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Intensity Modulator Bias Controller Application Note

Vision: 2025.5



1. Functionality

The intensity modulator bias controller (hereinafter called the “Controller”) automates the quadrature bias control of heater-bias intensity modulators.

2. Precautions

This bias controller may not realize the control under special requirements, such as maximum and minimum point control and control under ultra-high optical power input. Please contact our sales and marketing staff if you have such special control requirements.

Intensity modulator input optical power requirement: Please do not use the bias controller when the input optical power exceeds 23 dBm, as it may cause damage to the controller.

Other usage requirements: Please keep the bias controller powered off when connecting or disconnecting the intensity modulator. A hot plug may damage the controlled intensity modulator.

Double-check the connections before and after connecting the device to avoid modulator damage.

The RF signal input to the modulator should be after the automatic bias control has been stabilized.

3. Structure

The controller has 3 main wiring regions:

1. Power supply;
 2. ToDevice;
 3. UART;
- and a reset button. (Fig.1)

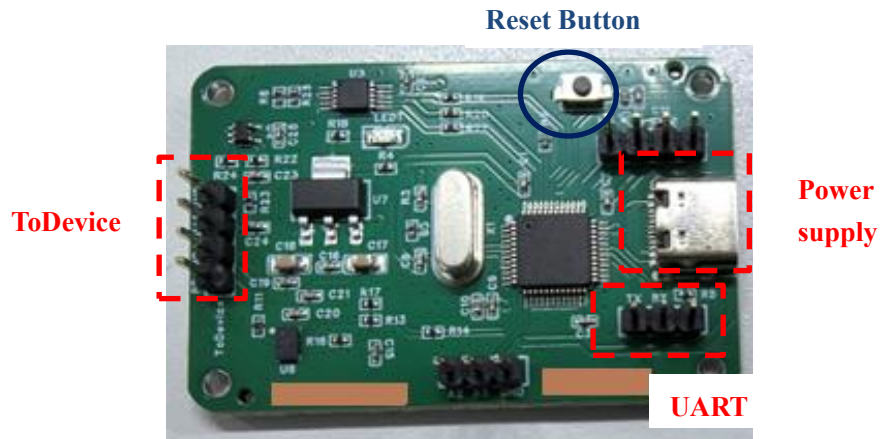


Fig.1 the structure of the controller

Power supply region has two pins with the silk screen '5V' and 'GND';

ToDevice region has 4 pins with the silk screen 'PD-', 'PD+', 'GND' and 'BIAS';

UART region has 3 pins with the silk screen 'TX', 'RX', the third one without silk screen is the board GND.

4. Accessories

The controller has 2 accessories: a type-C to USB cable and a UART Module (Fig.2).



Fig.2 UART Module

5. Wiring

Please wiring as shown in Fig.3.

