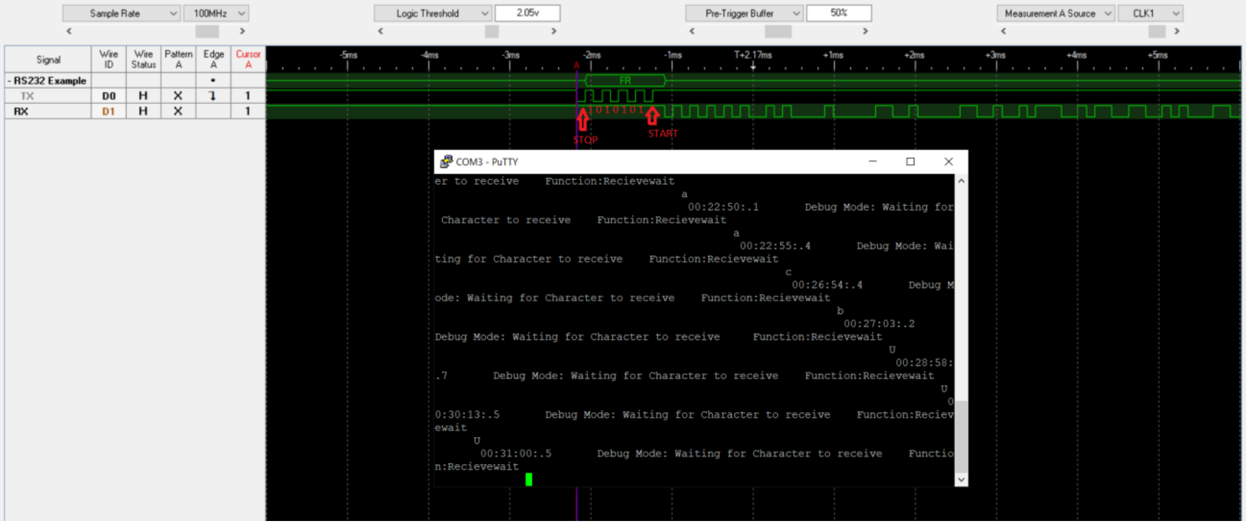
# UART SCREENSHOTS & THEIR INTERPRETATION

UART stands for Universal Asynchronous Receiver/Transmitter. It's not a communication protocol like SPI and I2C, but a physical circuit in a microcontroller, or a stand-alone IC. A UART's main purpose is to transmit and receive serial data. The UART that is going to transmit data receives the data from a data bus. The data bus is used to send data to the UART by another device like a CPU, memory, or microcontroller. Data is transferred from the data bus to the transmitting UART in parallel form. After the transmitting UART gets the parallel data from the data bus, it adds a start bit, a parity bit, and a stop bit, creating the data packet. Next, the data packet is output serially, bit by bit at the Tx pin. The receiving UART reads the data packet bit by bit at its Rx pin. The receiving UART then converts the data back into parallel form and removes the start bit, parity bit, and stop bits. Finally, the receiving UART transfers the data packet in parallel to the data bus on the receiving end.

(Reference: http://www.circuitbasics.com/basics-uart-communication/)

Attached below are the screenshots of UART based communication in polling and interrupt modes.

