

PLD-NS-GSS User Manual

Quick start

1. Solder the laser diode into the driver socket. **Note:** Make sure, the laser pins numbering matches with the imprint on the laser socket.
2. Power the driver board according to its datasheet. After the power is applied, the Power LED will light up
3. Connect the mini USB cable.
4. Run PLD-NS-GSS.exe.
5. Press ↻ icon to refresh the list of COM ports and select the COM port the driver is connected to from the drop-down menu, then click 'Connect' (fig.1).

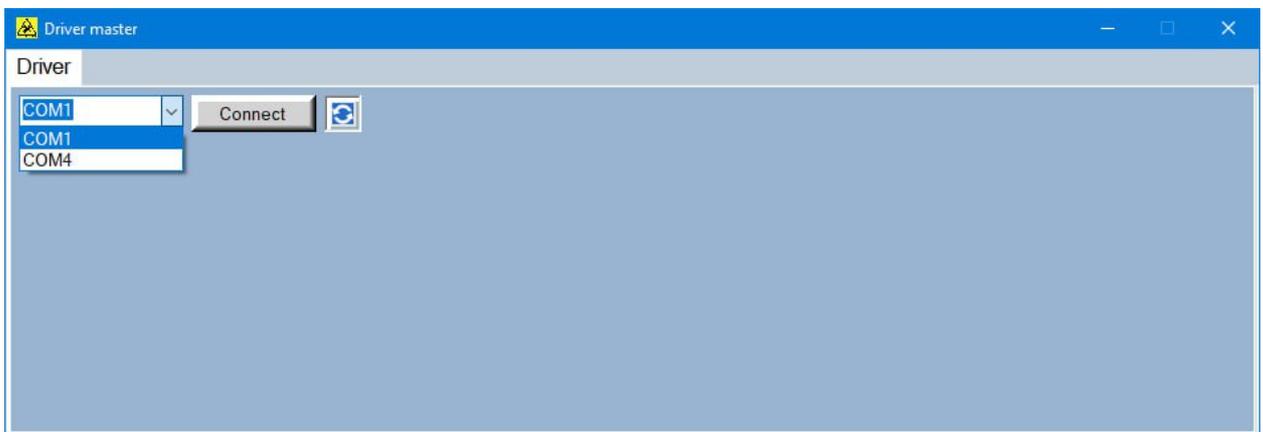


Figure 1: Connection

6. The 'Connect' button will change the color to green and the driver management interface will appear (fig. 2).

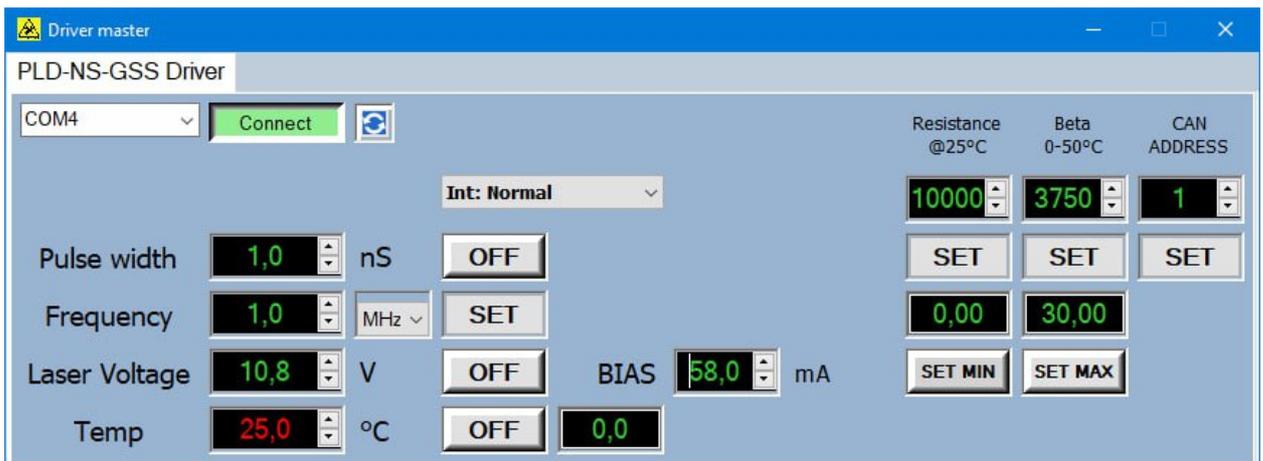


Figure 2: Interface

7. Set the values of resistance at 25°C and beta of the LD thermistor. To do this, enter the parameter value in the corresponding window and click 'SET' button under the window. By default the values are 10 kΩ and 3750, respectively.
8. The driver is now configured and ready for operation.