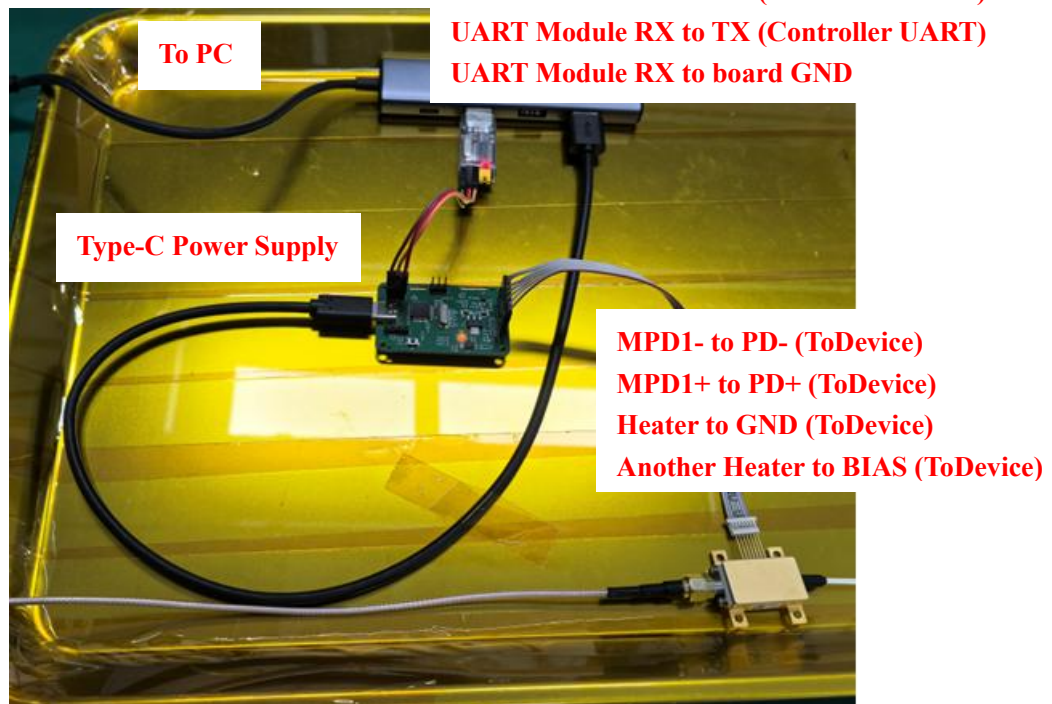


Fig. 3 wiring of the controller

Please double-check the PIN definition of the intensity modulator to avoid damage.

6. Starting & Reset of Controller

Once the wiring is complete, turn on the optical input to the modulator and then turn on the 5V power source for the controller for starting (connect the usb cable). Monitor the output optical power of the intensity modulator after power on, a curve similar to Fig. 4 can be observed. Eventually, the device output light will be controlled at around half the maximum value, i.e., near the quadrature point. Generally, it lasts 30 seconds before locking to the quadrature point.

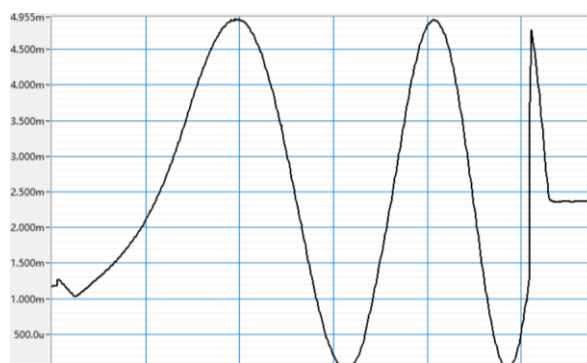


Fig. 4 Typical bias control curve of optical output (Y-axis in mW)

If the optical input to the modulator needs to be modified during the control process, press the reset button to restart the control process, or the working point will deviate.

7. Fine-Tuning Function

The fine-tuning function requires the connection to the host computer. The serial communication protocol between the controller and the host computer is UART and the logic is TTL. The baud rate of the communication is 9600. Find the serial port of the Uart module, the name should be "USB-SERIAL CH340".

After the quadrature point locking is finished, send a "6" followed by an "enter" through the serial interface to get the target MPD value of quadrature point. (Fig.5)

