

NEL CRYSTAL CLOCK OSCILLATORS

Application Note

3 Volt TTL Oscillator

Transistor Transistor Logic (TTL) is a bipolar technology which has been utilized for well over two decades in digital circuits. This type of logic gate has not seen a significant update in almost a decade. Thus, A true TTL device is generally +5 volt device with a threshold voltage (the point that the device determines the input signal has transitioned from high to low or low to high) of approximately 1.4 volts.

CMOS technology differs from TTL in a number a respects. One difference is the output signal of a CMOS device under no load condition is generally close to rail-to-rail (nearly from ground to the supply voltage) and the TTL device rises to about 3.5 volts at best. The CMOS threshold voltage is approximately at 50 percent of the supply voltage unless the device is designed for a special threshold voltage.

As CMOS technology advanced into higher frequencies and lower bias voltages, there was a need to have a version of CMOS devices available which were TTL compatible. They needed to have a threshold voltage at 1.4 volts and needed to have a smaller voltage swing required at the input. These device had very similar loading to standard CMOS devices. This has held true for both 5 volt applications as well as 3 (3.3) volt applications.

Oscillator applications which require TTL levels and must run on 3 volts will use CMOS technology devices. Since the load for CMOS devices with TTL logic levels is similar to a standard CMOS and the CMOS output from the oscillator will be rail-to-rail (thus, being more than enough voltage swing to meet the TTL compatible inputs) , the only requirement which needs to be different for the TTL levels is the threshold voltage (the point at which we measure symmetry, 1.4 volts verses 50 percent of the supply voltage).