

Blinky: LED driver makes simple IDE DMA detector



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"Blinky": LED driver makes simple IDE DMA detector

by Mike Stember, Field Apps Engineer

I frequently received requests from some of the software engineers to verify correct functioning of an IBM PC compatible hard drive. In particular, they had no good way to verify that the DMA (direct memory access) functions were working, as they could not see the DMA request and DMA-acknowledge handshake.

The first time or two the request came in, I would drag an oscilloscope into the software engineer's office, probe the DMA request and DMA-acknowledge line and verify handshaking was going on. This was tiresome the second time it happened. Then I decided we only needed to check the DMA request line from the hard drive. If it became active and the system did not hang, then the handshaking must be occurring. This also got old quickly.

Then I noted the duty cycle of the DMA request was high enough that it would probably register on a voltmeter. This worked and was more portable than an oscilloscope. I tried to show the software engineers how to probe with a voltmeter but was rejected. It was too easy to slip with the probe, short some signals out and let the "magic smoke" out of some parts.

One software engineer recommended we just hook up an LED to the DMA request line from the hard drive. I pointed out an LED will typically take 10 to 20mA, which would destroy the signal level and timing on the signal. However, it was the nugget of a good idea. If we could drive an LED in such a way that the loading would be very light on the DMA request line, even a software engineer would have no trouble telling a blinking LED from a dark LED.

So, I developed a very small circuit to do the job. (Please see schematic.) Note the DMA request line is loaded down only by the capacitance of the gate of the small 2N7002 FET. Any small signal can be substituted.

No decoupling capacitance is used here as the 5V supply is, worst case, "shorted" into a 200 ohm load. Also note, ground from the hard drive cable is not used; the ground circuit back through the power supply is used as a reference to activate the FET. These items simplify assembly.

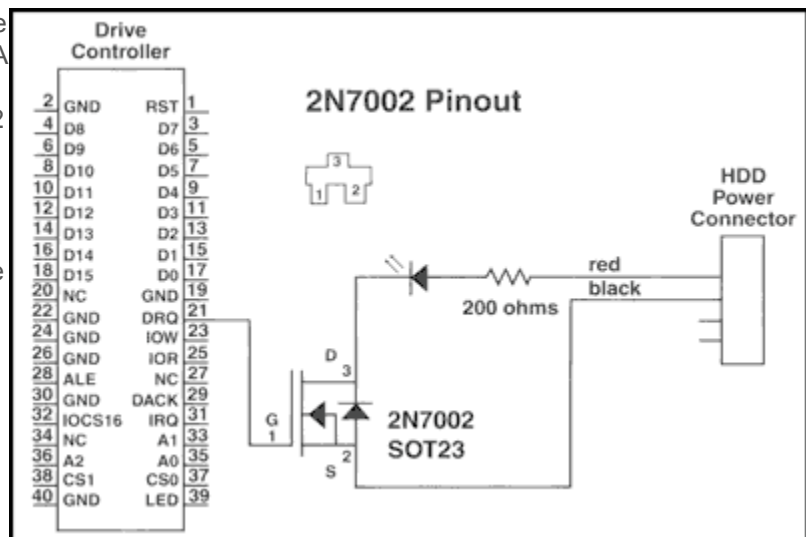
Guess what we called it

Since the development of the hard drive DMA detector, it has been nicknamed "Blinky." Cheap enough, we now incorporate the circuit into every motherboard we design.

"Blinky" is used in a system with a single drive and plugged into the unused drive connector on a typical IDE cable. It will work for 40- or 80-pin IDE cables. The power is supplied from a spare IDE hard drive power cable available on the system's ATX power supply. The power cable was cut off of a old CPU cooler fan. A shrouded keyed connector is highly recommended.

If you should need to detect DMA activity in a system which has two IDE devices attached to a single channel you can:

- Pull out a voltmeter



- Add a fourth connector to the typical IDE cable to attach "Blinky."
- Build "Blinky" with a pass through type connector typically used for PC104 systems, plug it into the motherboard and then attach the standard IDE cable to the bottom side.

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