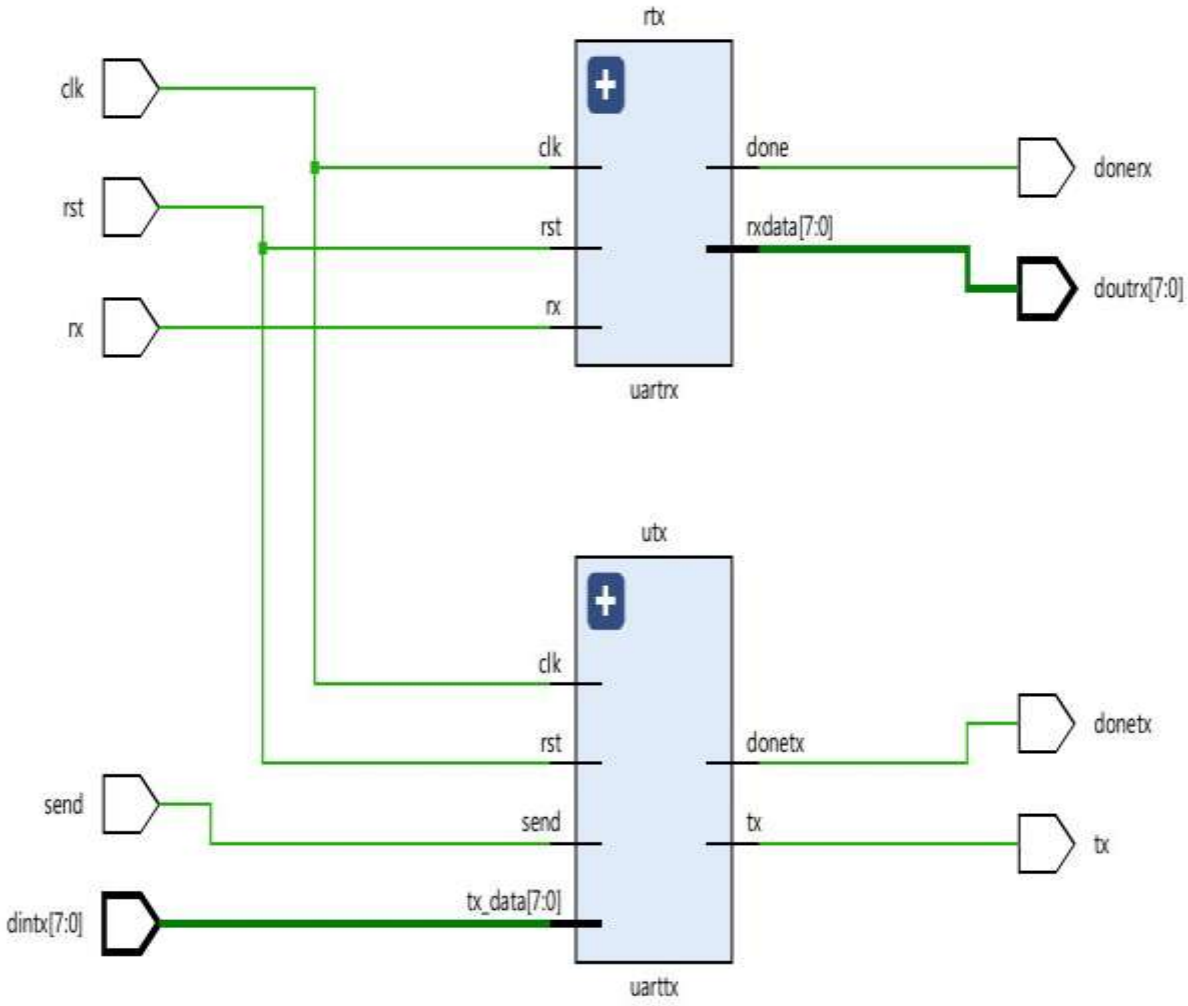
