Working with the New Focus 6528 with the dBm Optics CSA

Overview

This application note describes functional issues and improvements with the New Focus 6500 series tunable laser, as used with the dBm Optics Component Spectrum Analyzer.

Test 1: Dynamic Range - Deep Fiber Bragg Grating

One of the New Focus 6528 improvements over previous generations is the ASE performance. In this test, two fiber Bragg gratings are connected together (with an isolator in between) to provide a very deep well. We know from an OSA test that the grating is at least 60 dB deep and will be useful for this test. With an older New Focus laser, this grating would appear to be about 23 dB deep, depending on the power setting of the laser. This "false bottom" is due to the effect of the ASE noise floor interfering with the measurement.

With the 6528, it was confirmed that the grating is deeper than 60 dB. We did not test the actual dynamic range. The actual depth could have been found by performing a sweep at a slower rate with the CSA in its medium speed setting. That was not necessary in this case because the only goal was to confirm that the 6528 had improved dynamic range. It was found that the 6528 has STSE performance of at least 60 dB.

Figure 1

Stacked Fiber Bragg Gratings
Tested with New Focus 6528 and dBm Optics CSA

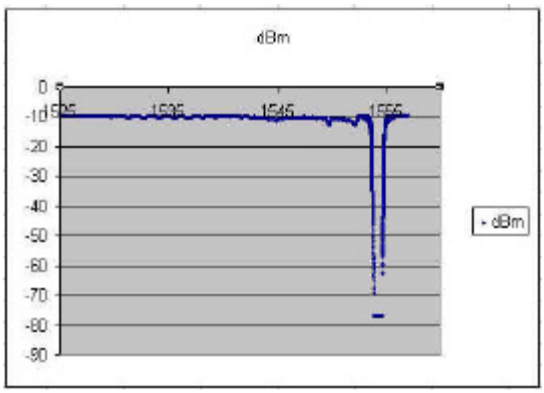
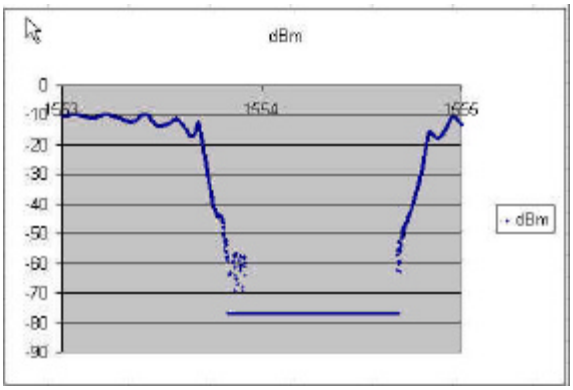


Figure 2

Increased Scale - Stacked Fiber Bragg Gratings
Tested with New Focus 6528 and dBm Optics CSA



Test 2: Wavelength Accuracy – HCN Cell

The New Focus 6528 specifications are for 30 pm accuracy (the same as previous models). This test is to ensure that the performance is the same and that the dBm Optics OMM-401 Wavelength Reference Option gives the anticipated performance with this laser.

In this test an HCN cell was used as the DUT and the dBm Optics gas cell application was run to check absolute accuracy versus reported wavelength position. This application uses the values reported by NIST for the HCN peaks and compares them to the locations reported in the swept wavelength test. The NIST values are considered absolutely accurate and provide an error value for this testing method at each peak location.

With the dBm Optics OMM-401 Wavelength Reference Module off, the performance of the 6528 laser is shown (figures 3 and 4). This particular 6528 has an accuracy of -7.5 pm to –26 pm across the range. In subsequent sweeps this proved to be repeatable to +/- 2 pm. This performance is very similar to previous generations and is in spec for this laser.

