# Using the Santec 210 Stepping TLS with the dBm Optics CSA or Swept Spectrometer

## Overview

The Santec 210 TLS can be directly controlled by the dBm Optics CSA (Component Spectrum Analyzer) or the dBm Optics Swept Spectrometer.

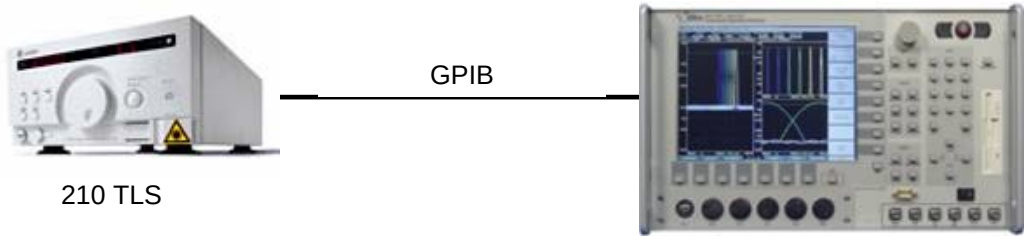
## Communication

The legacy versions of the 210 do not have any triggering capability, so all communication and timing are via the secondary GPIB port on the dBm instruments (option -740).

The lack of trigger makes timing coordination somewhat slower than with a normal triggered TLS.

## Initializing

When you first tell the dBm instrumentation that you are using a 210 TLS (along with the GPIB address for the laser), the dBm establishes communication with the laser. Since the 210 does not support the SCPI standard (Standard Commands for Programmable Instruments), it is not possible to simply determine the wavelength range of the laser. To overcome this limitation, the dBm commands the TLS to go to each wavelength extreme, and then reads back the wavelength at each of these points. This allows the dBm to show the maximum and minimum wavelength bounds, as it does for other tunable lasers. This process takes about 30 seconds and only occurs during the initialization process.




210 configured with dBm Optics CSA

## Setting Output Power

The 210 does not have provision to read back the output power limits. You can set the output power from the dBm instrument, but if you set it to a value that is outside the limits, the dBm instrument will attempt to make the setting, however it will not actually change the value of the power. To overcome this simply set the power again using a valid output power.

## Step Sweep Operation

The dBm instrument and the 210 operate well together in stepping sweep mode. The dBm instrument sets the wavelength through GPIB for each step. Reference the dBm manual for detail on how to run this measurement.

## Continuous Sweep Operation

The lack of output triggers on the 210 is problematic for a continuous sweep operation. The 210 does not directly support sweeping, but if you program a start and stop wavelength at the ends of your desired continuous sweep, then set the step size to the entire span of the settings, then it will continuously sweep from one wavelength to the other. The lack of a trigger means that the dBm does not know directly when the sweep commences. As a result, there is very little intrinsic wavelength accuracy during this type of sweep.

When you program a continuous sweep on the dBm, the start and stop wavelengths are set to 2 nm beyond the sweep settings, to ensure that all the desired wavelengths are captured (this over-scan is performed to eliminate errors of the TLS sweep rate that occur due to speed up and slow down at the ends of the sweep). This over-scan is only performed if the sweep settings are at least 2nm above and below the 210 wavelength limits. The dBm starts sweeping once the command is issued to start the sweep. Please note that the actual start and stop wavelengths are determined by the delays inside the 210, and will lead to somewhat large wavelength offsets. This offset can be corrected within the dBm setup using the TLS setup option “TLS Wavelength Offset”. The correct setting for the WL offset can be determined by using the following formula:

Wavelength offset setting = $WL_{actual} - WL_{measured}$

Before setting this, please correct the wavelength sweep rate per the following paragraph.

The wavelength sweep rate of the 210 in this mode varies somewhat by laser. Sweep rates are generally from 5 to 15 nm/sec in this model laser. An easy way to determine sweep rate is to run a sweep with a gas cell-based Wavelength standard (such as the dBm WA-series), and measure the wavelength spacing between any two gas cell lines. The correct wavelength sweep rate can be obtained by the following:

Actual WL Sweep Rate = (Wavelength $Spacing_{actual}$/WL $Spacing_{measured}$)* Initial WL Sweep Rate Setting

There is another way to use the 210 in continuous sweep mode to obtain an accurate wavelength start point, and that is to use a separate wavelength trigger box. dBm Optics produces a trigger box that produces an electrical trigger at a specified wavelength, which can then be used to trigger the dBm instrument or any other instrumentation that might be in use. This trigger is obtained purely by optical properties of the sweep, and as a result will eliminate the dependence on the electronics of the laser source that is being used.

## Wavelength Linearity

Different tunable lasers have different characteristics. For example some have high power, low noise, fast sweep, highly linear sweeps, triggering, and other characteristics. This variety makes certain TLS’s very appropriate for certain applications, and some TLS’s more appropriate for others. Your dBm Optics Applications Representative can assist you in the important effort of selecting the most appropriate laser for your particular application


dBm Optics
300 South Public Rd
Lafayette, CO 80026
303-464-1919
www.dbmoptics.com