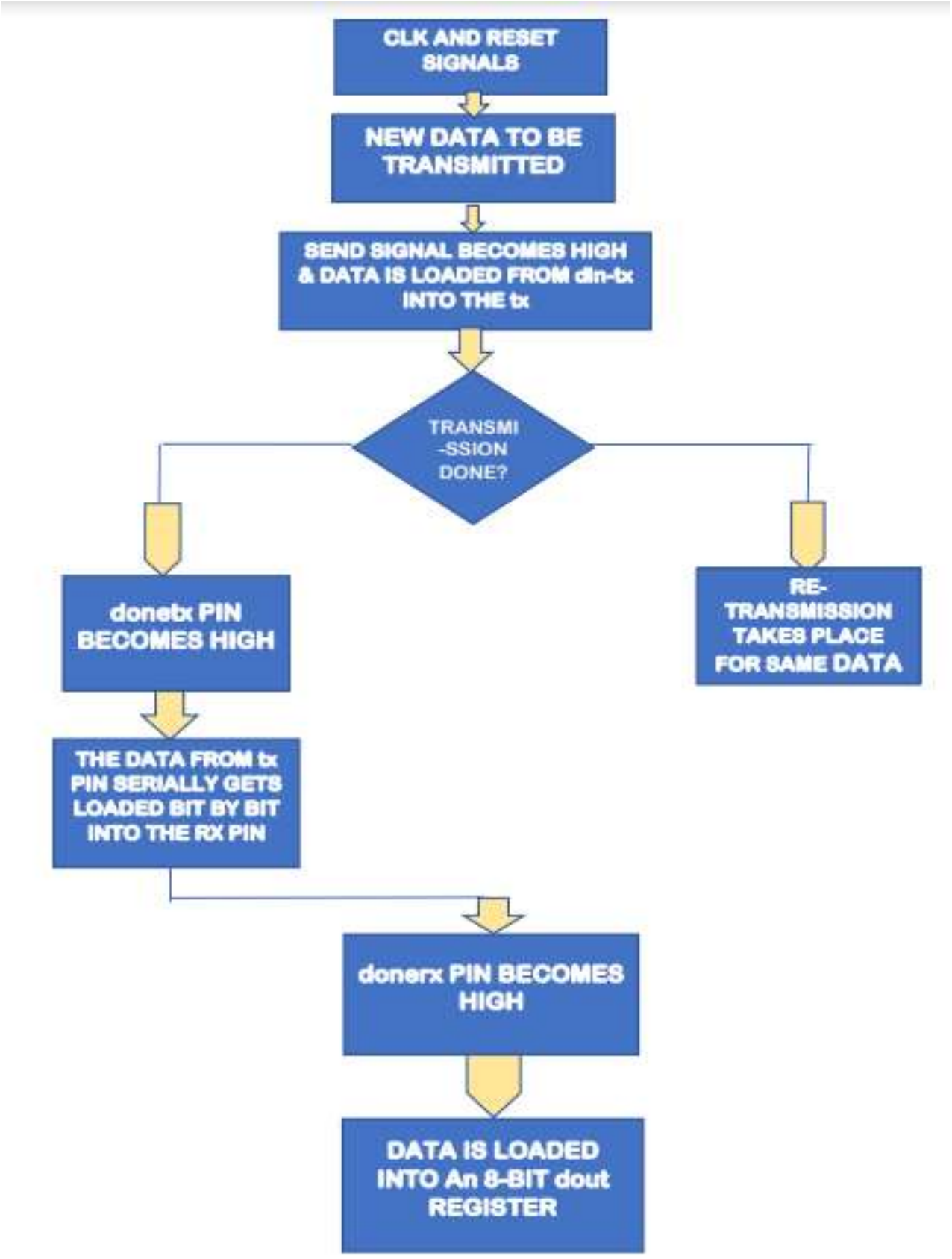
DESIGN AND VERIFICATION RESULTS

