

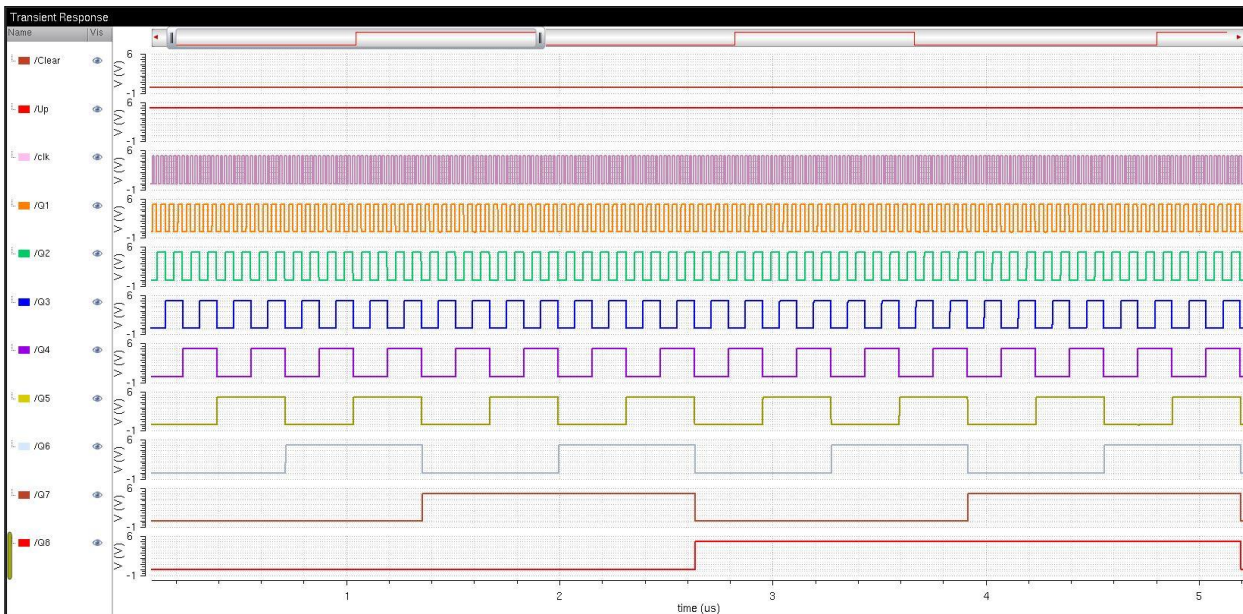
Chip 7 Testing Procedures

Circuit 1

8 bit Up/Down counter with clear.

The first circuit is an 8bit up/down counter with clear. Connect a 5 V dc power supply to pins 15 and 20 (positive terminal will connect to pin 15 and negative terminal to pin 20). Second, connect a function generator with a square wave (not less than 10ns period) to pin 16 (Clock in), then pin 17 to ground (connecting this pin to 5V will clear the counter). Pin 18 is to select the up and down function, with 5V the counter will count up with the rising edge of the clock and with 0V (grounded) will count down. Pins 7-14 are the outputs, please note that the LSB is connected to pin 14 and the MSB is pin 7.

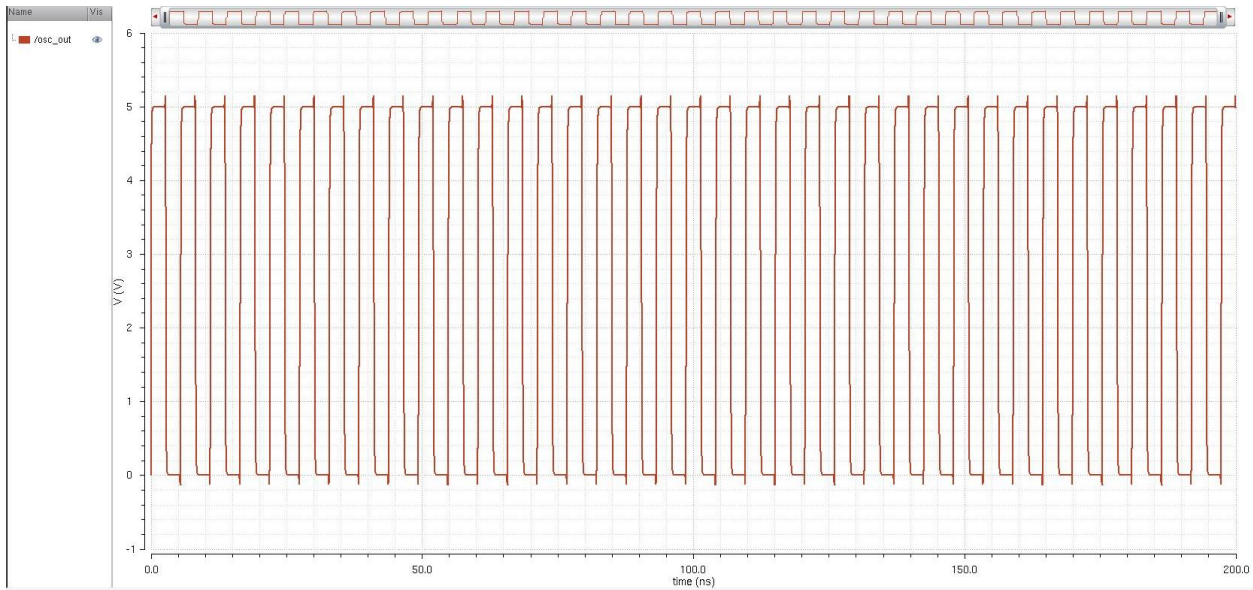
With an oscilloscope these are the waveforms that should be obtained. Note each of the outputs is connected to a buffer, to drive the oscilloscope. Full count 0-255.