1) Transmission of Character ‘U’ in Polling Mode



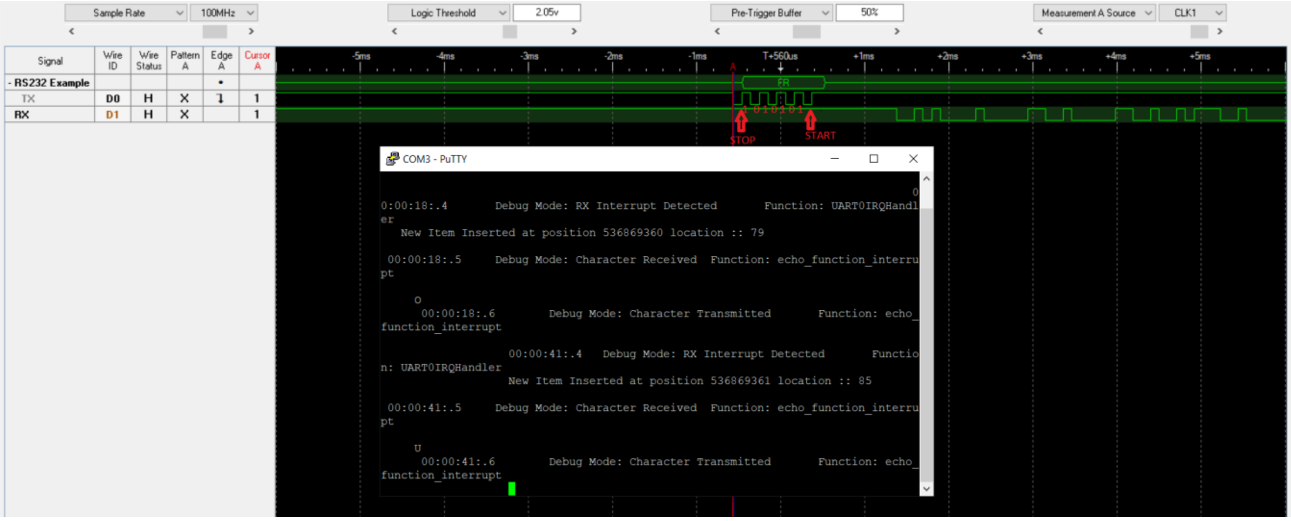
Sample Rate 100MHz    Logic Threshold 2.05v    Pre-Trigger Buffer 50%    Measurement A Source CLK1

| Signal | Wire ID | Wire Status | Pattern A | Edge A | Cursor A |
|---|---|---|---|---|---|
| - RS232 Example | | | | • | |
| TX | D0 | H | X | ↧ | 1 |
| RX | D1 | H | X | | 1 |

```
er to receive    Function:Recievewait
                                              a
                                               00:22:50:.1       Debug Mode: Waiting for
 Character to receive    Function:Recievewait
                                                      a
                                                       00:22:55:.4       Debug Mode: Wai
ting for Character to receive    Function:Recievewait
                                                              c
                                                               00:26:54:.4       Debug M
ode: Waiting for Character to receive    Function:Recievewait
                                                                      b
                                                                       00:27:03:.2
Debug Mode: Waiting for Character to receive     Function:Recievewait
                                                                              U
                                                                               00:28:58:
.7       Debug Mode: Waiting for Character to receive    Function:Recievewait
                                                                                      U
                                                                                       0
0:30:13:.5       Debug Mode: Waiting for Character to receive    Function:Reciev
ewait
      U
       00:31:00:.5       Debug Mode: Waiting for Character to receive    Functio
n:Recievewait
```

ASCII value of Character ‘U’ is 85 in decimal which is equivalent to 10101010 which can be observed in the pulse with start and stop bits.

