Distributed feedback laser grating order effects on optical systems with NRZ-RZ line coding scheme performance signature

Article *in* Journal of Optical Communications · April 2023

DOI: 10.1515/joc-2023-0072

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https://doi.org/10.1515/joc-2023-0072
Received February 25, 2023; accepted March 23, 2023;
published online April 17, 2023

Abstract: This work demonstrated the distributed feedback laser grating order effects on optical system in the presence of NRZ-RZ line coding schemes. Max lighted signal form power variations are studied with spectral base wavelength band variations through optical fiber based on first various distributed based band feedback laser (DFB) grating order. The total lighted form base power band through optical fiber based on first different DFB laser grating order is estimated. The max electrical base signal band power form variations with spectral base frequency form band variations through photo-detector based on various DFB laser grating order is demonstrated. Total electrical based power band form through photo-detector based on various DFB laser grating order is also clarified. Max base band power form band amplitude with time through photo-detector based on different DFB laser grating order is clarified. Max Q base band form is studied numerically with DFB laser grating order variations.

Keywords: DFB laser; grating order; NRZ line coding; RZ line coding.

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1 Introduction

There are main features of different SOA types. Dependent on polarization; requires polarization-maintaining fiber. Generally high gain ~20 dB [1–16]. 5–10 dBm is the output saturation power. Massive BW can function at wavelengths of 800, 1300, and 1500 nm. Small and simple to combine with other gadgets [17–33]. Arrays may incorporate this. High cross-talk and noise levels as a result of nonlinear phenomena like 4-wave mixing. Similar to a laser cavity is a semiconductor optical amplifier (SOA) [34–55]. A solitary amplifier is used. They can be incorporated into groups of switching and gating amplifying devices. Applicable to all optical 3R-regeneration systems [56–66]. Operation is restricted below 10 Gb/s. (With smaller gain, higher rates are feasible. The use of doped fiber amplifiers in optical communication systems is growing. Erbium doped fiber amplifiers (EDFAs), which can amplify signals in the low loss 1.55 m wavelength region, are perhaps the most significant variant. There are basic advantages and characteristics of EDFAs [67–80].

High signal power to pump power conversion efficiency (>50 %). WDM applications benefit from broad spectral band amplification with relatively flat gain (>20 dB). Over 1 mW of saturation output (10–25 dBm) is clarified [81–94]. Gain-time constant lengthened (>100 m s) to combat inter-modulation distortions and patterning effects (low noise). Devices have Substantial dynamic range [95–110]. Devices have low noise level. Devices are independent of polarization. Long-distance applications appropriate. EDFA has basic disadvantages such as the devices that are relatively huge (km-long fibre lengths) and difficult to interface with other devices. Amplified spontaneous emission is ASE [111–126]. As a result of ion stimulation in the fiber spontaneous noise [127–140], there is always some output even when there is no signal input. Devices impact of cross-talk. Devices have effects of gain saturation. Below is an energy level diagram for silica that has been doped with Er. With the main pump wavelengths of 1480 nm and 980 nm, pumping is mostly carried out optically [141–150]. The principal emission transition band is reached by atoms pushed to the 4I (11/2) 0.98 m band, as illustrated. Pumping with 1.48 μm light is directed at the emission band's upper transition levels [151–166].

2 Simulation setup

Figure 1 clarifies the simulation setup for this work. Both pump wavelengths have semiconductor lasers that have been created for them. At these base band spectral wavelengths, multi mW of absorbed base band pump power form can result in 30–40 dB of amplifier gain. 11 dB/mW pump efficiencies were attained at 980 nm. GaAlAs laser diodes can also be used for pumping at 820 and 670 nm. Although these lasers may be produced with high output power, the pump efficiency are lower. Both pump wavelengths have semiconductor lasers that have been created for them. At these wavelengths, 10–20 mW of absorbed pump power can result in 30–40 dB of amplifier gain. 11 dB/mW pump efficiencies were attained at 980 nm. GaAlAs laser diodes can also be used for pumping at 820 and 670 nm. Although these lasers may be produced with high output power, the pump efficiency are lower. This method may be used to describe the gain features of erbium as its gain spectrum resembles a 3-level atom. Wavelength division multiplexing has been assigned to a number of distinct wavelength bands, and EDFAs have been developed to operate in base form bands.

