So which will happen? If you'll make predictions, I'll go into the lab and try it.

John

Hard to predict... but it'll be brand dependent. ESD structures are a black art and are different for every foundry.

Why don't you try it and report back (and specify brand of 'HC14)?

...Jim Thompson

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Re: Looking for two-input comparator with hysteresis

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| <http://www.analog-innovations.com> | 1962 |

I love to cook with wine. Sometimes I even put it in the food.

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