Circuit 2

31-stage ring oscillator with output buffer.

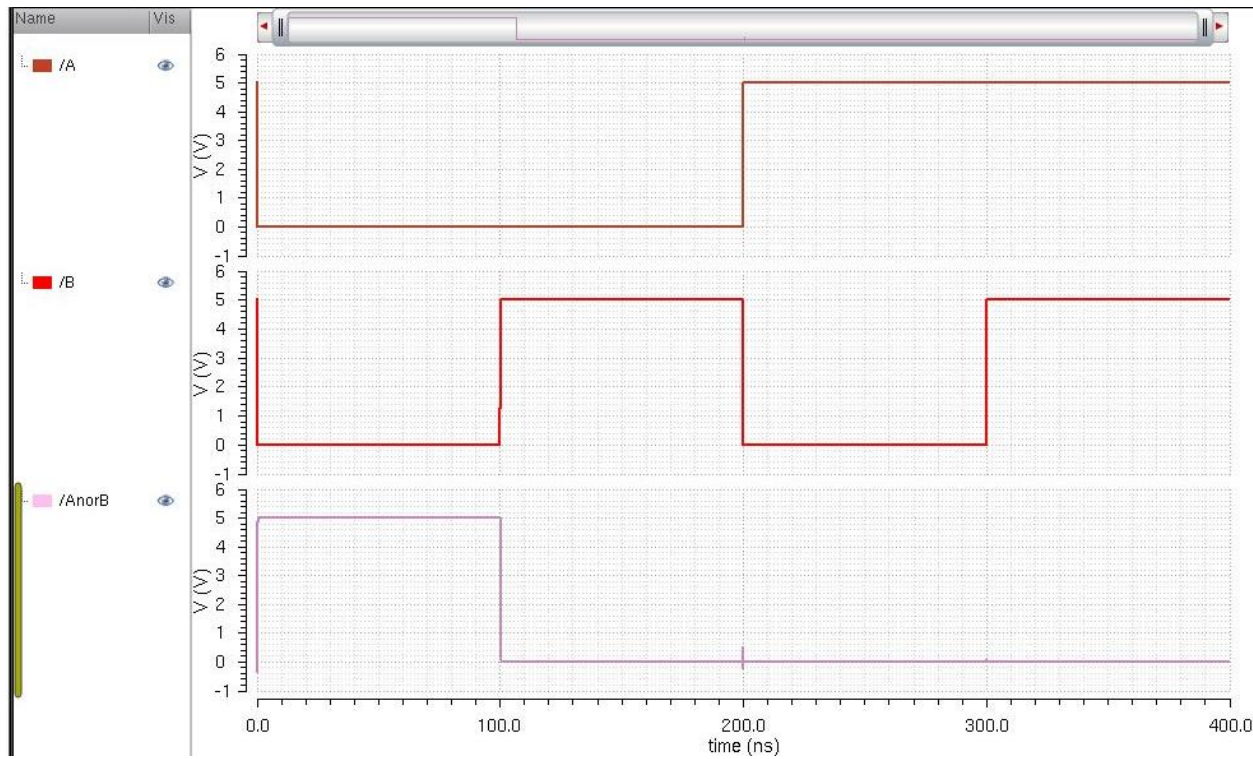
This is a more simple circuit, all it needs is 5V on pin 3, ground on pin 20 and the output pin 4. The out frequency is about 170 MHz.