EDFA doped optical amplifiers function very similarly to lasers. We don't have a resonator, which is the main distinction. The stimulated emission method is the main way that

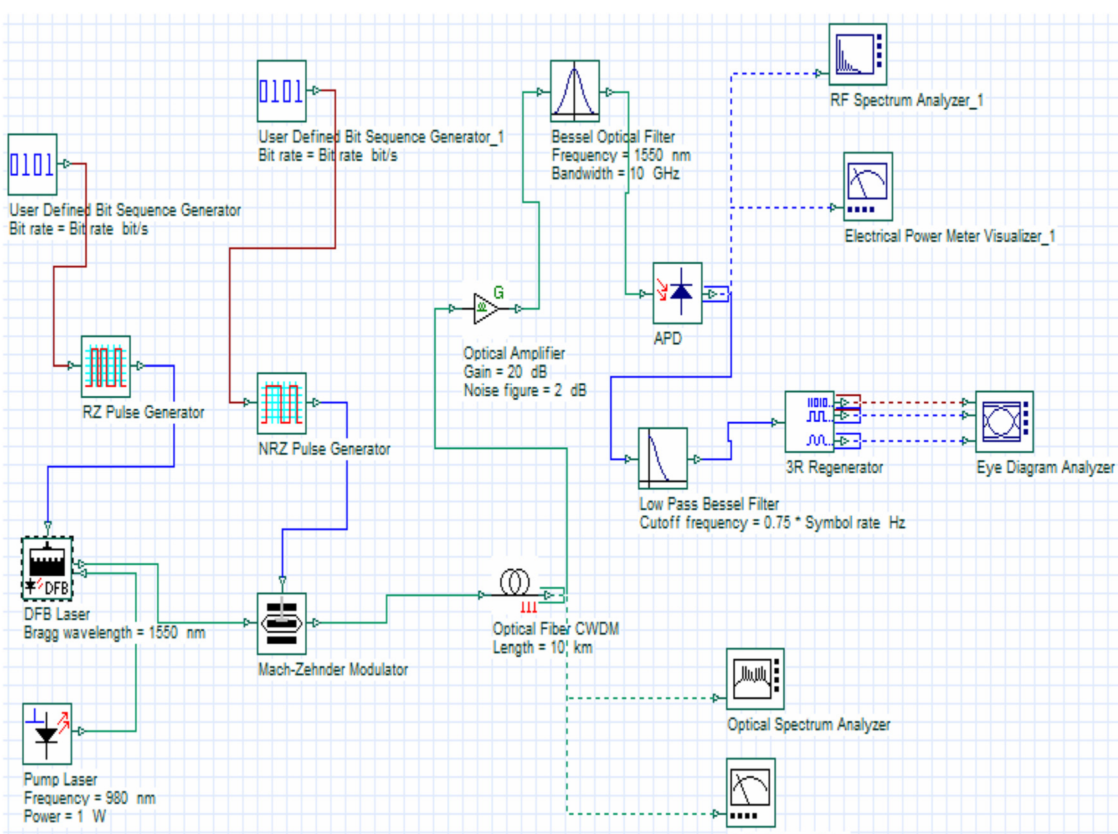

Figure 1: Experimental model setup description.

amplification happens. Until a population inversion state is reached, the medium is pumped. Usually, pump powers range from several 20–250 mW. To minimize reflections at the amplifier's input, an isolator is utilized. Transmission of frequency components of amplified spontaneous emission is decreased using a narrow band optical filter. Both the optical frequency and the local beam intensity within the amplifier section have an impact on the final optical gain. Consider a two-level homogeneously widened medium for the sake of this discussion.

3 Simulation results with discussions

We have demonstrated the distributed feedback laser grating order effects on optical system in the presence of NRZ-RZ line coding schemes. Max lighted signal form power variations are studied with spectral base wavelength band variations through optical fiber based on first various distributed based band feedback laser (DFB) grating order. The total lighted form base power band through optical fiber based on first different DFB laser grating order is estimated. The max electrical base signal band power form variations with spectral base frequency form band variations through photo-detector based on various DFB laser grating order is demonstrated. Total electrical based power band form through photo-detector based on various DFB laser grating order is also clarified. Max base band power form band amplitude with time through photo-detector based on different DFB laser grating order is clarified. Max Q base band form is studied numerically with DFB laser grating order variations. In order to make optical fiber systems more suitable for WDM systems and less susceptible to scattered sent signals, large spectral BW amplifiers are preferred. EDFA gain spectrum is saturated. The bandwidth is dictated by the base band dipole basic base band relaxation time, and the gain spectrum of erbium ions alone is homogeneous widened. However, the silica and any other dopants have an impact on the spectrum when in a glass host. Inhomogeneous broadening contributions may emerge from this. The total BW of EDFAs, including homogeneous and inhomogeneous, is about 30 nm.

Figure 2 shows the max lighted signal form power variations with spectral base wavelength band variations through optical fiber based on first DFB laser grating order. Figure 3 indicates the max lighted form signal power variations with spectral base wavelength band variations through optical fiber based on second DFB laser grating order. Figure 4 demonstrates the max lighted signal form power variations with spectral base wavelength band variations through optical fiber based on third DFB laser grating order. Figure 5 clarifies total lighted form base power band through optical fiber based on first DFB laser grating order. Figure 6 illustrates the total lighted form base power band