Basic controls and operation

Selection of driver operation mode:

PLD-NS-GSS driver can operate in five modes:

- **Int: Normal** – the standard mode. The driver generates a pulse train with a constant repetition frequency set in the driver's control panel from the onboard pulse generator.
- **Int: Burst** – the internal burst mode. The driver generates bursts of pulses at a predefined frequency from the onboard pulse generator. The user can set the number of pulses in burst (N) and the number of pulses skipped between the bursts (M).
- **Ext: Normal** – the standard external mode. The driver starts to generate pulses at a preset frequency as a response to an external TTL trigger signal. The change of trigger signal level from LOW to HIGH starts pulse generation. Change of trigger signal from HIGH to LOW stops pulse generation.
- **Ext: Burst** – the same as **Ext: Normal**, but bursts of pulses are generated as a response to an external trigger signal.
- **Pulse on Demand** – external trigger signal (change of trigger signal level from LOW to HIGH) generates a single pulse.

To set the operating mode of the laser diode, select the required operating mode from the drop-down menu (fig. 3). **Note:** In order the driver to work in external modes, it must be connected to an external source of synchronizing pulses via the SMA "EXT TRIG" connector using a coaxial cable.

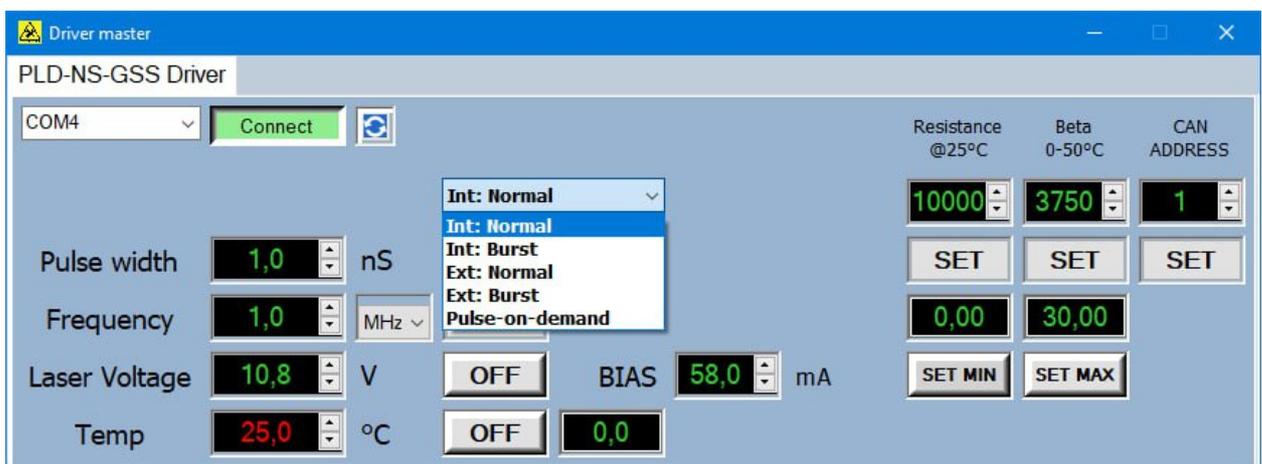


Figure 3: Operation mode.

Setting up operation parameters of laser diode

- To set the LD **temperature**, enter the parameter value in the 'Temp' window and click 'OFF' button to the right of the window. The button will change the label to 'ON' and change the color to green. After that, the thermoelectric cooler (TEC) will turn on, bringing the temperature

of the laser diode to the set temperature, and the TEC LED on driver board will light up, the value in 'Temp' window will change color to green. The current LD temperature is displayed according to the thermistor readings in the window to the right of the button.

- To set pulse train **repetition rate**, select the required repetition rate range from the drop-down menu, then enter the required repetition rate value in the 'Frequency' window. **Note:** When changing the repetition rate range, the pulse width value is reset to 1 ns.

- To set **pulse width** enter the required pulse width value in the 'Pulse width' setting window. Click 'OFF' button to the right of the window. The button will change the label to 'ON' and change the color to green. After that, the driver will start generating sync pulses on the SYNC OUT connector.

Note: The maximum pulse duration depends on the selected pulse repetition rate and the duty cycle value cannot exceed 2 % to avoid overheating of the driver high current components.