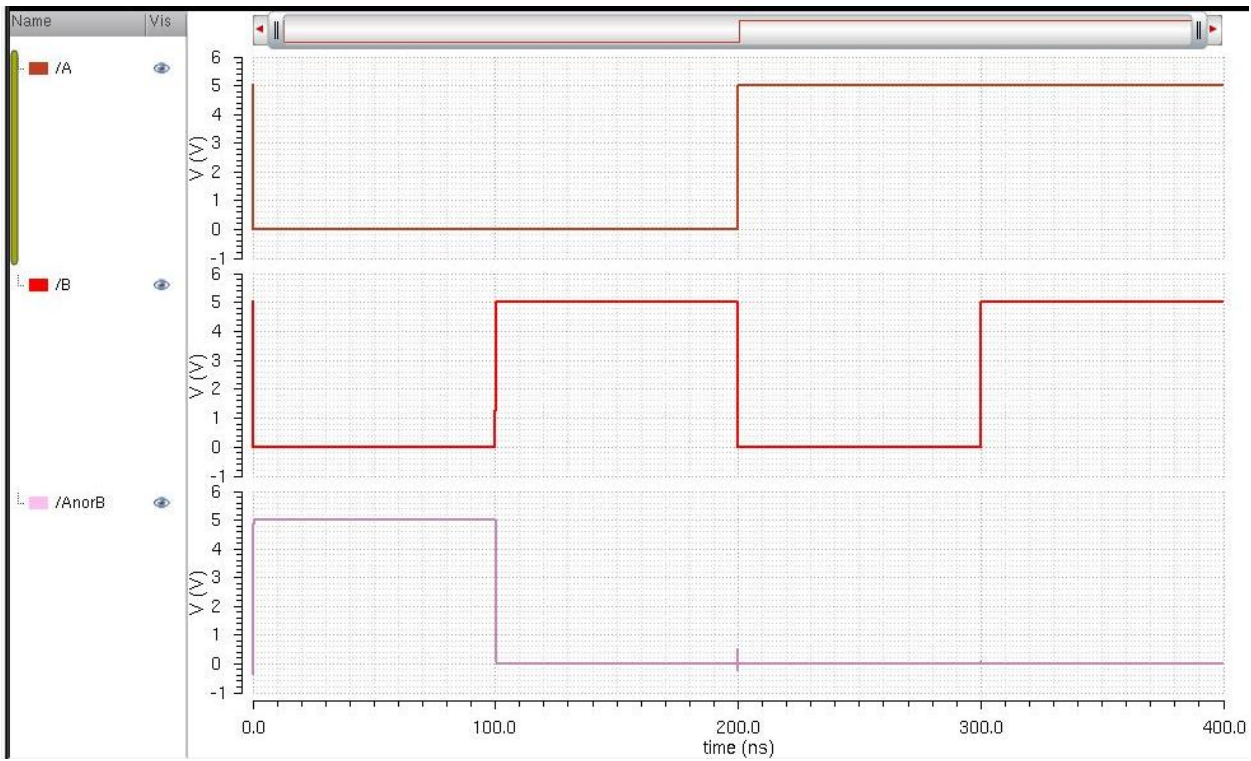
Circuit 3

2 input NAND and NOR and inverter

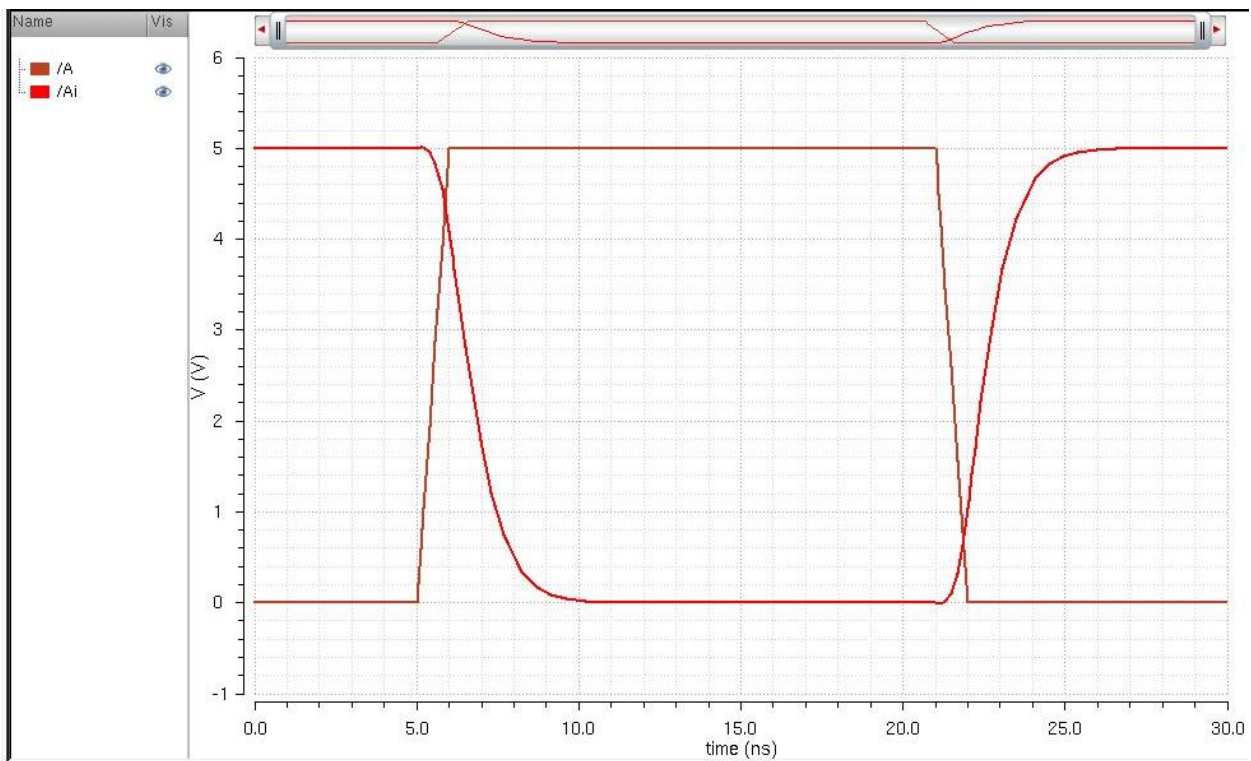
For the NAND gate pin 22 is +5V and pin 20 ground. The inputs are 22 and 23 (A and B), output pin is 24