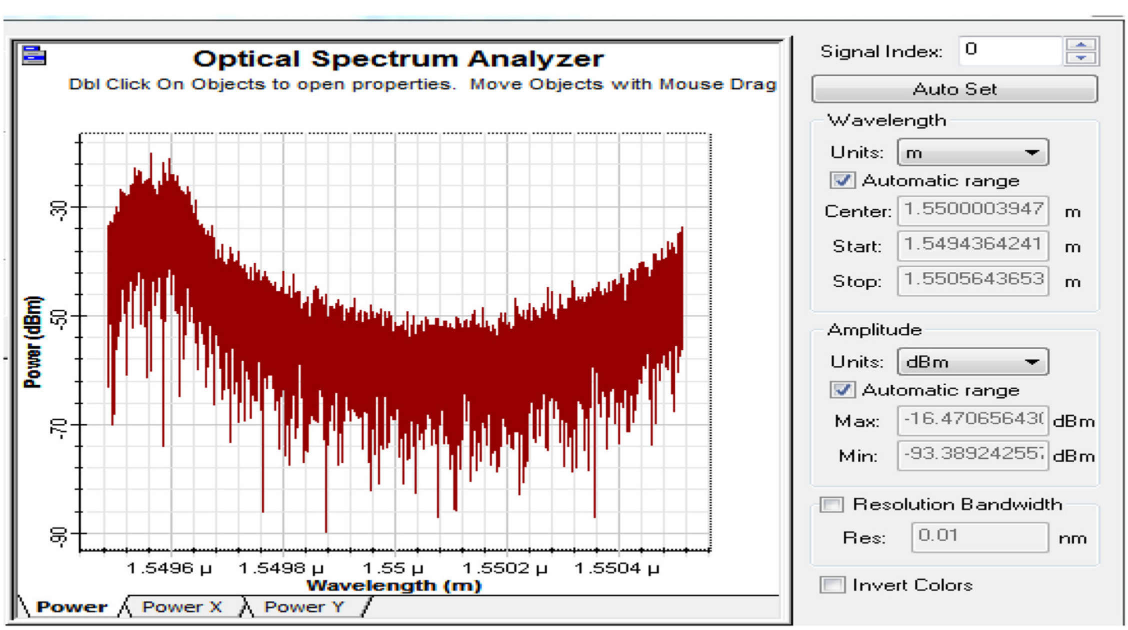

Figure 2: Max lighted signal form power variations with spectral base wavelength band variations through optical fiber based on first DFB laser grating order.

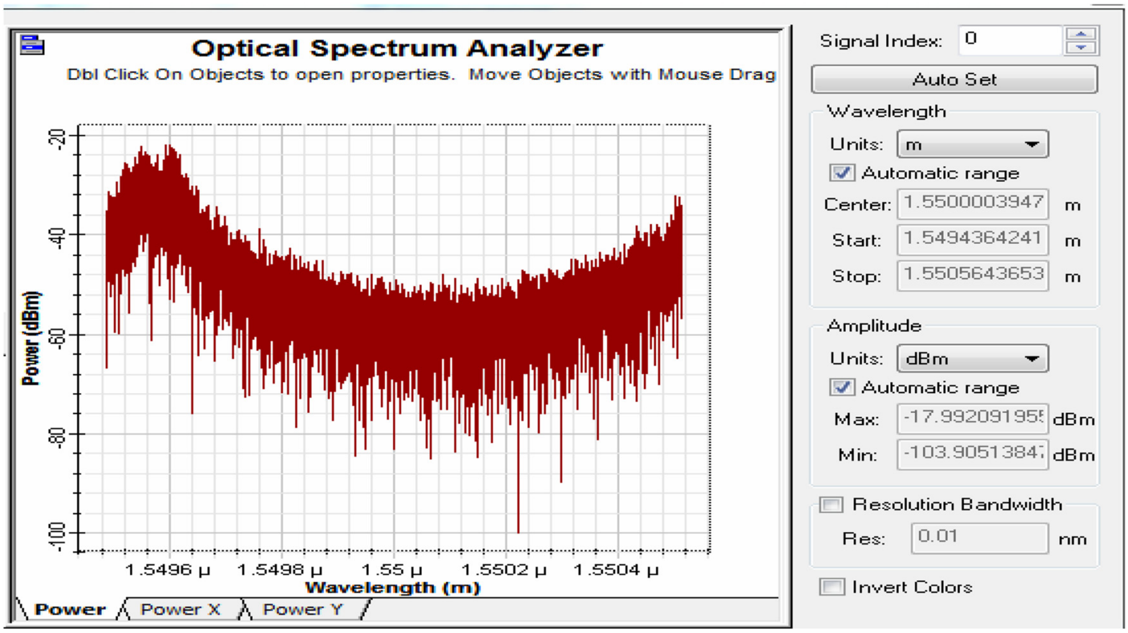

Figure 3: Max lighted form signal power variations with spectral base wavelength band variations through optical fiber based on second DFB laser grating order.

