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Low Power Consumptions Voltage Controlled Oscillator designed at nano scale technology for short range communications system

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ABSTRACT-
in the present article, a new topology-based oscillator circuit has been presented to design the voltage-controlled oscillator. complimentary compound pair i.e. RKTG pair topology has been used in designing this VCO and resistive feedback also has been taken. The most attractive feature of the presented topology are its low power consumptions and its ability to operate on the very low power supplies, Due to these properties we have present a new model of VCO using RKTG pair, this pair work up to mega to giga hertz. The circuit has been designed on Cadence Virtuoso software using 45nm technology. During analysis it is found that this RKTG pair is working smoothly from few Hz to giga Hz and their power consumptions is of µW level.
Key Words- VCO, RKTG Pair, Low power consumptions, low noise. Short range applications

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I. Introductions

In the field of radio communications, continuous and progressive progress is being seen in the field of communications applications without connections in small space. In the present time, there has been sudden increased in the demand for small equipment along with low cost and low power energy consumptions, the main resign for this is their ability to be carried around easily and the availability of there use for a long time. In a developing country like India, there is a huge demand for communications devices with long battery life, reducing the power consumptions of devices is very important step for long term use. Low power consumptions, low noise, low voltage circuit technology, high performance capability, VCO is very important part for multi-purpose audio/radio frequency range in any communications equipment. CMOS is playing a revolutionary role in reducing the cost of devices, controlling power consumptions, minimizing communications devices and manufacturing high quality devices.

The researchers and designer and focusing on reducing the power consumptions on the constructions of CMOS based VCO using a variety of technologies and topologies for optimum performance among all the constraints.

Expletory pair- In this part, the author has presented a discussion about the designed pair, this pair is jointly designed by our supervisor and his researcher scholar and name as RKTG pair. This pair basically works on the principal that if two transistor which are complimentary to each other are arranged in such a way that one transistor is in driver stage and other is it fallower then whole pair worked as single transistor like driver transistor. It can be easily under stood by given below diagram.

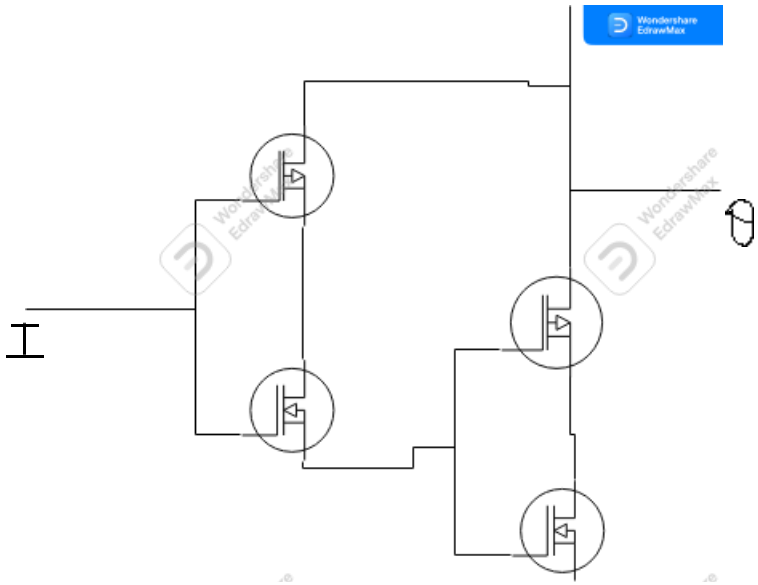

Fig- Basic diagram of RKTG pair

PROPOSED VCO TOPOLOGY- The expletory circuit of proposed VCO is shown in figure2.

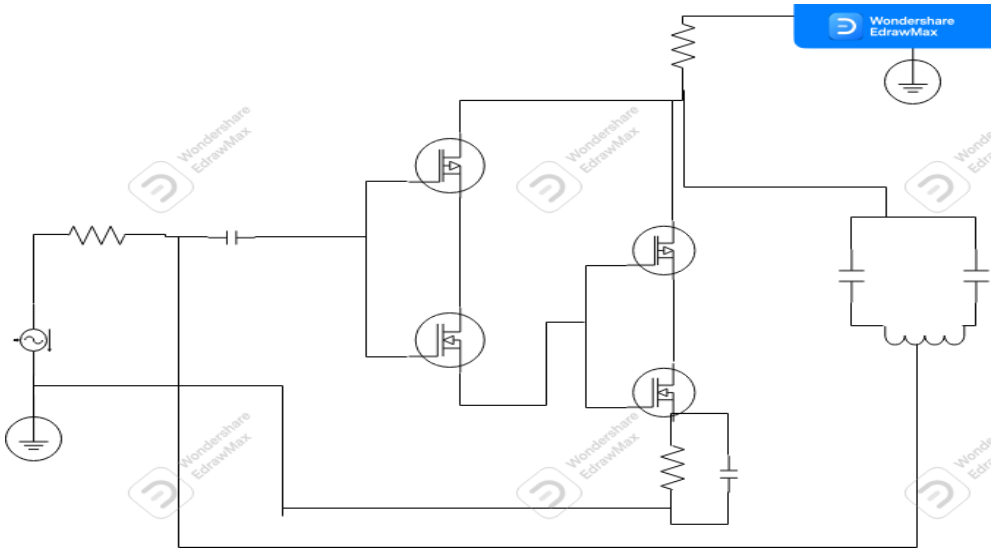

Fig 2- Experimental circuit of VCO oscillator

this circuit is divided in three-part; part first is RKTG pair-based amplifier, second pair is oscillatory circuit and last third is feedback. In this circuit design we use 2 NMOS and 2 PMOS i.e. 4 MOS transistor, all MOS transistor having value of w/l is 45 nm with threshold voltage is 120 nm, and in oscillatory circuit value C_1&C_2 having value 1µF and inductor value is 1pH. The active component value used for basing is input capacitor C_i is 1P and R_i is 100Ω biasing resistance R_1 and R_2 is 33k Ω and 10k Ω respectively and source resistance 1k Ω and bypass capacitor is 1µF. All the simulations work is done by cadence virtuoso by 45nm technology and transient analysis is done by 100ms.

