## Randomizer

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| --- | --- |
| **Main File Name** | **Randi.vhd** |
| **Testbench File Name** | **Randi\_tb.vhd** |

### Ports:

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| --- | --- | --- | --- | --- |
| Signals | In/Out | Type | Width | Function |
| Clk |  |  |  |  |
| Reset |  |  |  |  |
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### Block Diagram Sketch:

### Testing and Functionality

* We have 96 cycles, with a period of 40 ns = (3640 ns runtime in testbench).
* No Setup nor warm-up cycles
* Handshakes (ready and valid signals ) are in phase with inputs/outputs.

### RTL (Quartus)

A plane flying in the sky

Description automatically generated

### WaveForm (Sketch Expect)

A plane flying in the sky

Description automatically generated

### Results (ModelSim Altera)

A plane flying in the sky

Description automatically generated

## FEC

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| **Main File Name** | **FEC.vhd** |
| **Testbench File Name** | **FEC\_tb.vhd** |
| **Extra File** | **PPL\_BLOCK.vhd** |

### Ports:

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| Signals | In/Out | Type | Width | Function |
| Clk |  |  |  |  |
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### Block Diagram Sketch:

### Testing and Functionality

1. We receive 96 data bits at 50 MHz, at period 20 ns. They are processed in parallel and sent to our PLL\_BLOCK (RAM).
2. Then we transmit 192 bits of data a faster rate of 100 MHz.
3. We need to either send or receive not both. And repeats the cycle again.

### RTL (Quartus)

A plane flying in the sky

Description automatically generated

### Memory Element RTL (PPL)

A plane flying in the sky

Description automatically generated

A plane flying in the sky

Description automatically generated

### WaveForm (Sketch Expect)

A plane flying in the sky

Description automatically generated

### Results (ModelSim Altera)

A plane flying in the sky

Description automatically generated

## Interleaver

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| --- | --- | --- |
| **Main File Name** |  | **Randi.vhd** |
| **Testbench File Name** |  | **Randi\_tb.vhd** |
| **Extra File 1** |  | **Sipo.vhd** |
| **Extra File 2** |  | **Piso.vhd** |

### Ports:

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| Signals | In/Out | Type | Width | Function |
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### Block Diagram Sketch:

### Testing and Functionality

A plane flying in the sky

Description automatically generated

### RTL (Quartus)

A plane flying in the sky

Description automatically generated

### WaveForm (Sketch Expect)

A plane flying in the sky

Description automatically generated

### Results (ModelSim Altera)

A plane flying in the sky

Description automatically generated

## Modulation

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| --- | --- |
| **Main File Name** | **MODU.vhd** |
| **Testbench File Name** | **MODU\_tb.vhd** |

### Ports:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Signals | In/Out | Type | Width | Function |
| Clk |  |  |  |  |
| Reset |  |  |  |  |
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### Block Diagram Sketch:

### Testing and Functionality

A plane flying in the sky

Description automatically generated

### RTL (Quartus)

A plane flying in the sky

Description automatically generated

### WaveForm (Sketch Expect)

A plane flying in the sky

Description automatically generated

### Results (ModelSim Altera)

A plane flying in the sky

Description automatically generated

**Extra File 1**