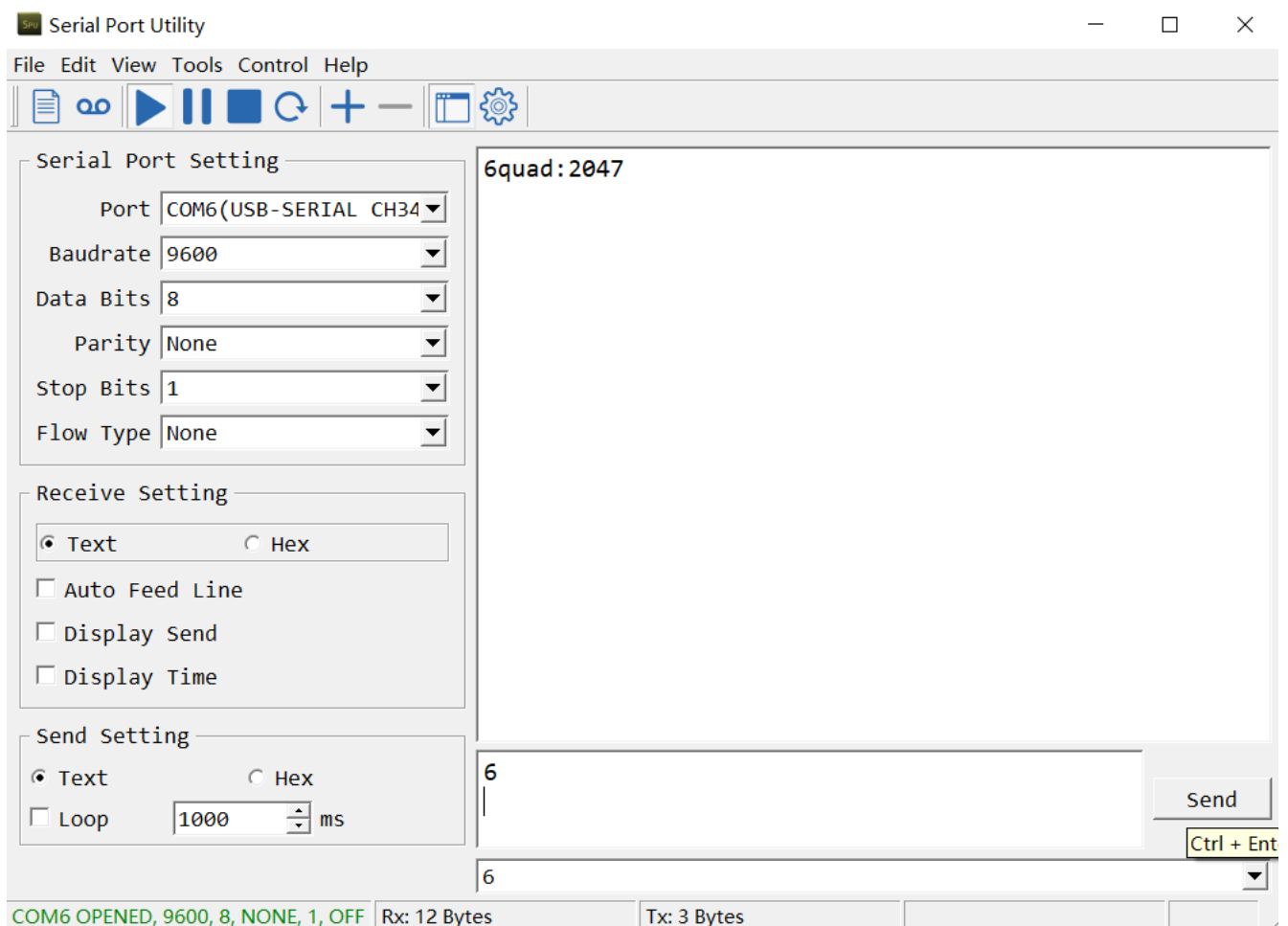


Fig. 5 Send "6" and an "enter" to show the target MPD value

Sending a "w" followed by an "enter" through the serial interface will increase the target MPD value by 1 . The output optical power of the modulator will be slightly reduced. (Fig. 6)

Sending a "s" followed by an "enter" through the serial interface will reduce the target MPD value by 1. The output optical power of the modulator will be slightly increased.