2) Transmission of Character ‘U’ in Interrupt Mode



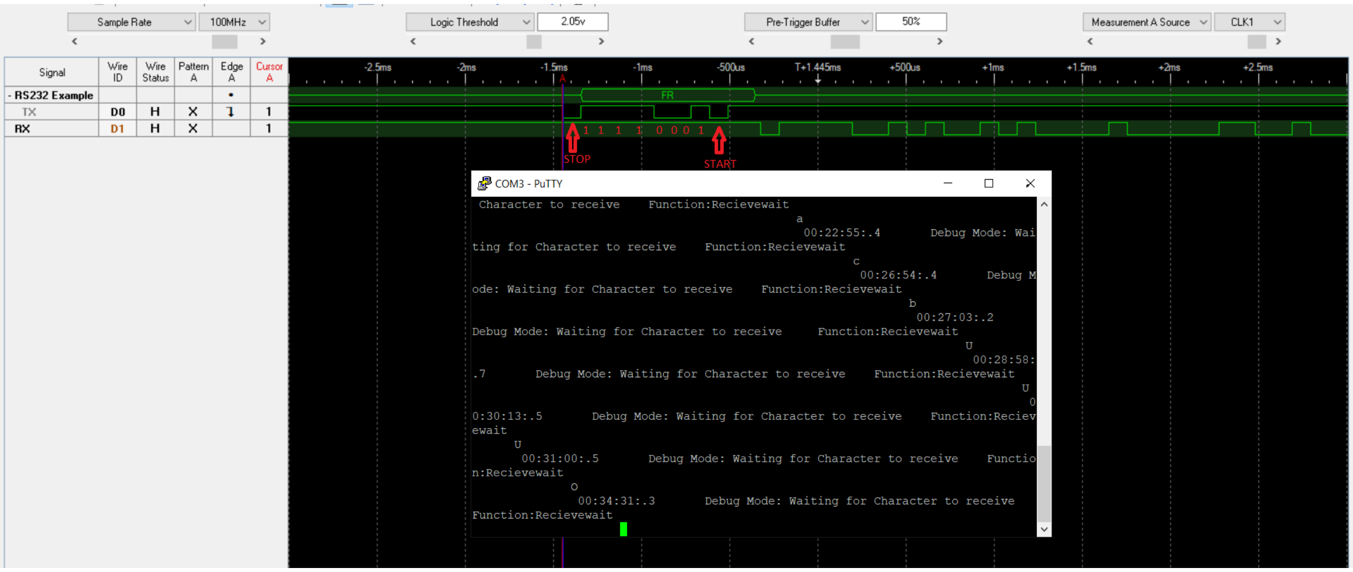
Sample Rate 100MHz    Logic Threshold 2.05v    Pre-Trigger Buffer 50%    Measurement A Source CLK1

| Signal | Wire ID | Wire Status | Pattern A | Edge A | Cursor A |
|---|---|---|---|---|---|
| - RS232 Example | | | | • | |
| TX | D0 | H | X | ↧ | 1 |
| RX | D1 | H | X | | 1 |

```
                                                                                       0
0:00:18:.4       Debug Mode: RX Interrupt Detected       Function: UART0IRQHandl
er
   New Item Inserted at position 536869360 location :: 79

 00:00:18:.5     Debug Mode: Character Received  Function: echo_function_interru
pt

     O
      00:00:18:.6       Debug Mode: Character Transmitted       Function: echo_
function_interrupt

                   00:00:41:.4   Debug Mode: RX Interrupt Detected       Functio
n: UART0IRQHandler
                   New Item Inserted at position 536869361 location :: 85

 00:00:41:.5     Debug Mode: Character Received  Function: echo_function_interru
pt

     U
      00:00:41:.6       Debug Mode: Character Transmitted       Function: echo_
function_interrupt
```

ASCII value of Character ‘U’ is 85 in decimal which is equivalent to 10101010 which can be observed in the pulse with start and stop bits. This data is sent in interrupt mode.

### 3) Transmission of Character ‘O’ in Polling Mode



Sample Rate: 100MHz
Logic Threshold: 2.05v
Pre-Trigger Buffer: 50%
Measurement A Source: CLK1

| Signal | Wire ID | Wire Status | Pattern A | Edge A | Cursor A |
|---|---|---|---|---|---|
| - RS232 Example | | | | • | |
| TX | D0 | H | X | ↧ | 1 |
| RX | D1 | H | X | | 1 |

```
 Character to receive    Function:Recievewait
                                              a
                                               00:22:55:.4       Debug Mode: Wai
ting for Character to receive    Function:Recievewait
                                                      c
                                                       00:26:54:.4       Debug M
ode: Waiting for Character to receive    Function:Recievewait
                                                              b
                                                               00:27:03:.2
Debug Mode: Waiting for Character to receive     Function:Recievewait
                                                                      U
                                                                       00:28:58:
.7       Debug Mode: Waiting for Character to receive    Function:Recievewait
                                                                              U
                                                                               0
0:30:13:.5       Debug Mode: Waiting for Character to receive    Function:Reciev
ewait
      U
       00:31:00:.5       Debug Mode: Waiting for Character to receive    Functio
n:Recievewait
              O
               00:34:31:.3       Debug Mode: Waiting for Character to receive
Function:Recievewait
```

ASCII value of Character ‘O’ is 79 in decimal which is equivalent to 1001111 which can be observed in the pulse.