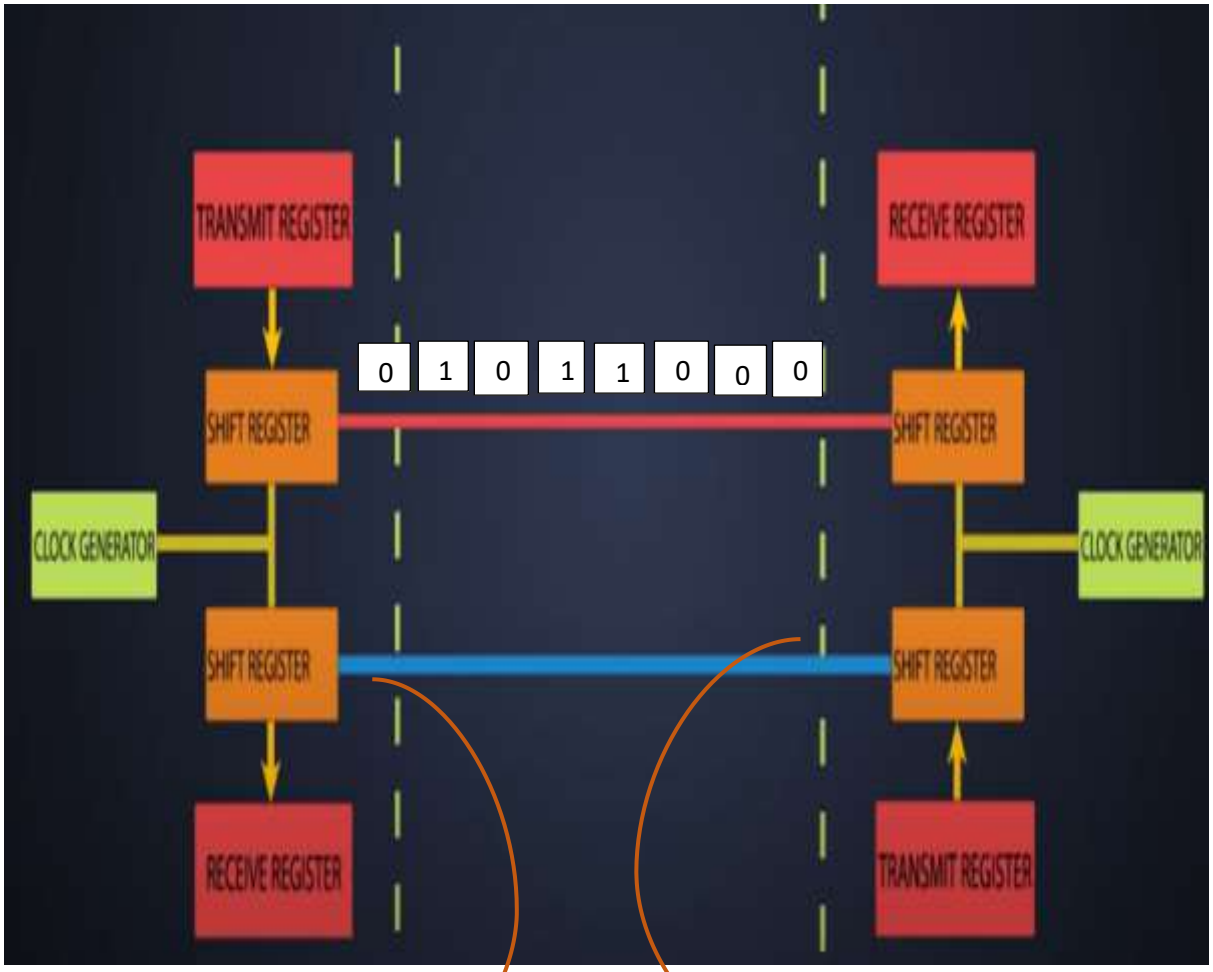
This is the schematic design result from Vivado.