For the NOR gate pin 25 is +5V and pin 20 ground. The inputs are 26 and 27 (A and B), output pin is 28

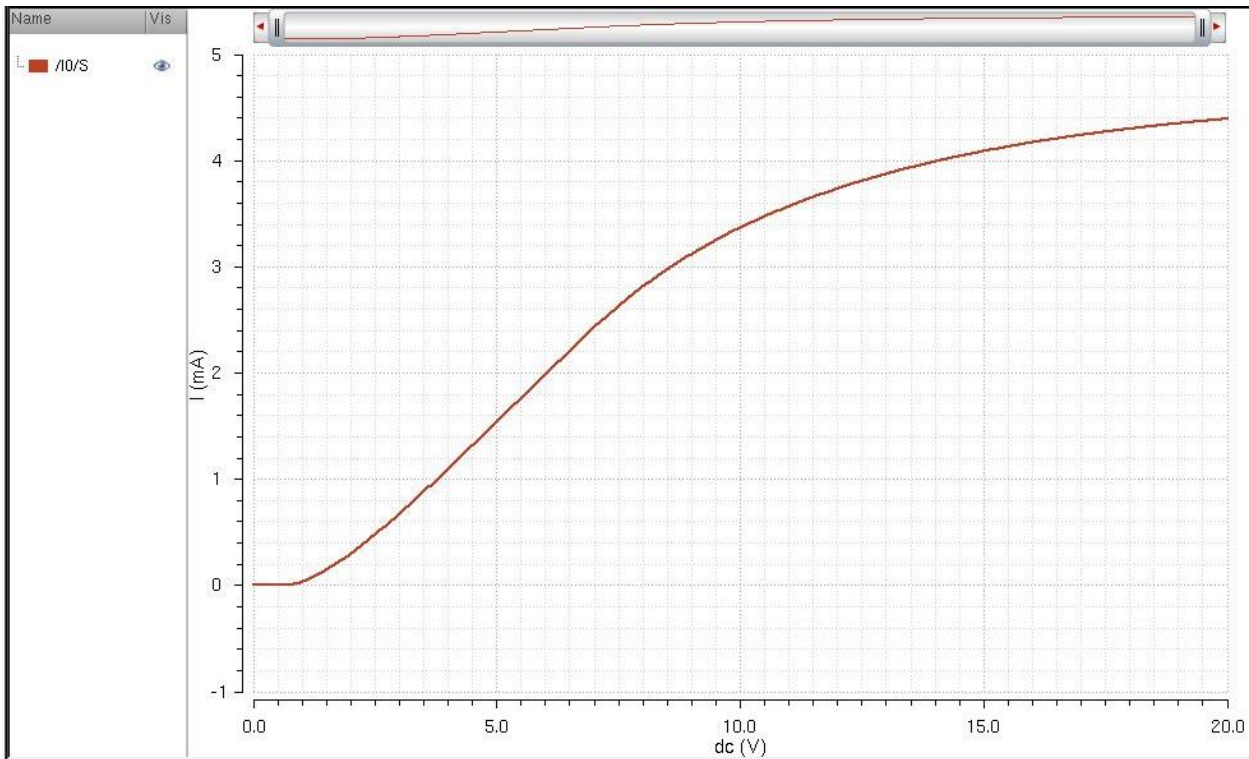


For the inverter, pin 39 is +5V and pin 20 ground. The input is 37, output pin is 38.

