2K20/EC/016 AGAM SHARMA

ELECTRONICS AND COMMUNICATION DEPARTMENT (DTU)

DESIGN OF VOLTAGE CONTROLLED OSCILLATOR USING CMOS INVERTERS.

The Voltage Controlled Oscillator is the basis of many modern electronics, including telecommunications.

Therefore, the VCO must operate in the GHz frequency range. This project describes the design and implementation of a five-phase, current-free CMOS voltage-controlled oscillator for use in a phase-locked loop. The current VCO is a simple ring oscillator made up of stepping inverters.

CMOS is also sometimes called Complementary Symmetry Metal Oxide Semiconductor (or COS-MOS). Section "Complementary Symmetry" refers to the CMOS digital design which uses complementary and symmetrical p-type and n-type metal-oxide semiconductor field-effect transistor (MOSFETs) pairs to implement logic functions. A Voltage Controlled Oscillator or VCO is an electronic oscillator designed to oscillate at a frequency of by controlling voltage. The frequency of oscillates differently with the electronic controller. A Voltage Controlled Oscillator or VCO is an electronic oscillator designed to control the oscillating frequency of the with the input voltage. It produces a controllable clock at -50% to +50% of the average value.

Section Oscillation frequency changes with reference DC voltage "Vcon". The Current Starved VCO is a ring oscillator based VCO with an additional CMOS that follows the current to the inverter

The ring oscillator has multiple delay stages, the feeds the output of the last stage for the first time. input processing. The current starved VCO is designed using a ring

oscillator and works similarly. As can be seen from the circuit schematic MOSFETs M1 and M2 act as inverters and MOSFETs M13 and M14 act as current sources.

Current parts M2 and M3, limits the current available for inverter M1 and M2. In other words, the inverter is below current. MOSFET M11 and M12 flow current are the same and adjusted by voltage control. Current in M11 and M12 is reflected at each

inverter/current source stage. The upper PMOS transistor is connected to the gate of M11 and voltage is applied to the gate of all lower NMO transistors. The biased circuit is used to provide the correct polarization for the

M2 and M16 transistors. The advantage of this configuration is that the oscillation frequency can be changed by changing the value of the control voltage

