Quick Start: Modulating an ILX Lightwave Laser Diode Driver

INTRODUCTION

Most ILX Lightwave laser diode current sources and controllers have an external modulation input. The purpose of this technical note is to give a quick overview on setting up an ILX Lightwave laser diode controller for sine wave modulation. A more detailed discussion on modulation can be found in ILX Lightwave Application Note #22: Modulating Laser Diodes.

REQUIRED EQUIPMENT

For this technical note we will be using an ILX Lightwave LDC-3724B and Agilent Waveform Function Generator model 33120. Using the modulation function on the LDC-3724B is very similar to all other ILX Lightwave laser diode current source and controllers.

1. You should check the specifications of the modulation input; this can be found in the user manual. The specifications for modulation are listed as Input, Transfer Function, and Bandwidth.

    a. Input typically refers to a voltage and resistance. Voltage is the allowable voltage that can be input into the modulation circuit, for the LDC-3724B it is from 0 – 10 Volts. The resistance refers to the input impendence of the modulation circuit. Since the modulation frequency of the laser diode driver is lower then 10MHz having mismatched impendence will not affect the output of the driver.

    b. The Transfer Function is typically referenced in mA/V. On most ILX Lightwave laser diode drivers the transfer function is listed below the modulation input connector. For the LDC-3724B the transfer function is 20mA/V and 50mA/V for the two respective ranges of output current.

    c. The bandwidth is the frequency range that can be supported without having a significant change in the output and is dependent on modulation waveform. Most ILX Lightwave laser diode drivers have two modes for current outputs either I or I_{HBW}. The I mode is designed for low bandwidth and to give the best low noise performance. In I_{HBW} it allows for high bandwidth modulation of the output current. For the LDC-3724B the low bandwidth range (I) operates from DC to 10 kHz and for the high bandwidth range (I_{HBW}) from DC to 1 MHz.

2. Locate the modulation input on the controller. On the LDC-3724B the modulation input is a BNC connector on the right hand side of the controller with the description of "MOD" above it. Connect the waveform function generator to the LDC-3724B using a BNC to BNC cable.

3. Before turning on the output it is important to set the current limit, as there is a potential at overdriving the laser diode while modulating. Like all ILX Lightwave current sources the LDC-3724B has a clamping circuit that will not allow you to overdrive the laser even while modulating. To learn more about the clamping circuit please read technical note "TN3525-3: Clamping Limit of an LDX-3525 Precision Current Source."

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4. As an example if you wanted to modulate the LDC-3724B from 120mA to 80mA at 100 kHz. You will need to set the LDC-3724B to I_{HBW} with a 100mA output current. Next set the waveform function generator to output a sine wave, at a frequency of 100 kHz with a peak to peak voltage of 1 Volt. Figure 1 shows the output that you will see on an oscilloscope.
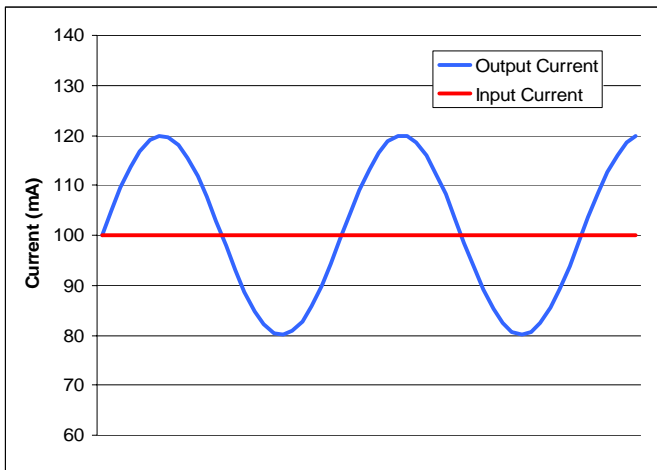

Figure 1: Modulated Current Output

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