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Title :4 BIT SYNCHRONOUS DOWN-COUNTER

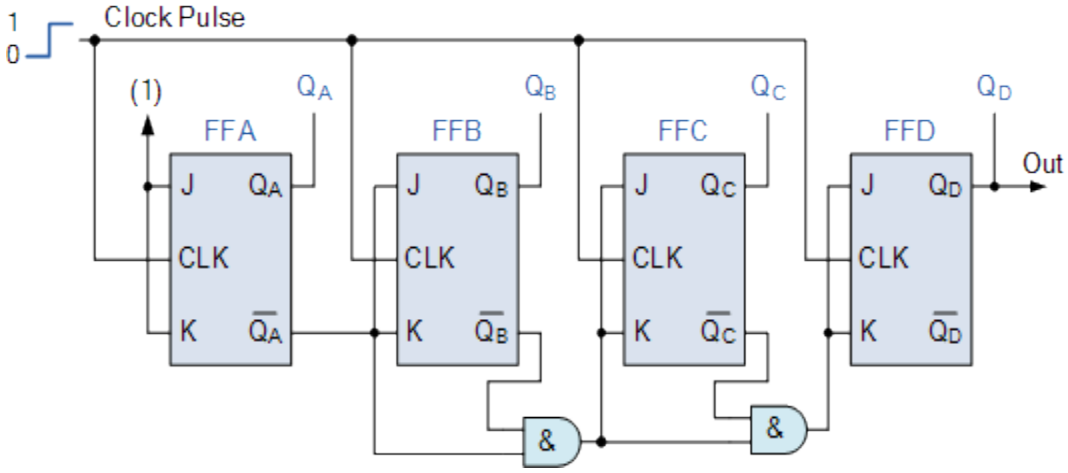
Abstract :

A counter is a device which stores (and sometimes displays) the number of times a particular event or process has occurred, often in relationship to a clock signal. Counters are used in digital electronics for counting purpose, they can count specific event happening in the circuit. In DOWN COUNTER a counter decreases count for every rising edge of clock.

A 4-bit Synchronous down counter starts its counting sequence from 1111 in binary i.e 15 in decimal and decrement in downward counting sequence by "one" for each clock pulse until it count reaches to 0000 in binary i.e 0 in decimal and then restart new counting cycle by getting reset itself from 1111 again.

In Synchronous DOWN COUNTER, the external clock signal is connected to the clock input of EVERY individual flip-flop within the counter so that all of the flip-flops are clocked together simultaneously (in parallel) at the same time giving a fixed time relationship. In other words, changes in the output occur in “synchronization” with the clock signal.