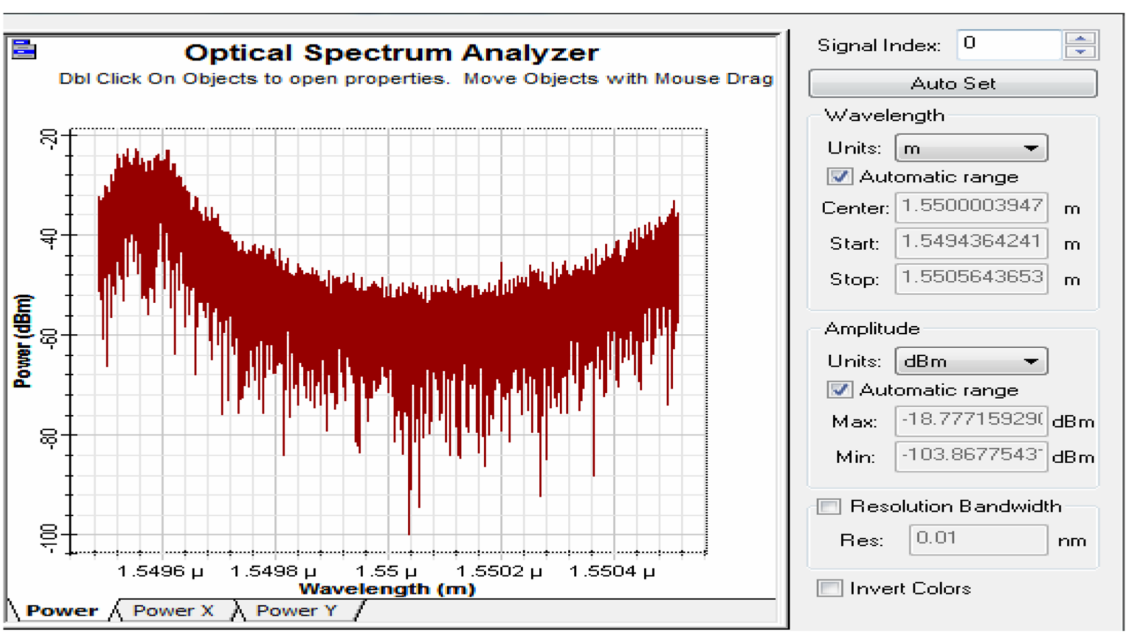

Figure 4: Max lighted signal form power variations with spectral base wavelength band variations through optical fiber based on third DFB laser grating order.

through optical fiber based on second DFB laser grating order. Figure 7 illustrates the total lighted form base power band through optical fiber based on third DFB laser grating order. Figure 8 shows the max electrical base signal band power form variations with spectral base frequency form band variations through photo-detector based on first DFB laser grating order.

Figure 9 shows the max electrical base signal band power form with spectral band frequency form through photo-detector based on second DFB laser grating order. Figure 10

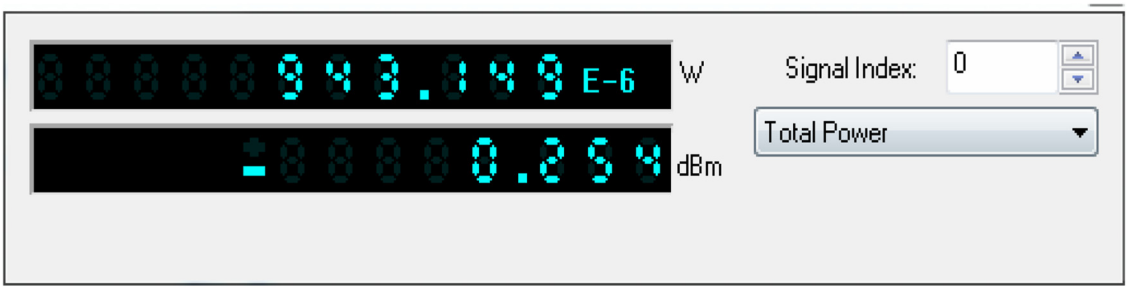

Figure 5: Total lighted form base power band through optical fiber based on first DFB laser grating order.

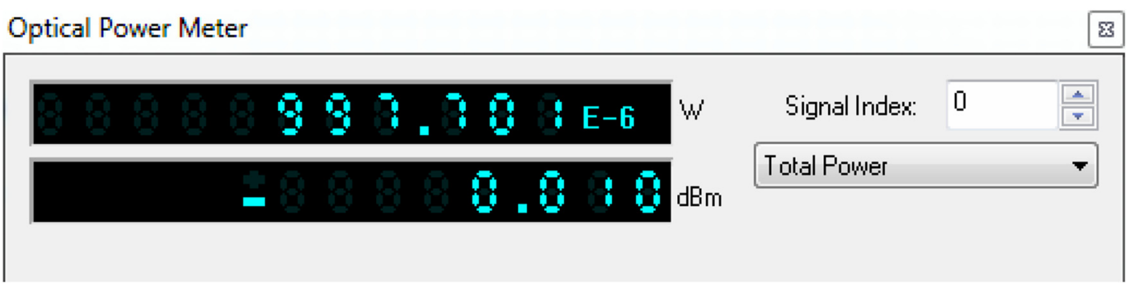

Figure 6: Total lighted form base power band through optical fiber based on second DFB laser grating order.