Simulations result – proposed oscillator show good transient response with stop time 100ms . simulation result is shown in below graph. Proposed oscillator circuit work on proper choice of component and provided better wide range frequencies. This circuit works at few micro watts power.

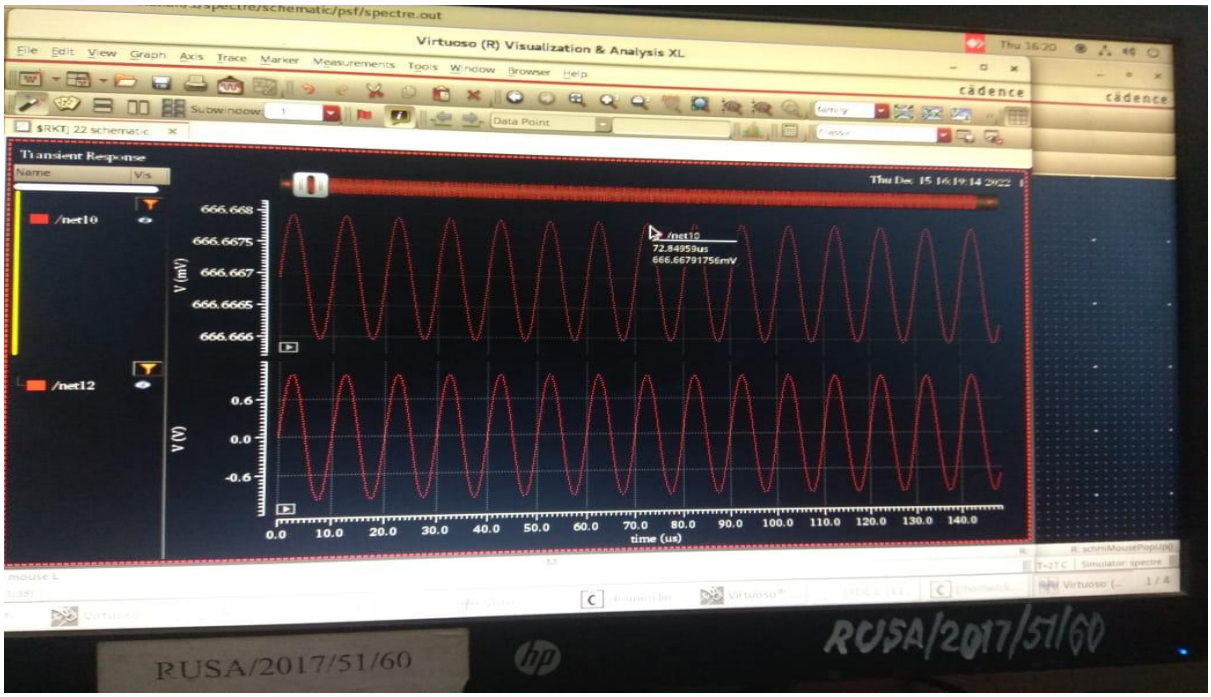

Figure3- Transient response of proposed oscillator at 100MHz frequency

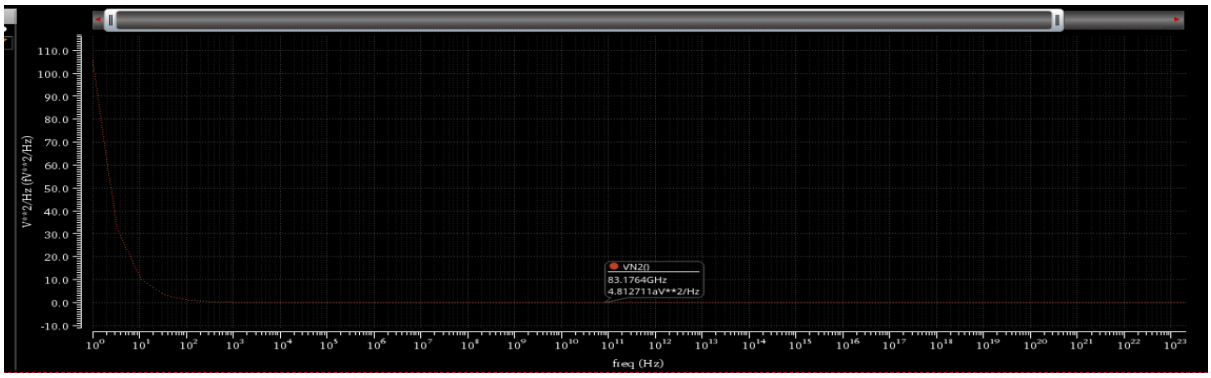

Figure- Noise response of proposed oscillator

II. Conclusion

from above observation it is found that RKTG pair-based amplifier circuit play an important role in communication system with proper choice of circuit element. This oscillatory circuit work at few HZ to GHz with power dissipation in range of few microwatts, this pair is very useful in design higher than 4th generations communications system. Thus RKTG pair based oscillator circuit is very useful to solve real challenges design 5th and other more than communications systems etc.

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