- The laser diode **bias current** is set by "Bias" parameter. The 'BIAS' value is equal to the laser diode CW current. The bias current suppresses the gain switch, the higher the current, the stronger the suppression. To set bias current, enter the required value in the 'BIAS' setting window and press "Enter" on PC keyboard. **Note:** When the bias current exceeds the threshold current, the laser diode begins to emit in CW mode. Tune the Bias value carefully near the threshold current of the laser diode used to find the value which provides the desired pulse shape.

- To set the pulse amplitude, enter the required value in the 'Laser Voltage' setting window. **Note:** The 'Laser Voltage' value is not equal to the laser diode voltage, but the larger the parameter, the larger the amplitude. Gradually increase 'Laser Voltage' parameter and monitor optical output power from the LD at the set pulse repetition rate and pulse width to determine pulse peak power. The interplay between the values of 'BIAS' and 'Laser Voltage' parameters allows to effectively control the shape of the leading edge of the optical pulse.

Note: In pulse mode the laser diode current can significantly exceed the CW operating current, however, this can lead to accelerated degradation of the laser diode.

- To set the **parameters of the burst mode**, choose, select external or internal burst mode in the operating mode drop-down menu (fig. 4), after that enter the required number of pulses in the burst in the corresponding setting window, then enter the required number of the skipped pulses between bursts in the corresponding setting window.

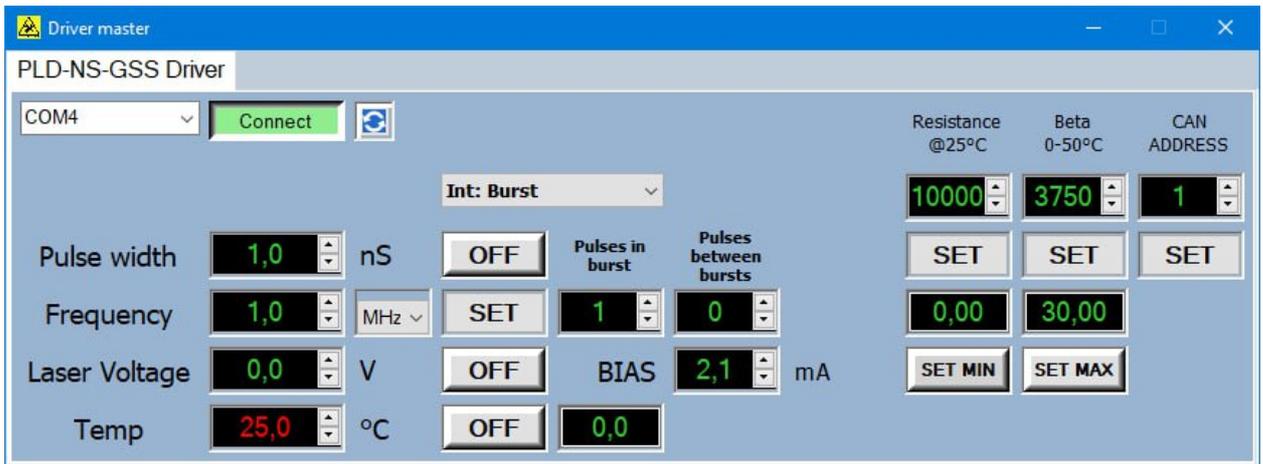


Figure 4: Burst mode.

- To **turn on** the laser diode emission, click the ‘OFF’ button to the right of the ‘Voltage’ window. The button will change the label to ‘ON’ and change the color to green, the indicator LASER LED on driver board will light up. To **turn off** the laser diode emission, click the button to the right of the ‘Voltage’ window. The button will change the label to ‘OFF’ and change the color to grey, the indicator LASER LED will go off. **Note:** The laser radiation will not turn on if the generation of sync pulses is not enabled (the button to the right of the ‘Pulse width’ window should be in the ‘ON’ position).

Note: Do not turn on the laser emission if the temperature control is OFF. This can cause the laser diode damage.

The user can change the pulse parameters (except the repetition rate) without turning off the radiation. To do this enter the required value to the corresponding setting window. Also, the value can be changed with the up and down arrows on the left side of the window or with the mouse scroll will.

Recommendation

For the first launch of the certain laser diode, we recommend connect the driver sync out and the laser diode optical output to the oscilloscope, set the required frequency and pulse duration, and set the ‘Laser Voltage’ and ‘BIAS’ values to zero, then turn on the radiation. After that gradually increasing the values of the ‘Laser Voltage’ parameter to achieve the required pulse amplitude (the gain switched peak could pop up at the leading edge of the pulse), then gradually increasing ‘BIAS’ until the gain switch peak will be suppressed. Then the experimentally found values of both parameters can be used further on.