Figure 7: Total lighted form base power band through optical fiber based on third DFB laser grating order.

illustrates the max electrical base signal band power form with spectral band frequency form through photo-detector based on third DFB laser grating order. Figure 11 demonstrates the total electrical based power band form through photo-detector based on first DFB laser grating order. The total electrical based power band form through photo-detector based on second DFB laser grating order is clarified in Figure 12 illustrates the total electrical based power band form through photo-detector based on the third DFB laser grating order is demonstrated in Figure 13.

Figure 14 clarifies the max base band power form band amplitude with time through photo-detector based on first DFB laser grating order. Max base band power form band amplitude with time through photo-detector based on second DFB laser grating order is indicated in Figure 15. The max base band power form band amplitude with time through photo-detector based on third DFB laser grating order is clarified in Figure 16. The max Q base band form with DFB laser grating order is observed in Figure 17.

4 Conclusion

We have demonstrated the distributed feedback laser grating order effects on optical system in the presence of

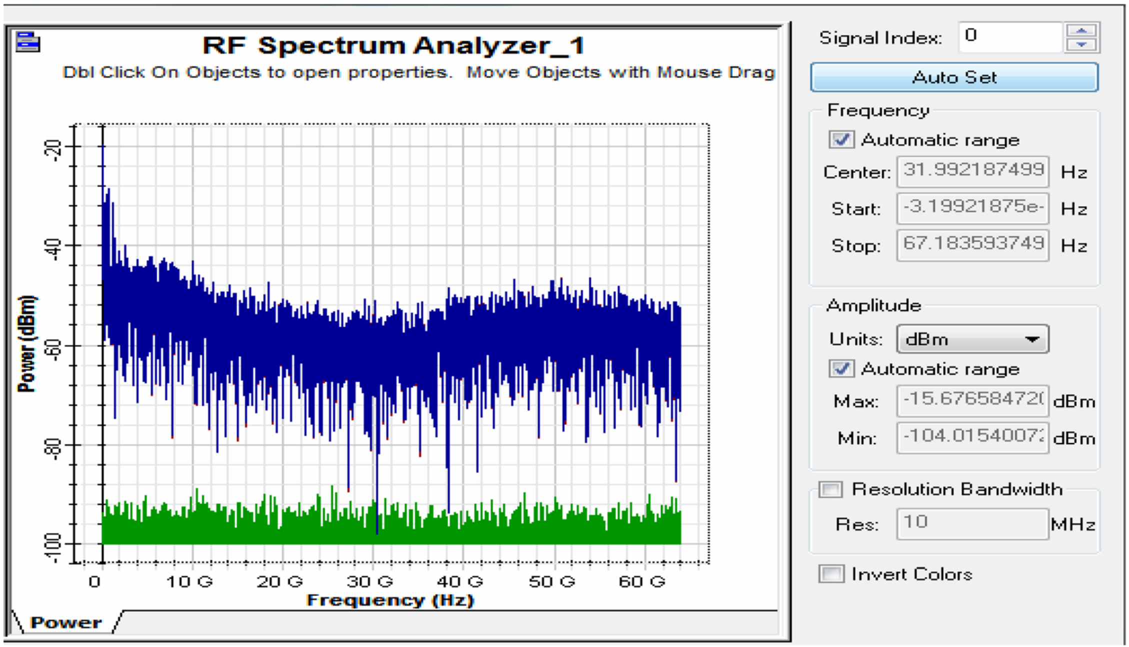

Figure 8: Max electrical base signal band power form variations with spectral base frequency form band variations through photo-detector based on first DFB laser grating order.

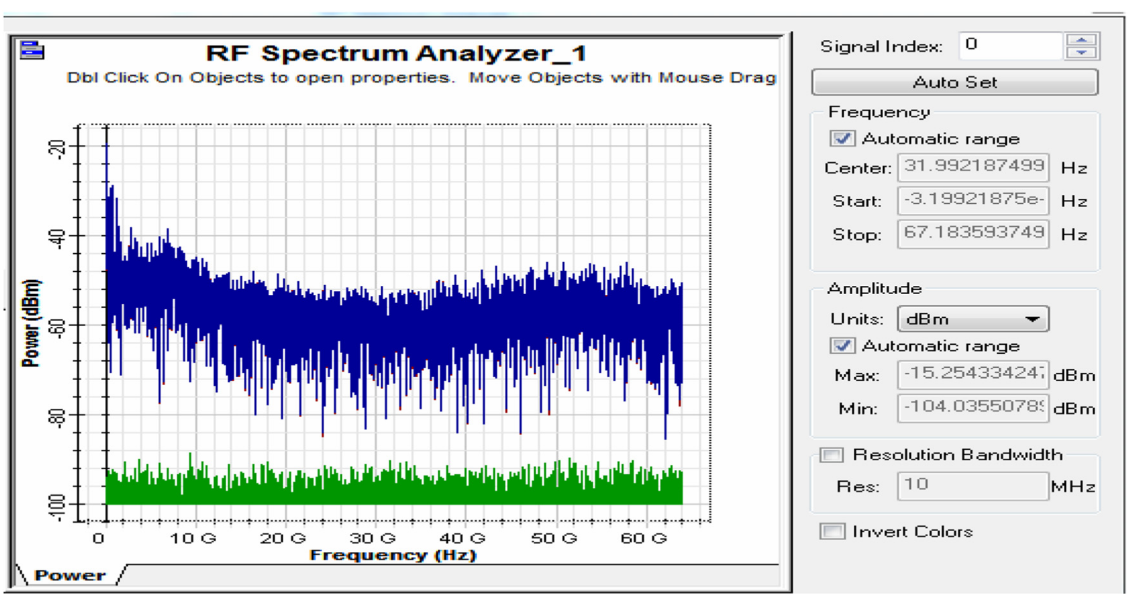

Figure 9: Max electrical base signal band power form with spectral band frequency form through photo-detector based on second DFB laser grating order.

