

Re: Please help: My experiment with a transistor switch.....

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There are so many things wrong here, but simply, the $f_t=100\text{MHz}$ parameter is a small signal characteristic, which is obtained under specific conditions... you're using the transistor in a large signal mode, as a switch, with significant overdrive which takes the device well into saturation.

Keeping in mind that this device is not rated for switching operation, you'll likely see fast turn-on times, but turnoff will be a problem because of stored charge which affects turnoff delay, as well as miller effect on rise-time characteristics once the device comes out of saturation.

royalmp2001 wrote:

I have been studying about using a transistor as a switch at:
<http://www.kpsec.freeuk.com/trancirc.htm>

I built a npn transistor switch on breadboard using a MPSA06 (HFE=100min, FT = 100MHz).

I have a 4.7K resistor connected to the base which I connect to a 0-10Mhz function generator that produces +5V square wave above 0V (positive going only).

I have a 470 Ohm resistor as the load and I connect a oscilloscope to the collector - emmitter.

The switch is powered by a 8V power supply.

I calculated the resistor values from the web site above.

I figured that as the transistor has a current gain bandwidth product of 100MHz I would have no problem with a 10MHz signal.

Well when I get upto around 4Khz, the mark to space ratio (duty cycle) starts to lessen and is no longer 1:1 (50% duty cycle).

When I get to 44Khz it is 1:2

Until finally at around 140-150Khz the spike is too narrow to see on the scope.

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If this is a 100Mhz transistor why is this happening?

I want to eventually build a switch running on a 25V power supply that will track upto 10Mhz or 20Mhz using a 2SC2078 driven by the 5V square wave signal.

The load will be high resistance(>10K) with a 200 Ohm 5W power resistor in series with the output in case the output is short circuited.