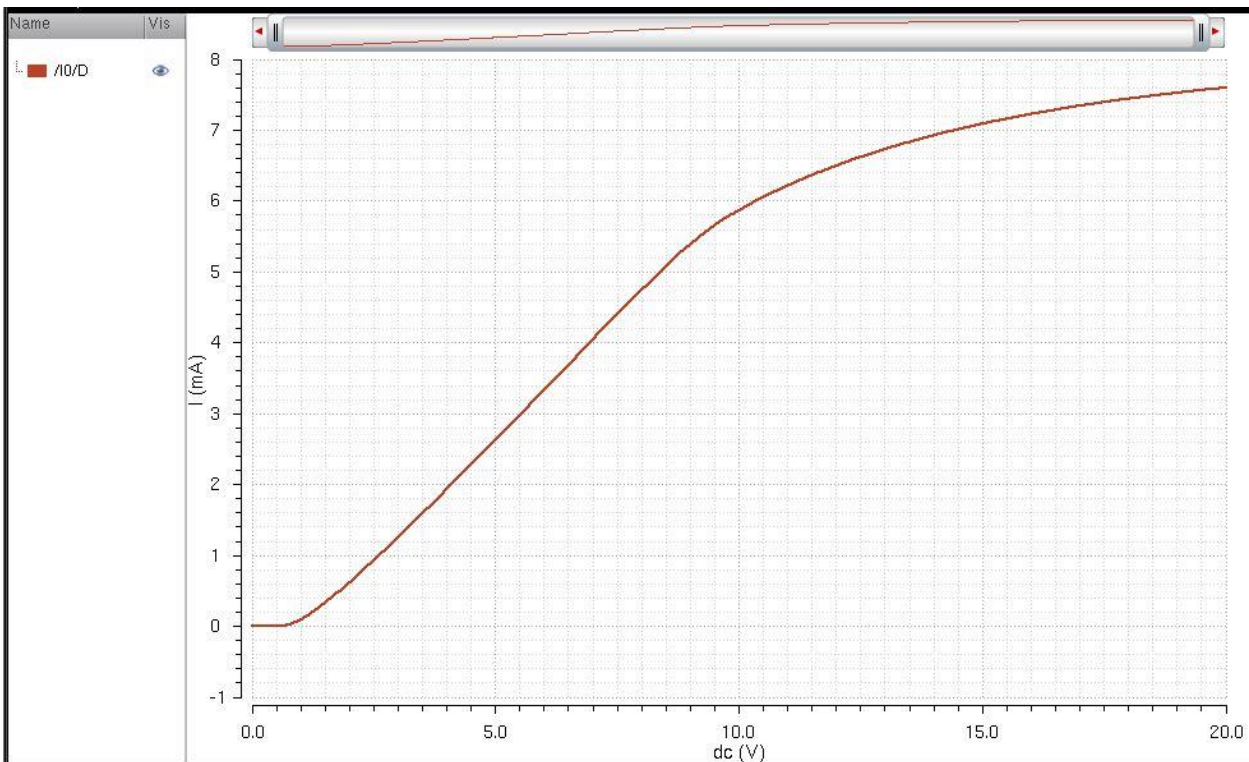


MOS Devices

The pins for the PMOS are as follow; pin 29 source, pin 30 gate, pin 31 drain and 32 is the body. This the IV curve I_d vs V_{SG}



The pins for the NMOS are as follow; pin 33 source, pin 34 gate, pin 35 drain and the body is grounded that's why there is no pin. This the IV curve I_d vs V_{GS}



Circuit 4

Voltage divider using a 10k ohm and 25k ohm resistors. V_{in} is pin 6, pin 5 is V_{out} and pin 20 is ground. The general formula to calculate V_{out} is $\frac{5}{7} \times V_{in}$. To measure the resistance on the 10k resistor place the ohmmeter between pins 5 and 6, for the 25k resistor use pin 5 and pin 20. The 10k resistor should be around 10.21k ohms and the 25k is about 25.01k.