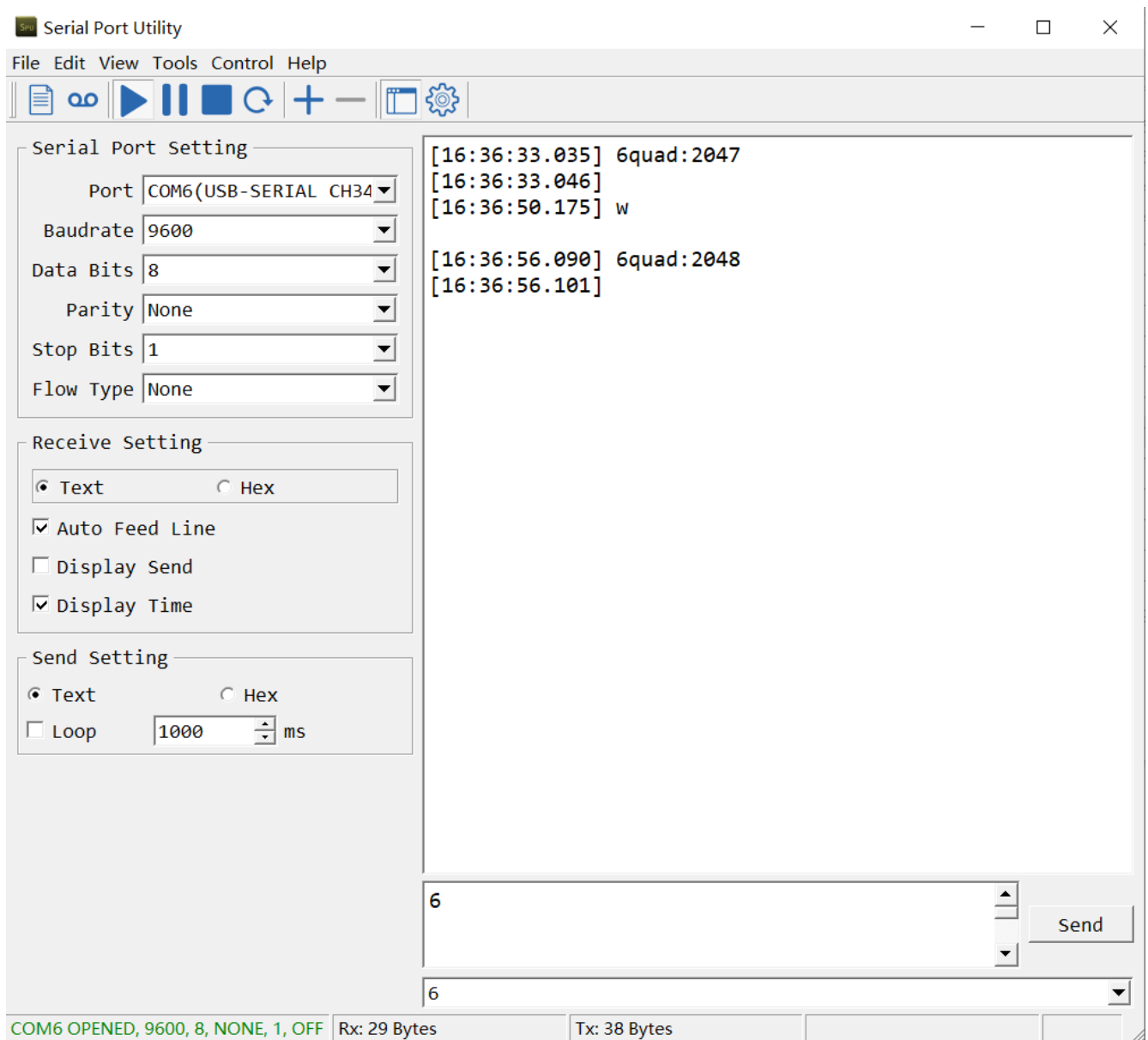


Fig. 6 Send “w” and an “enter” to make the target MPD value plus 1

Sending a "a" followed by an "enter" through the serial interface will increase the target MPD value by 10. The output optical power of the modulator will be significantly reduced. (Fig. 7)

Sending a "d" followed by an "enter" through the serial interface will reduce the target MPD value by 10. The output optical power of the modulator will be significantly increased.

