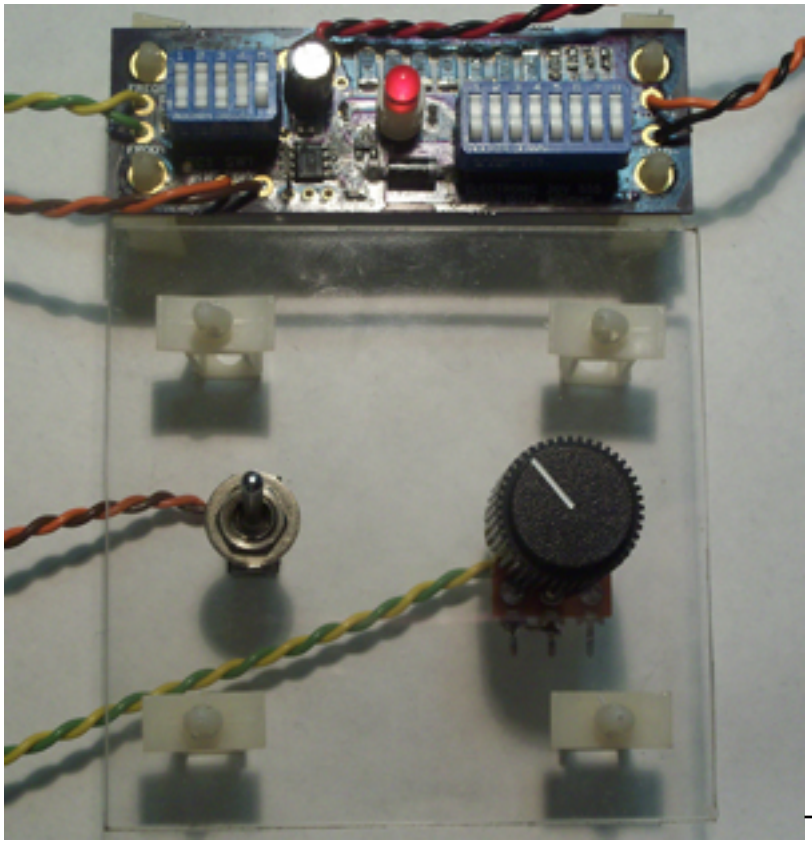
Low power, low-cost testing

M. Simon

 I'm sure some of you were wondering about the board I described in A Beauty [1]. What is it for? It is an electronic load of sorts for power supply testing. Low power (under a watt) power supply testing. The principle is simple. You apply a pulsing load to the power supply and watch its response. Look for peaks and dips in the output as the frequency of the load is varied. It is an old trick but it was first taught to me by a power supply engineer when I did a stint at Zenith Computer (RIP) in the late '90s.

You can see the schematic here [2] if you want to follow along. Click on the schematic to enlarge it.

 To keep the costs down and reduce the design time I made the load (resistive) variable in a binary manner. 1, 2,

4, 8 etc. using dip switches. The load can also be made fixed (in the same binary manner) by flipping a switch. In the pulsed mode the load waveform is roughly a square wave. The load is clean out to past 100 KHz. More than adequate for most power supply testing. It does start glitching (double pulsing) at about 150KHz due to the "long" wires (18 inches) that connect the frequency changing resistor to the board. I put the potentiometer off the board to keep the board cost and size down. The closer the potentiometer is mounted to the board the higher the frequency where the pulses are clean. The board does go down to about 1 Hz. That gives a range of better than 100,000 to 1. Plus DC. The switch next to the potentiometer will stop the pulsing if the potentiometer is set to the low frequency end of its range.

The load resistors are sized for the maximum voltage you want to test. The circuit maximum is 40 volts due to the tranzorb used to protect the transistor which is rated for 60 volts. I was interested in testing a 24 volt supply so the resistors on the board are sized for 30 volts maximum DC to give some margin for supply variation.

I will be reporting on the supply when the design and testing are done.

Also note that if you want to reproduce the boards yourself the Gerbers, a BOM with supplier part numbers, and the schematic design files [2] are for sale for $6 for the package. With the service listed at the page linked you can get the 1" by 3" boards made for $5 each (in multiples of 3).

I did do some modifications to the board. I used DIP sockets for the DIP switches to allow for changing the switches in case of a switch failure. That is really not necessary for the frequency range controlling DIP switch but I used one there because I like my designs to not only be functional but to also look pretty.

Also note that the power ratings on the schematic for the load resistors are minimums. For instance the lowest value resistors show a rating of 1/2 watt but the actual resistors used (and in the BOM) are rated for 3/4 watts.

Have fun. I did.

If you have any questions M. Simon's e-mail can be found on the sidebar at Space-Time Productions [3]. Or leave a comment here.

Links:
[1] http://www.ecnmag.com/blogs/2012/04/beauty
[2] http://spacetimepro.blogspot.com/2012/05/load-electronic-small-555.html
[3] http://spacetimepro.blogspot.com/