The below flow-chart explains the data flow in the UART protocol.

FLOWCHART

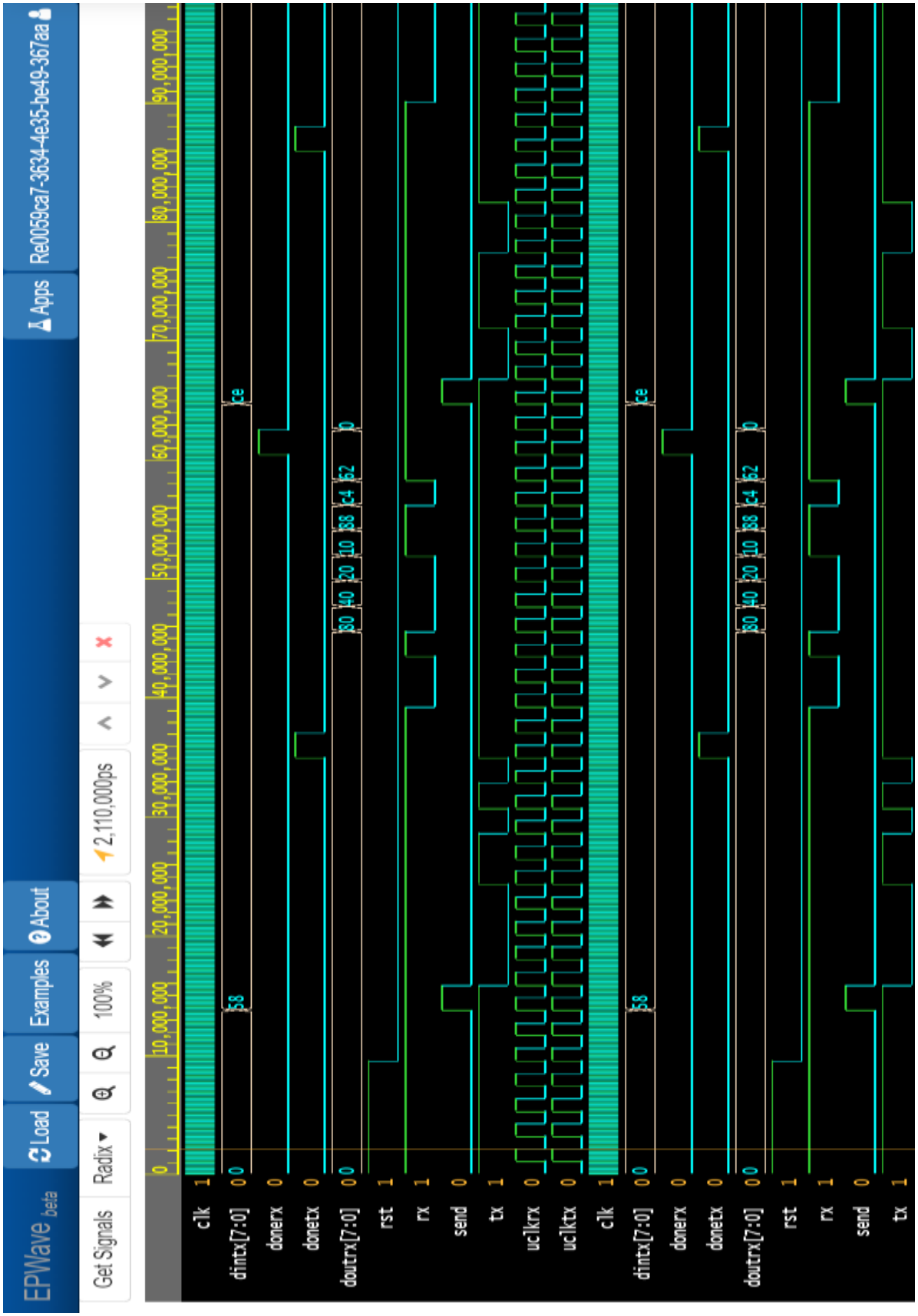

CLK AND RESET SIGNALS
NEW DATA TO BE TRANSMITTED
SEND SIGNAL BECOMES HIGH & DATA IS LOADED FROM din-tx INTO THE tx
TRANSMI -SSION DONE?
donetx PIN BECOMES HIGH
RE-TRANSMISSION TAKES PLACE FOR SAME DATA
THE DATA FROM tx PIN SERIALLY GETS LOADED BIT BY BIT INTO THE RX PIN
donerx PIN BECOMES HIGH
DATA IS LOADED INTO An 8-BIT dout REGISTER



TRANSMITTER MODEL

RECIEVER MODEL

EDA PLAYGROUND WAVEFORM RESULTS



In the above waveform we can see that random 8-bit data has been generated and it is loaded into the dintx[7:0].

Whenever the new data is available then the send signal becomes high and then the data gets loaded from the dintx register into the tx pin.

Then tx signal becomes high and when the transmission is completed the donetx signal becomes high and immediately the rx pin becomes high . after the whole 8-bit data reception is completed the donerx signal becomes high and then the data gets stored into the doutrx register.

LOG WINDOW RESULTS

```
# KERNEL: Kernel process initialization done.
# Allocation: Simulator allocated 5599 kB (elbread=459 elab2=4975 kernel=164 sdf=0)
# KERNEL: ASDB file was created in location /home/runner/dataset.asdb
# KERNEL: [DRV] : RESET DONE
# KERNEL: [GEN] : oper : write send : 0 TX_DATA : 01011000 RX_IN : 0 TX_OUT : 0 RX_OUT : 00000000 DONE_TX : 0 DONE_RX : 0
# KERNEL: [DRV]: Data Sent : 88
# KERNEL: [MON] : DATA SEND on UART TX 88
# KERNEL: [SCO] : DRV : 88 MON : 88
# KERNEL: DATA MATCHED
# KERNEL: [GEN] : oper : read send : 0 TX_DATA : 00001010 RX_IN : 0 TX_OUT : 0 RX_OUT : 00000000 DONE_TX : 0 DONE_RX : 0
# KERNEL: [DRV]: Data RCVD : 98
# KERNEL: [MON] : DATA RCVD RX 98
# KERNEL: [SCO] : DRV : 98 MON : 98
# KERNEL: DATA MATCHED
# KERNEL: [GEN] : oper : write send : 0 TX_DATA : 11001110 RX_IN : 0 TX_OUT : 0 RX_OUT : 00000000 DONE_TX : 0 DONE_RX : 0
# KERNEL: [DRV]: Data Sent : 206
# KERNEL: [MON] : DATA SEND on UART TX 206
# KERNEL: [SCO] : DRV : 206 MON : 206
# KERNEL: DATA MATCHED
```

The above image explains the log window results where every test bench component results are shown clearly.