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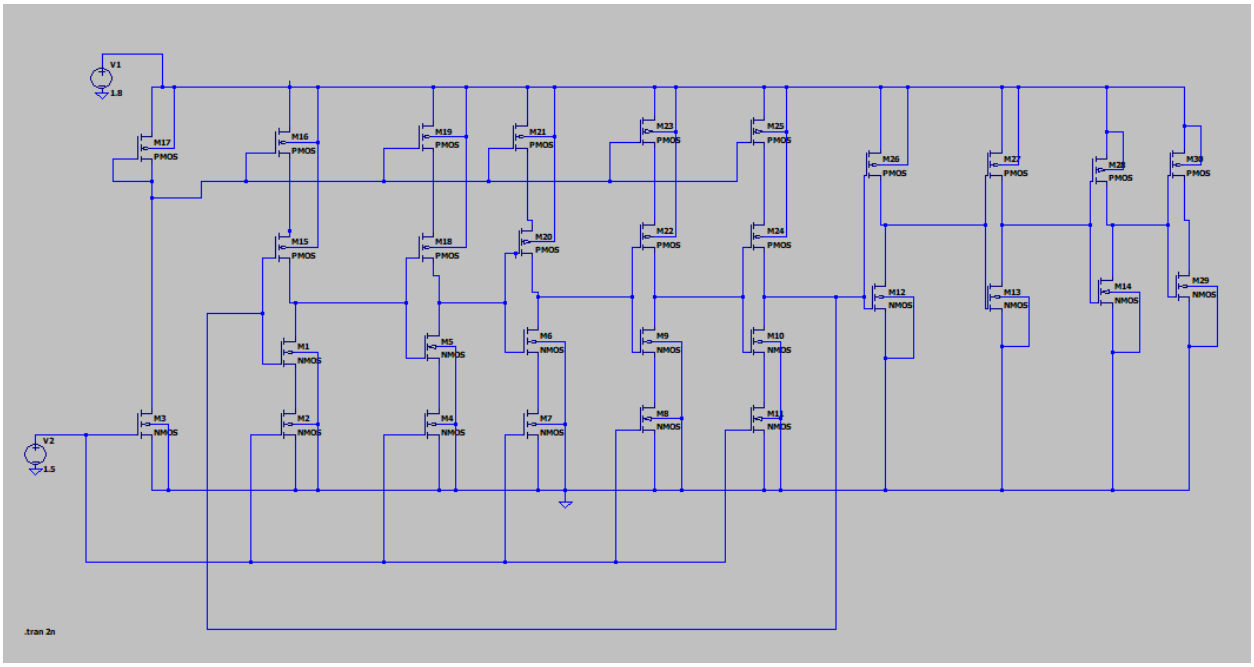
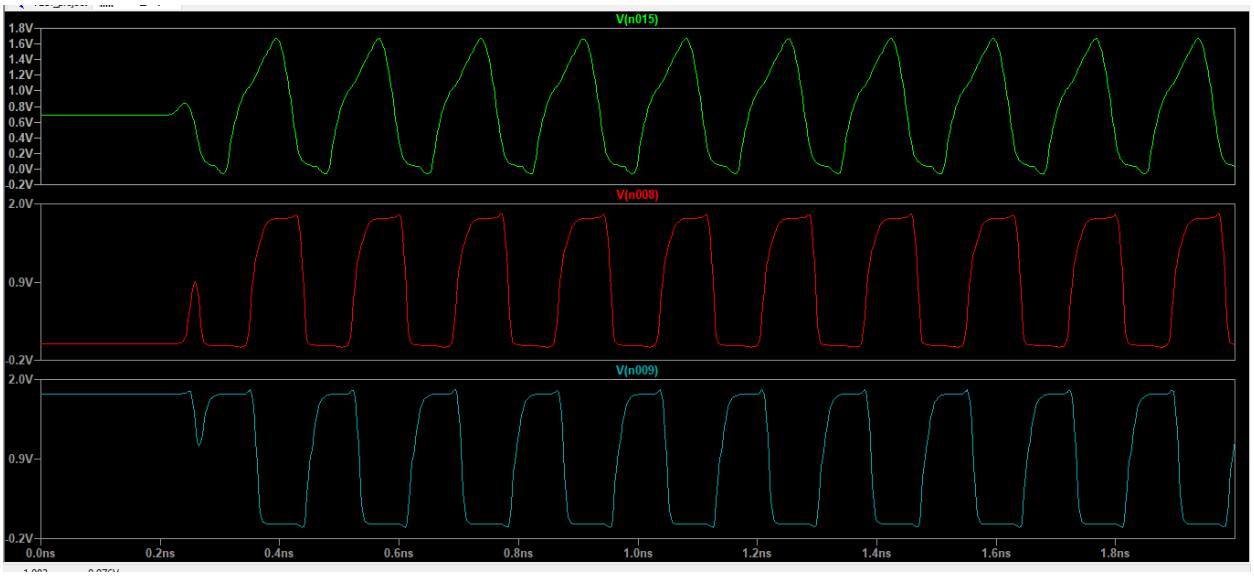
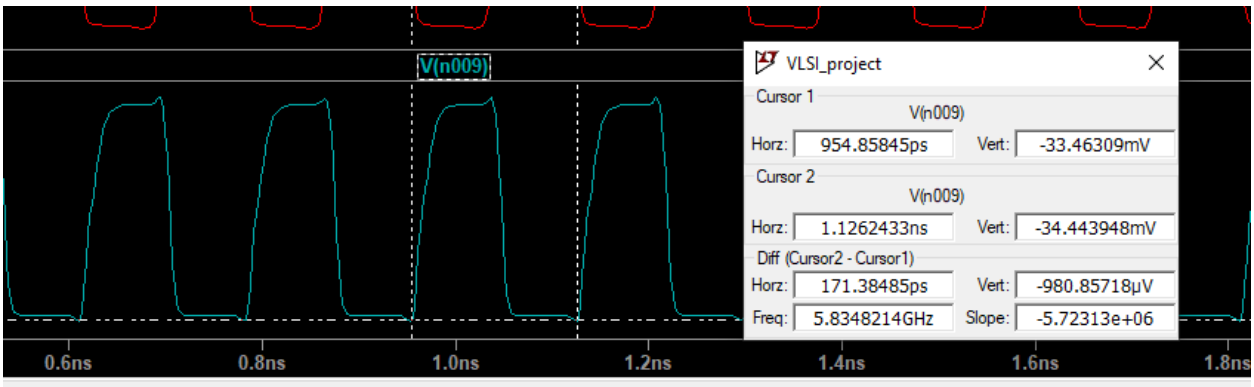


DEVICE SPECIFICATIONS

Device name	Type	Aspect ratio
M15-M28, M30	PMOS	450n/180n
M1-M14,M29	NMOS	180n/180n

SIMULATION RESULTS:





Frequency of the Oscillator is approximately 5.78 GHz.