NRZ-RZ line coding schemes. Max lighted signal form power variations are studied with spectral base wavelength band variations through optical fiber based on first various distributed based band feedback laser (DFB) grating order. The total lighted form base power band through optical fiber based on first different DFB laser grating order is estimated. The max electrical base signal band power form variations with spectral base frequency form band variations through photo-detector based on various DFB laser grating order is demonstrated. Total electrical based power band form

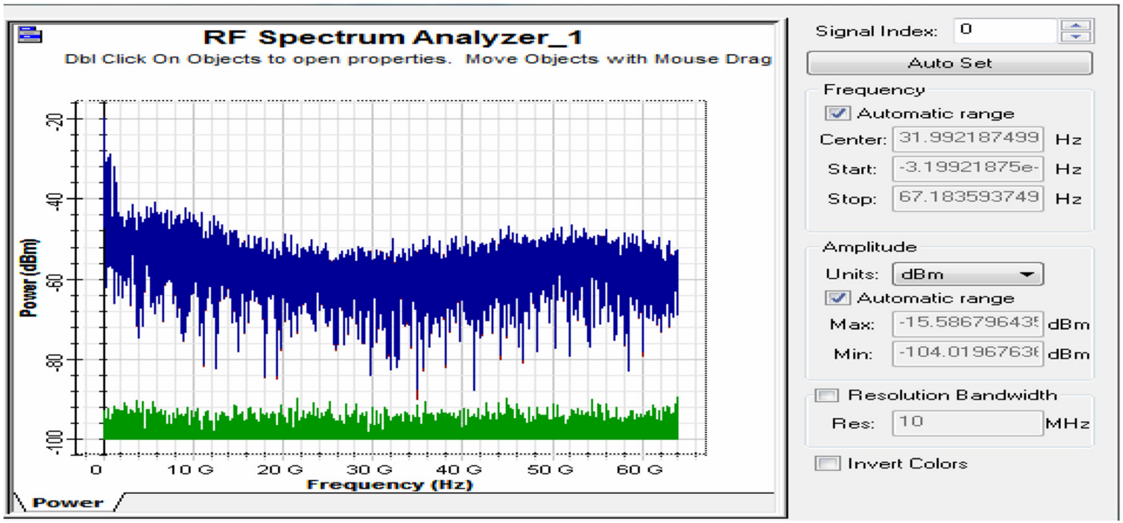

Figure 10: Max electrical base signal band power form with spectral band frequency form through photo-detector based on third DFB laser grating order.

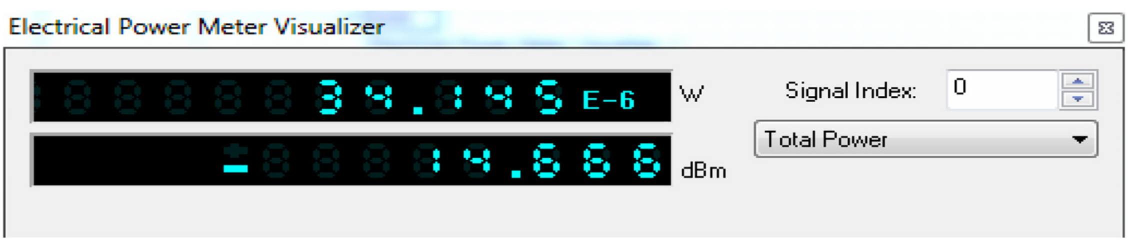

Figure 11: Total electrical based power band form through photo-detector based on first DFB laser grating order.

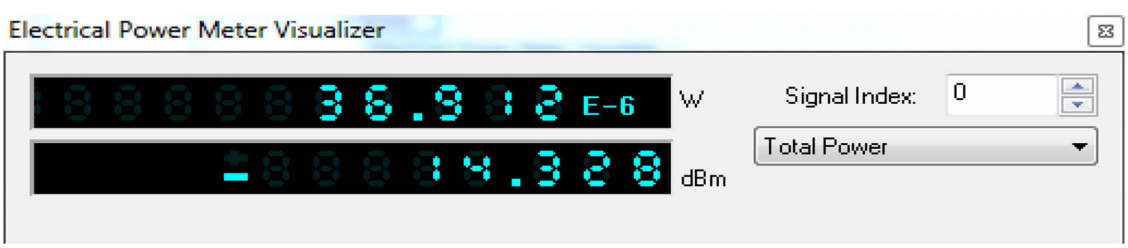

Figure 12: Total electrical based power band form through photo-detector based on second DFB laser grating order.