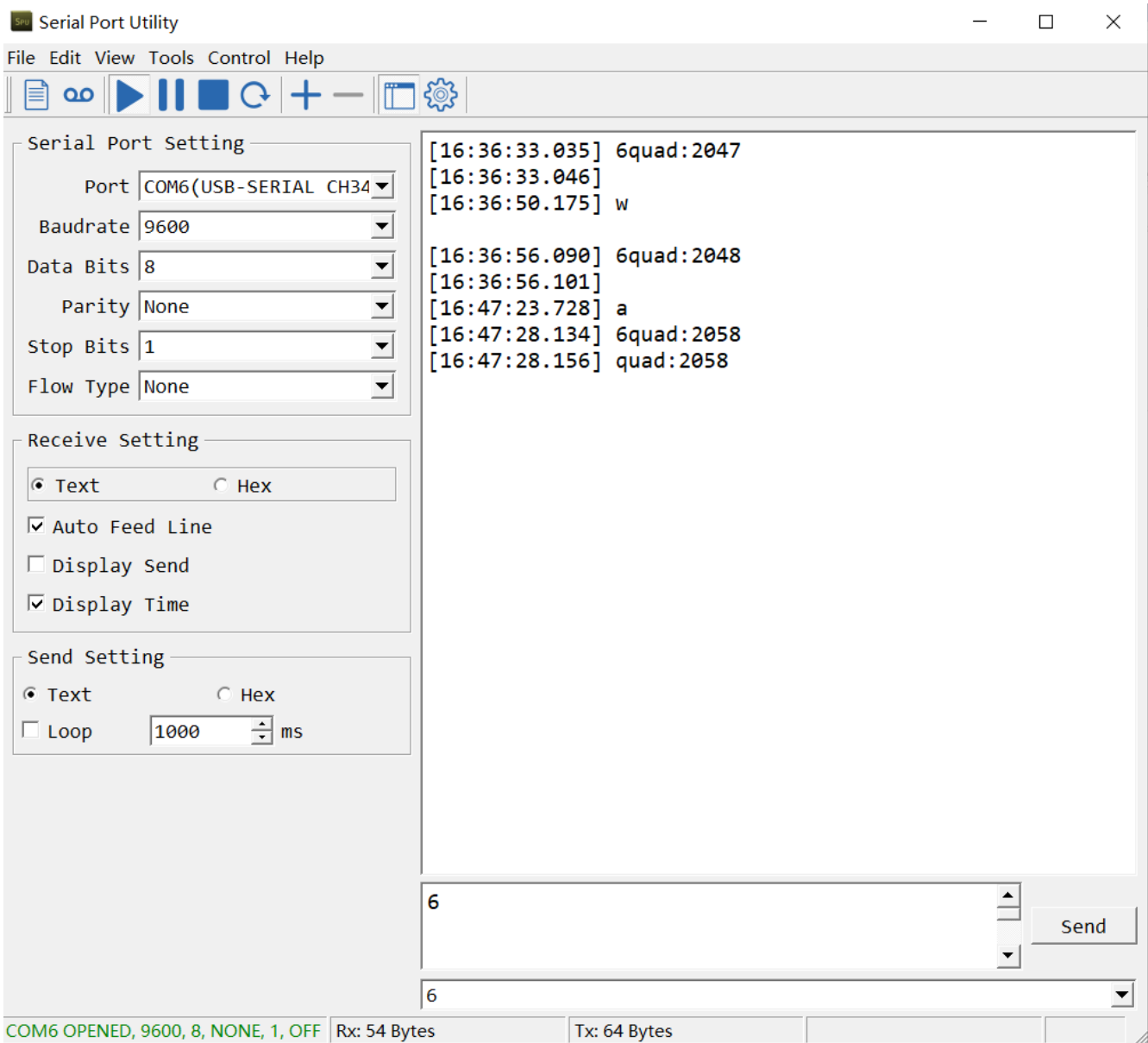


Fig. 7 Send “a” and an “enter” to make the target MPD value plus 10