

### **Based on 4.8.1 Programmable square wave generator**

A programmable square wave generator is a circuit that can generate a square wave with variable on (i.e., logic '1') and off (i.e., logic '0') intervals. The durations of the intervals are specified by two 4-bit control signals, m and n, which are interpreted as unsigned integers. The on and off intervals are  $m \times 100$  ns and  $n \times 100$  ns, respectively (recall that the period of the onboard oscillator is 10 ns). Design a programmable square wave generator circuit:

- The circuit should be completely synchronous, and your implementation must be structural (i.e. do not solely depend on behavioral description).
- Make sure you include a block diagram illustrating your design.
- Use a logic analyzer or oscilloscope to verify the operation of your circuit.