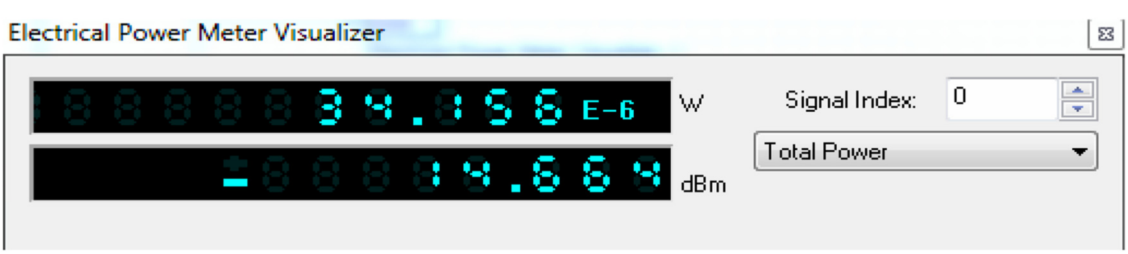

Figure 13: Total electrical based power band form through photo-detector based on third DFB laser grating order.

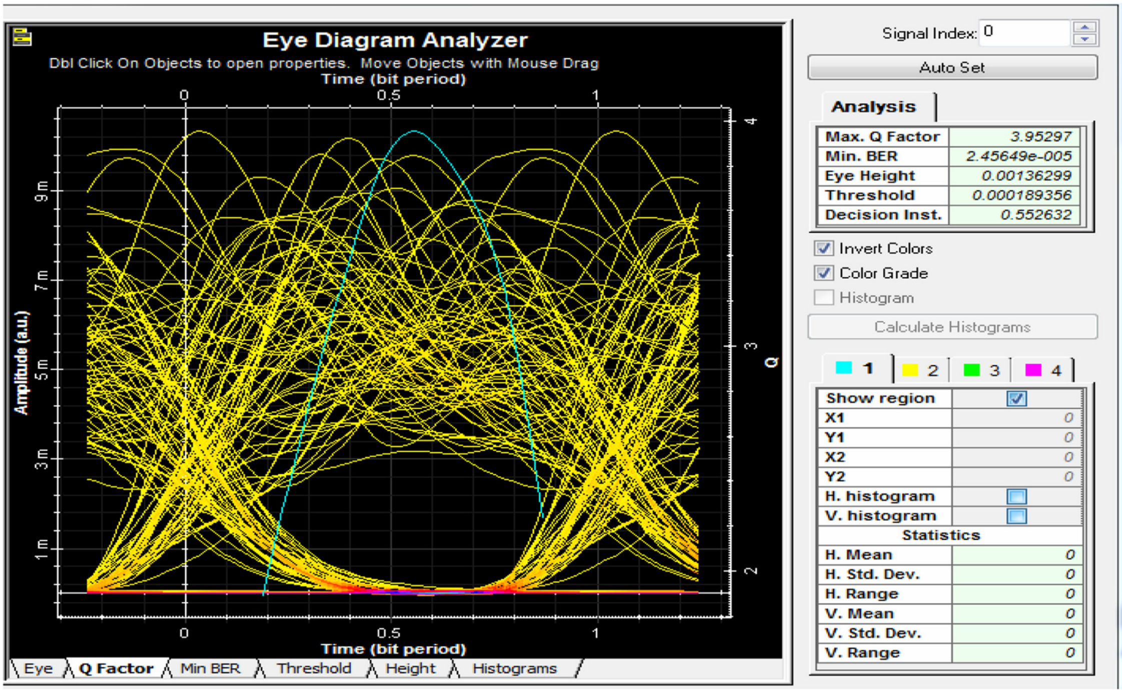

Figure 14: Max base band power form band amplitude with time through photo-detector based on first DFB laser grating order.