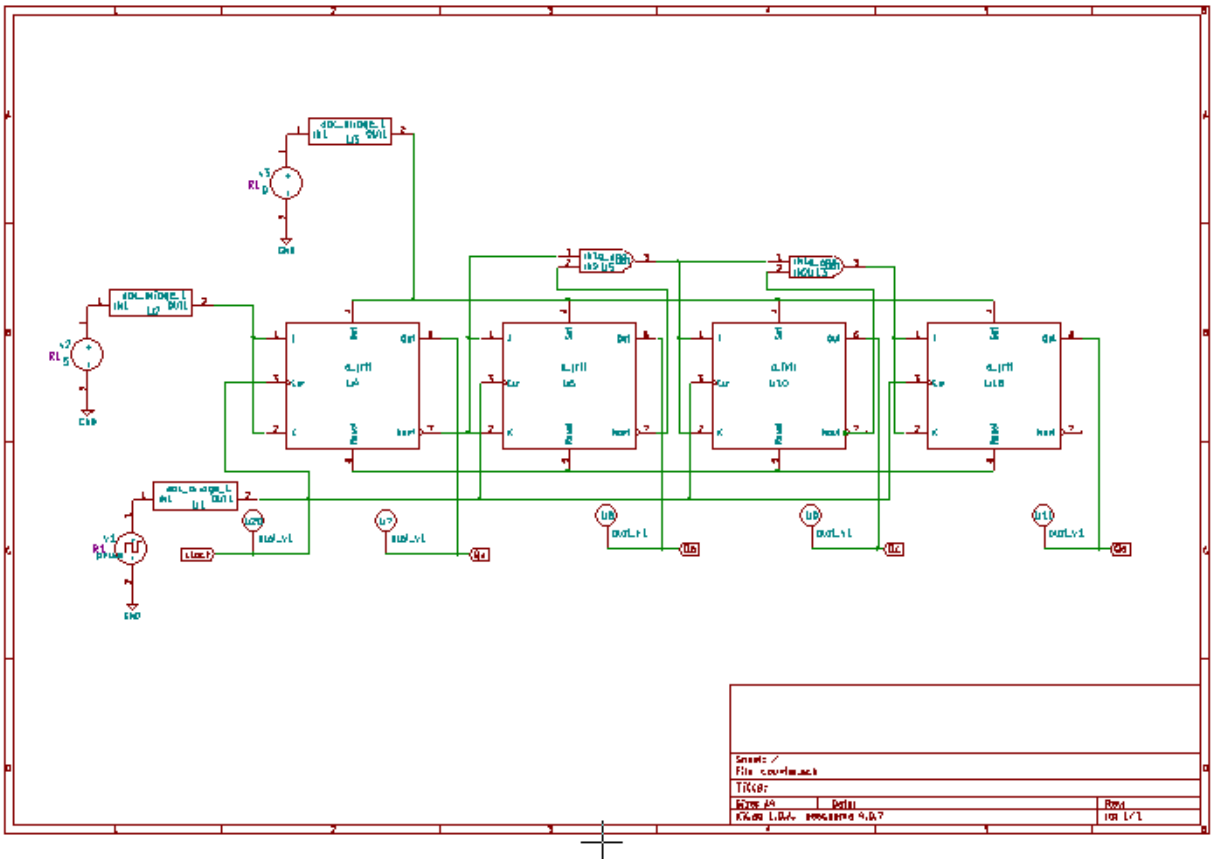
Circuit Diagram:

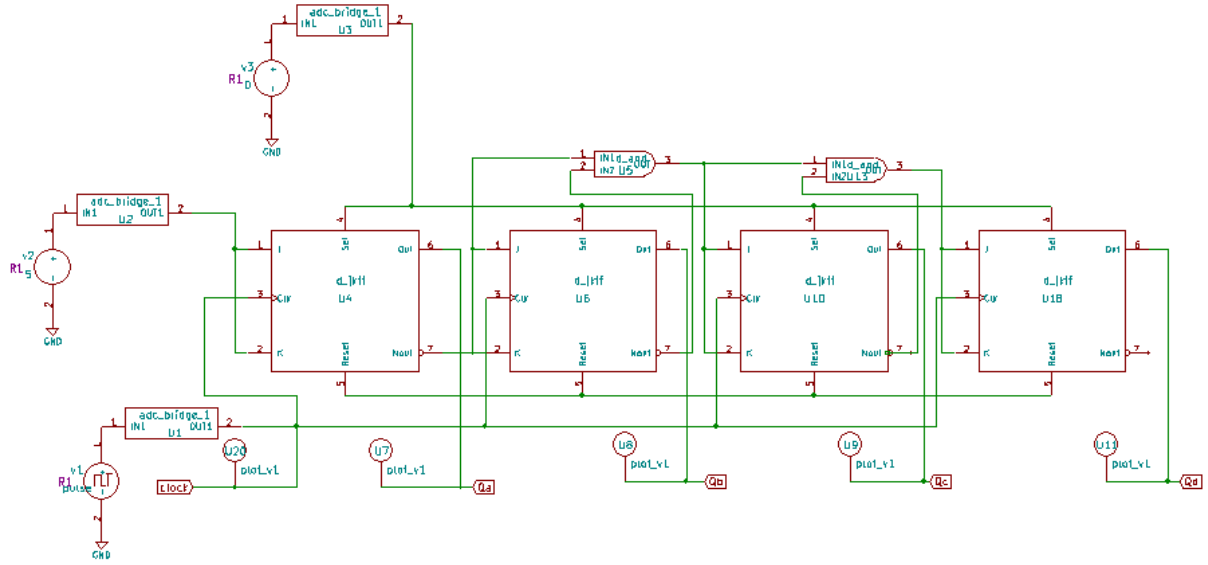


ESIM Required Components:

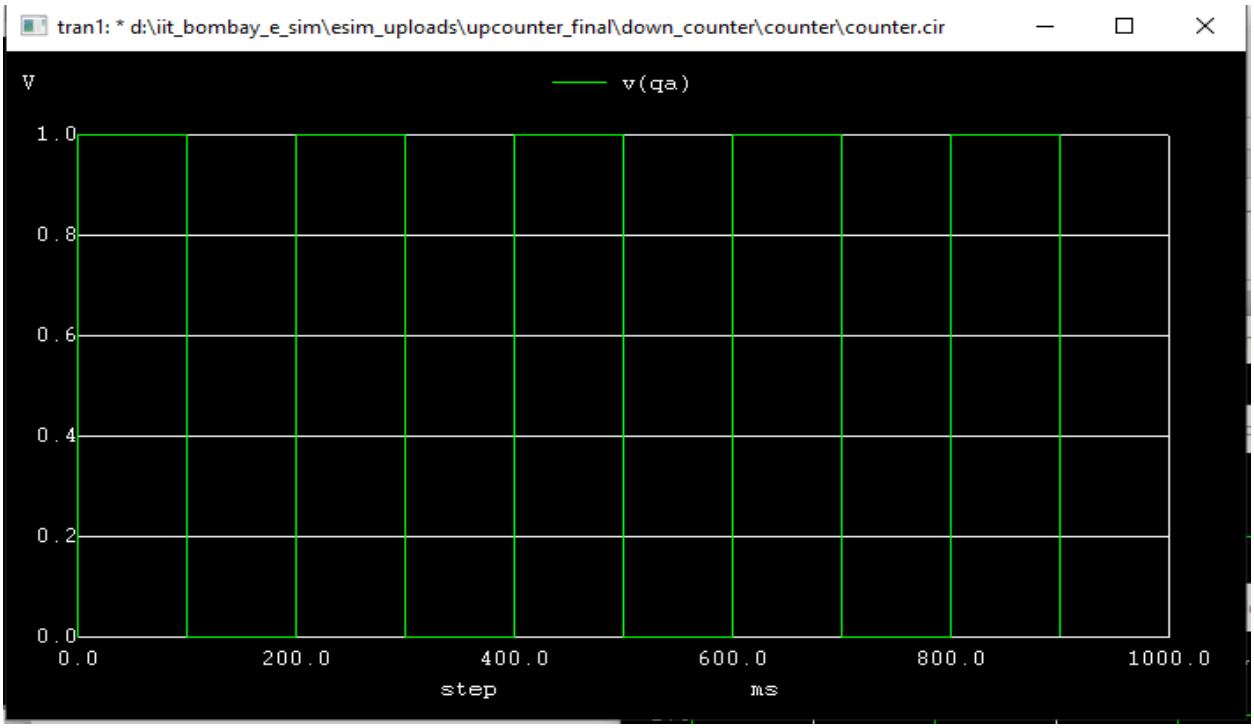
Synchronous up counter	
Component Name	**Type**
d_and	And gate
d_jkff	J-K Flip Flop
DC	DC voltage source
clock	clock input

ESIM Circuit design snapshot:

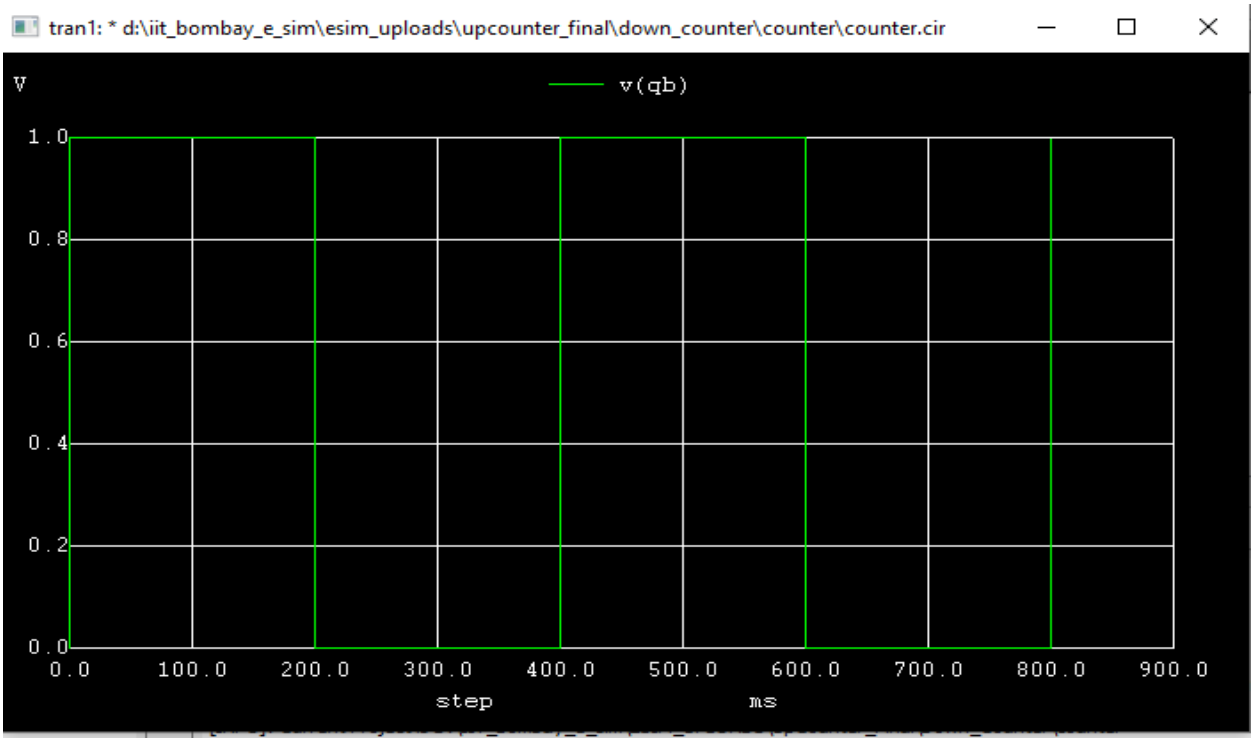




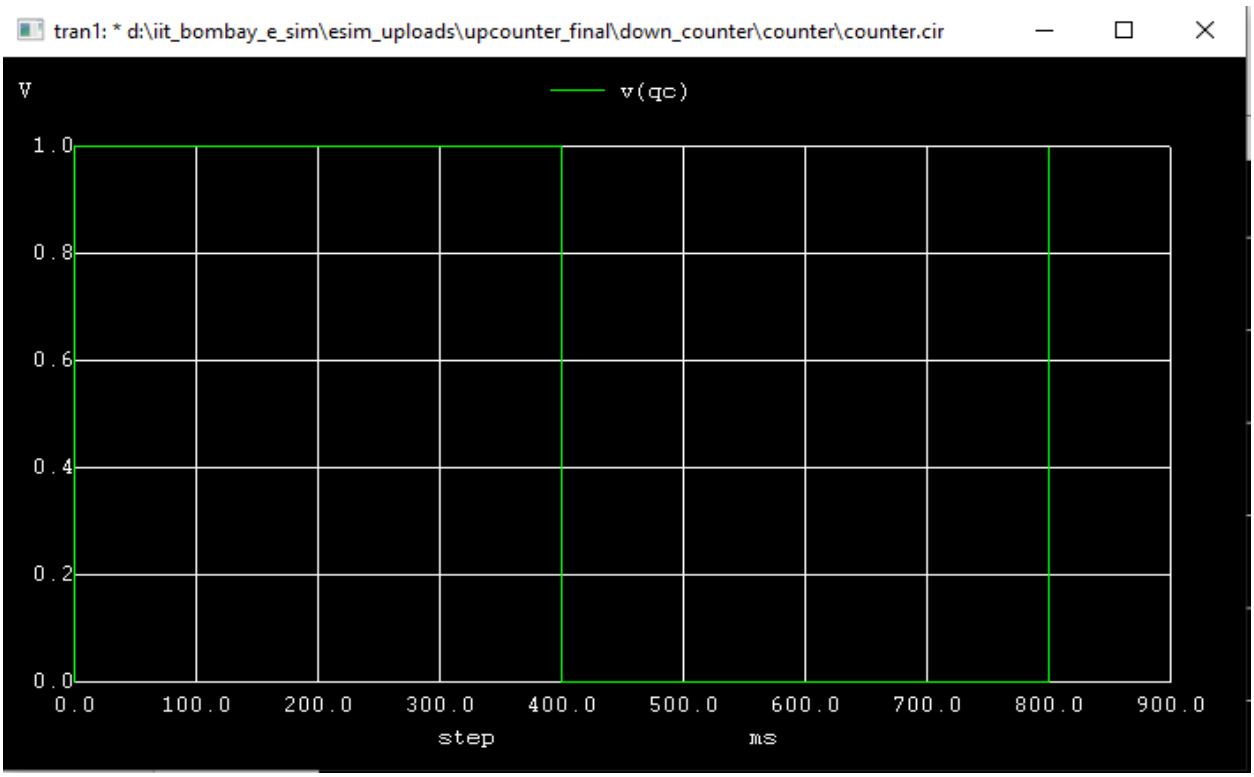
Graph for v(qa) vs time



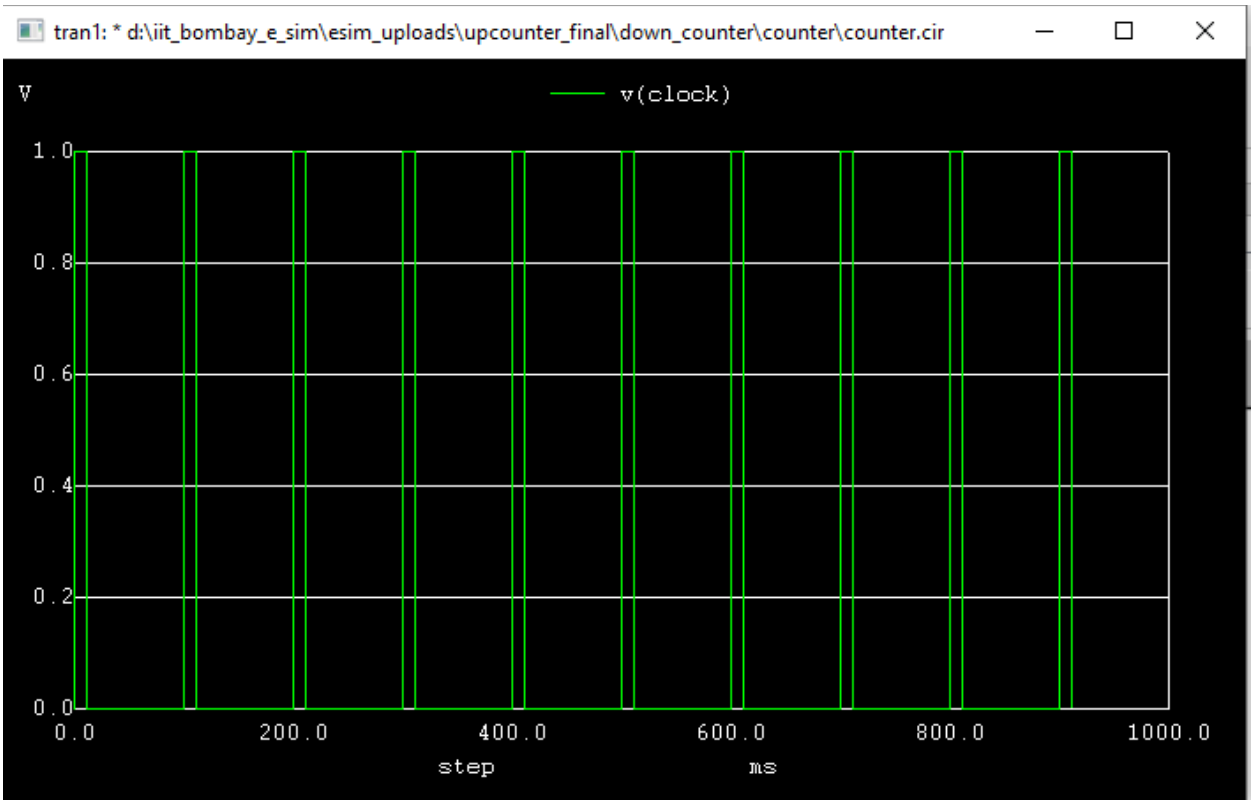
Graph for v(qb) vs time



Graph for v(qc) vs time



Graph for v-clock pulse



References:

- https://www.electronics-tutorials.ws/counter/count_3.html
- **http://ngspice.sourceforge.net/**