

# UART interfacing on EV-COG-AD3029 platform using Mbed OS

- **Features:**

- [ADuCM3029](#) has one UART port
- It supports baud rates upto 1500000 Mbps
- It is compatible with industry standards 16450/[16550](#)
- Various interrupt sources are available such as receive buffer full interrupt, receive FIFO timeout interrupt
- 16550 standard offers 16 byte deep transmit and receive FIFO

- **Overview:**

- Create object for class [Serial](#) specifying Tx and Rx pin parameters with baudrate as optional parameter (default = 9600)
  - Tx pin: USBTX and Rx pin: USBRX
- Baud rate can be specified separately in main function using [baud](#)(int baudrate) function where 'baudrate' parameter is in bps
- For sending data in ASCII character format to serial port, use printf() while to send data in 8-bit data format use [write](#)() function
- For reading data from serial port, use [read](#)() function or Receive Buffer Register (UART\_RX) can also be read directly using address pointer
- For using receive buffer full interrupt:
  - Configure Nested Vectored Interrupt Controller (NVIC) for UART event and attach it to interrupt handler
  - Set FIFO control register (UART\_FCR) value to enable FIFO and trigger interrupt when there are n bytes (n = {1,4,8,14}) available in FIFO
  - Read receive buffer register (UART\_RX) in ISR to clear interrupt source

- **Example Code:**

- For programming AD3029 board using Mbed OS [click here](#)
- **Example 1:** Send data from microcontroller to PC using UART
  - Program sends "Hello World" every second through UART serial port at 9600bps
  - Using any serial terminal software, select COM port for connected AD3029 board and set baud rate at 9600bps
- **Example 2:** Receive data on microcontroller from PC and send it back to PC using UART

- Program triggers interrupt when a data byte is available in Rx FIFO
- In ISR, FIFO contents are read by copying the contents of UART0\_RX register to a character array, this also clears interrupt source
- Received character is then printed back on serial port

- **Note:**

- [readable\(\)](#) function in Mbed OS does not work properly, hence RX FIFO Byte Count register (UART\_RFC) can be used to give number of data bytes available in receiver FIFO
- [attach\(\)](#) function does not attach ISR to interrupt source correctly, hence `NVIC_SetVector()` function is used to attach UART events to user defined ISR as shown in example 2 code

- **References:**

- <https://os.mbed.com/platforms/EV-COG-AD3029LZ/>
- <https://www.analog.com/media/en/dsp-documentation/processor-manuals/ADuCM302x-mixed-signal-control-processor-hardware-reference.pdf>
- <https://os.mbed.com/docs/mbed-os/v5.13/apis/index.html>
- <https://os.mbed.com/forum/mbed/topic/419/?page=1#comment-39967>