Figure 3

HCN Cell Transmission and Overlaid Accuracy
dBm Optics Wavelength Reference **OFF**

(Vertical axis is dBm for transmission curve and pm for accuracy report)

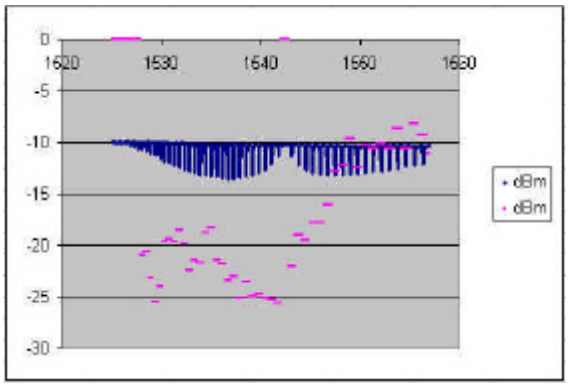
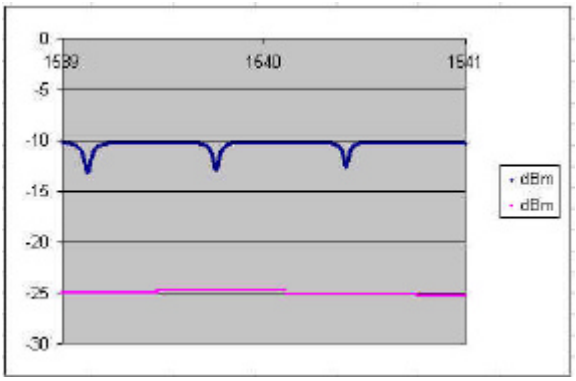


Figure 4

Increased Scale: HCN Cell Transmission and Overlaid Accuracy
dBm Optics Wavelength Reference **OFF**

(Vertical Axis is dBm for Transmission Curve and pm for Accuracy Report)



With the dBm Optics OMM-401 Wavelength Reference Module on, the performance of the combination of the reference and the 6528 are shown in Figures 5 and 6. The system showed accuracy of +.2 pm to –5 pm across the range. This is in spec and similar to performance that we have seen with the previous New Focus generations.

Figure 5

HCN Cell Transmission and Overlaid Accuracy
dBm Optics Wavelength Reference **ON**

(Vertical axis is dBm for transmission curve and pm for accuracy report)

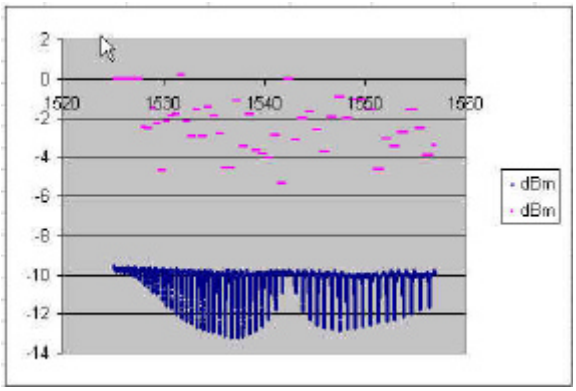
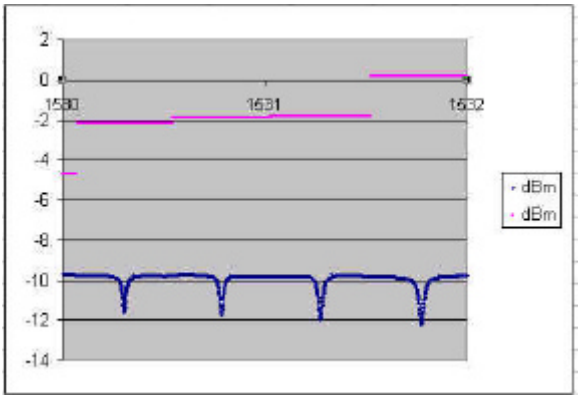


Figure 6

Increased scale : HCN Cell Transmission and Overlaid Accuracy
(dBm Optics Wavelength Reference **ON**)

(Vertical axis is dBm for transmission curve and pm for accuracy report)



It was also found that accuracy improvements could be made by selecting a tuning speed which provided better performance. Each laser tuning speed had a different accuracy profile with and without the OMM 401 turned on. In some cases 2.5 pm accuracy was obtainable