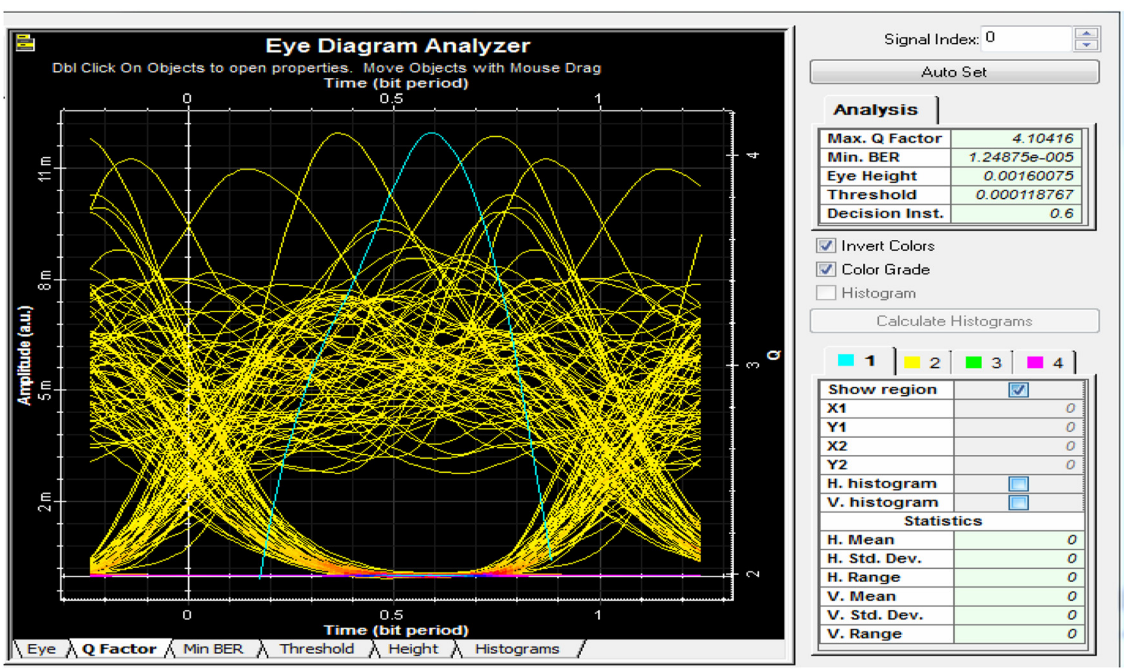

Figure 15: Max base band power form band amplitude with time through photo-detector based on second DFB laser grating order.

through photo-detector based on various DFB laser grating order is also clarified. Max base band power form band amplitude with time through photo-detector based on different DFB laser grating order is clarified. Max Q base band form is studied numerically with DFB laser grating order variations. The larger the DFB grating order the larger the Q base band form quality. Also max base band power form band amplitude is optimized with the largest DFB laser order.

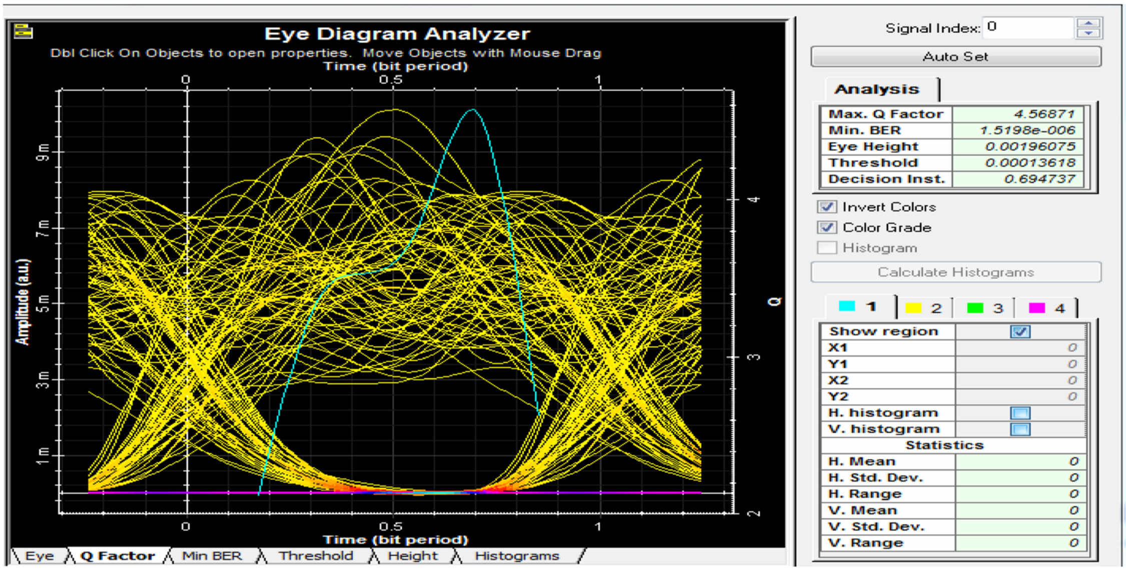

Figure 16: Max base band power form band amplitude with time through photo-detector based on third DFB laser grating order.

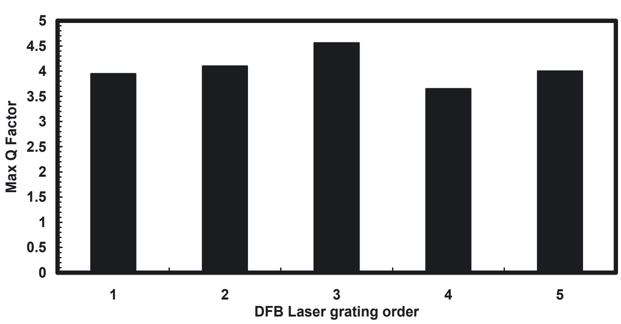

Figure 17: Max Q base band form with DFB laser grating order.

Author contribution: All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission.

Research funding: None declared.

Conflict of interest statement: The authors declare no conflicts of interest regarding this article.

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