A Crystal Oscillator Analog Pads (3.3V, Fclkout-1MHz-4MHz @osu180nm)

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Abstract— **This report provides the understanding about the Crystal Oscillators. Its important for us to understand the utilization of new method by carefully analysing the previous benefits. The above-mentioned crystal oscillation analog pads has an oscillation frequency of 1MhHz-4MHz with the pins being of 180nm. This document plans to assist in the fabrication of the Crystal Oscillator Analog Pads**

***Keywords*— Include at least 5 keywords or phrases**

I. Introduction

In 1920s, the invention of crystal oscillators brought a significant change in the synchronous circuits. The gradual innovation made by Pierce, Miller and Sabaroff contributed to the current and improved Oscillator. An autonomous circuit which periodically generates time varying signals. Here, we are going to specify the type of oscillator based on Output Waveforms. Thus, the Low Voltage PECL works on +3.3V or lower. The output voltage swing of LVPECL is depicted in the Fig 1.1.

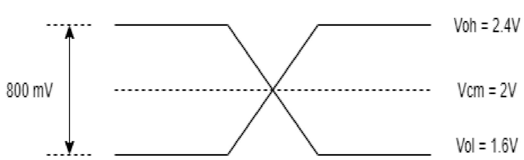

Fig 1.1 Output voltage swing of LVPECL

II. Crystal Oscillator Description

If a circuit has positive feedback and a loop gain higher than 1 it will oscillate. With a crystal in the loop as a serial element, and no other frequency-sensitive elements in the circuit, it will oscillate at the fundamental serial-resonant frequency of the crystal. A quartz crystal must always oscillate at its basic frequency and must be forced to oscillate at a harmonic.

When the feedback loop of the oscillator circuit is first closed, oscillation of the sine wave starts, and the amplitude rises until there is a overload. The overloading waveform becomes a clipped sine wave and finally approaches a heavily overloaded square wave.

Another important aspect of this oscillator is to specify the oscillator output waveform for approaching the lowest noise floor. To achieve the lowest noise floor, we must achieve the maximum signal to noise ratio. LVPECL at 400 mV peak to peak is 800 mV relative to LVDS and will have a higher Signal to Noise Ratio. If the frequency of a certain signal to noise ratio is generated in the oscillator, it can never be enhanced from that.

III. Understanding the clock Oscillator

Since the discussed oscillator is a clocked oscillator which is fixed to a permanent frequency source. Several parameters influence the overall accuracy of the oscillator through frequency-temperature stability, tolerance calibration at 25°C, frequency change over power supply and aging. Phase noise is essential to success in many aspects of a system. Every single oscillator in the chain can affect the system's overall phase noise. A cautionary note about phase noise is that it can increase tremendously in a crystal oscillator under vibration. The quartz crystal piezoelectric property is mainly responsible for oscillator phase noise increase under vibration. In order to construct the oscillator, we must specify the jitter in the time domain instead of the frequency domain phase noise. Symmetry or duty cycle shall be specified as the ratio of the positive portion of the output signal to the entire output signal duration. The LVPECL the threshold is mentioned in the Figure 1.1 as Vcm.

IV. Application of the Crystal Oscillator

The crystal oscillator has been a requirement for various situation where we require to run sequential clocks to work on the base of oscillation. An oscillator is a mechanical or electronic device which operates on the oscillation principles. To put it another way, oscillator can be described as the periodic fluctuations between two things based on energy changes. Computers, clocks, watches, radios etc. are practical applications of oscillators.

Electronic oscillators are mainly used to generate signals in computers, wireless receivers and transmitters, and audio-frequency equipment. It is especially used in music synthesizers. There are diverse types of electronic oscillators available. All the electronic oscillators work on the same basic principle. An oscillator often employs a sensitive amplifier, the output of which is fed back in response to the input signal. Therefore, the signal regenerates and sustains itself. That is called being a positive feedback. Therefore, the oscillator uses positive feedback to work. That is nearly the same with the unwanted "howling" in public address systems. Figure 1 displays the corresponding circuit diagram of a Field Emitter Transistor (FET) oscillator constructed.

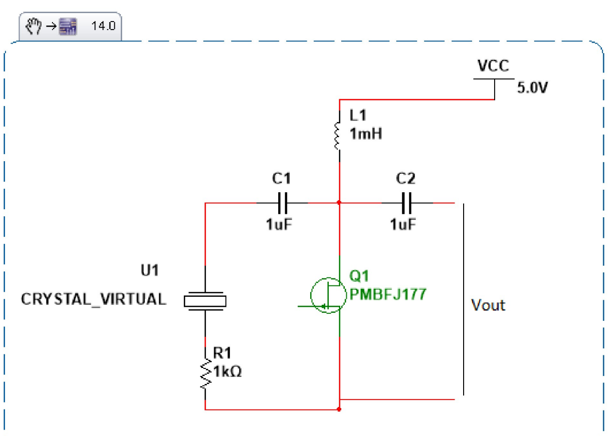

Fig 1.2 Field Emitter Transistor used for Crystal Oscillator

A quartz crystal decides how much frequency an oscillator operates at. If a direct current is applied, these crystals vibrate at a frequency that depends on the nature of their thickness and whether it is separated from the original mineral rock. Some oscillators employ combinations of inductors, resistors, and condensers to determine the frequency. But the use of quartz crystals in oscillators gives the best stability (frequency constancy). Figure 2 displays a crystal circuit diagram and is used as a microprocessor clock used in a CPU.

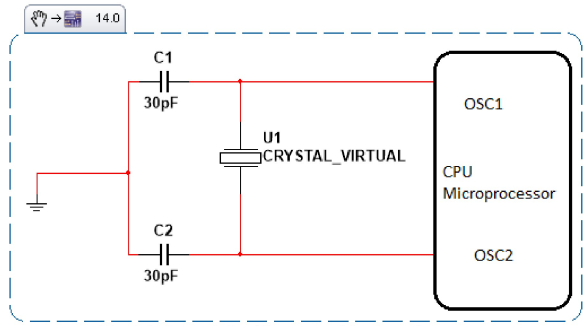

Fig 1.3 Crystal Oscillator used in the microprocessor

In a computer the clock supports the microprocessor as a kind of pacemaker. The clock is merely a specialist oscillator. The frequency of the clock (also known as clock speed) is usually specified in the frequency of Megahertz (MHz). The frequency of the clock is an important factor in determining the rate at which a computer can perform instruction execution. Figure 4 displays an oscillator 's corresponding circuit diagram, created by a Bipolar Junction Transformer (BJT). U1 signifies the crystal in the Chain.

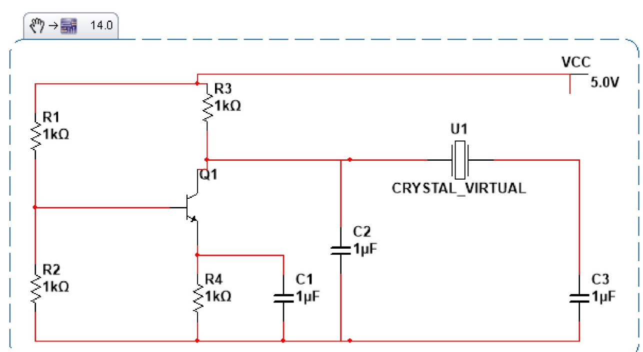

Fig 1.4 Crystal Oscillator through BJT

Crystal Oscillators are used in both military and aerospace for the powerful contact system. The communication system shall be established in the guidance systems.