

Laboratorij za sevanje in optiko  
Fakulteta za elektrotehniko

# **Sodobne komponente v optičnih komunikacijah**

Matjaž Vidmar

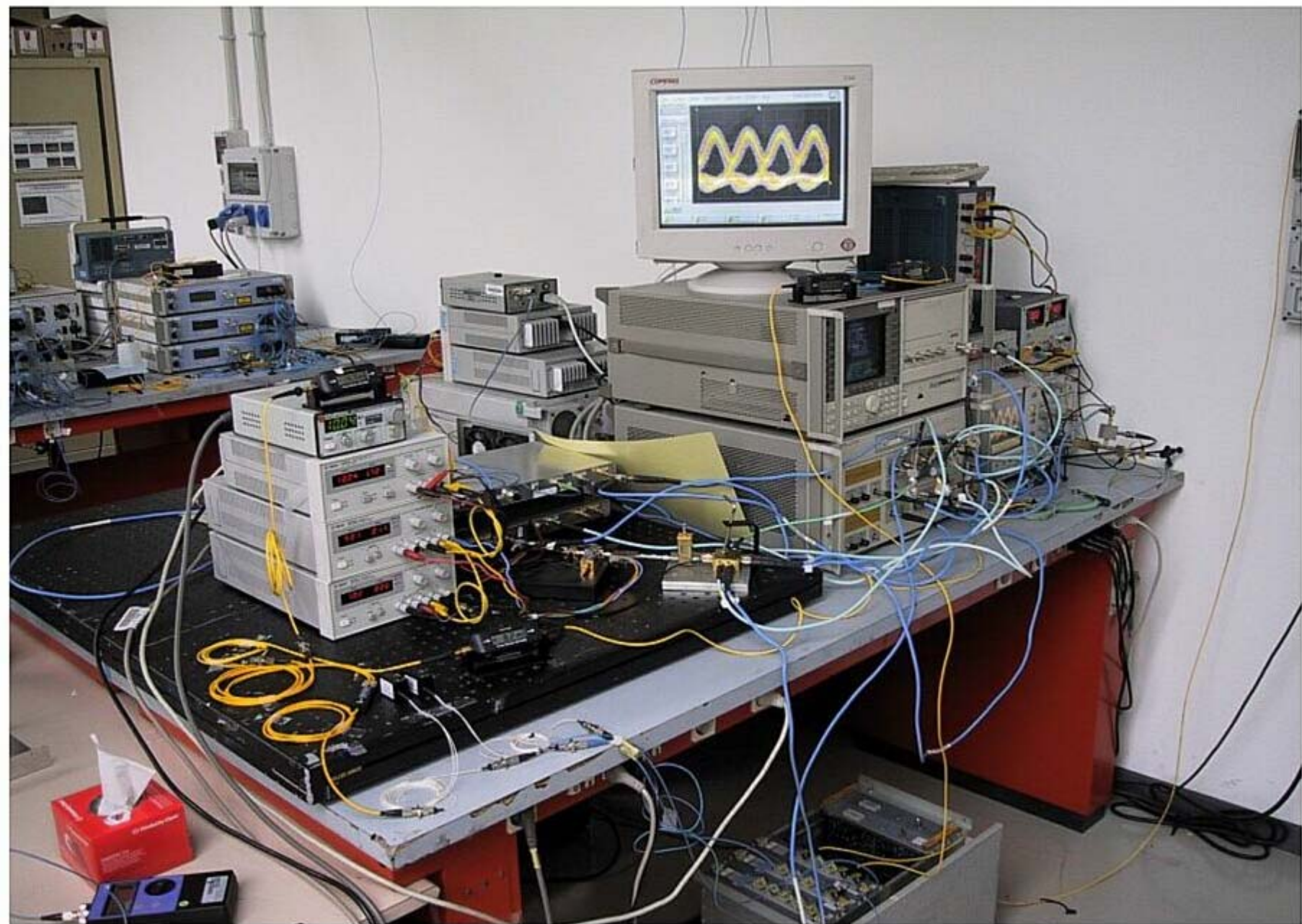
Seminar optične komunikacije 2004

## Seznam prosojnic predavanja:

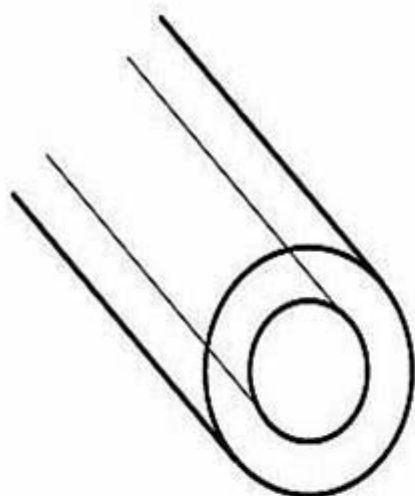
### Sodobne komponente v optičnih komunikacijah

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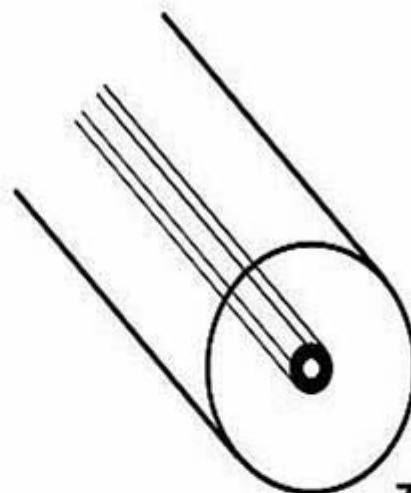
- 1 - Laboratorijski poskus: zanimiv, a daleč prekompliciran.
- 2 - Uveljavljene zvrsti svetlobnih vlaken.
- 3 - Najpogostejši enojni vlakenski konektorji.
- 4 - Ferule vlakenskih konektorjev.
- 5 - Trakovi (ribbon) svetlobnih vlaken.
- 6 - Polprevodniški izvori svetlobe.
- 7 - Neposredno modulirani FP in DFB laserji.
- 8 - Temperaturno stabilizirani DFB laserji z ozko spektralno črto.
- 9 - Oddajniki z vgrajenim modulatorjem.
- 10 - Oddajnik z nastavljivo valovno dolžino.
- 11 - Svetlobni sprejemniki PIN in APD.
- 12 - SDH sprejemniki/oddajniki.
- 13 - Ethernet sprejemniki/oddajniki.
- 14 - Optični izolatorji in cirkulatorji.
- 15 - Erbijeve optični ojačevalniki.
- 16 - Sita in kretnice za valovnodolžinsko razvrščanje (WDM).
- 17 - Tankoslojna sita in vlakenske uklonske mrežice.
- 18 - Kretnice z valovodno razvrstitveno strukturo (AWG).



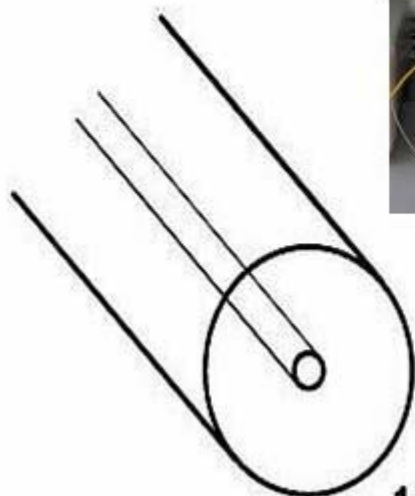
Slika 1 - Laboratorijski poskus: zanimiv, a daleč prekomplíciran.



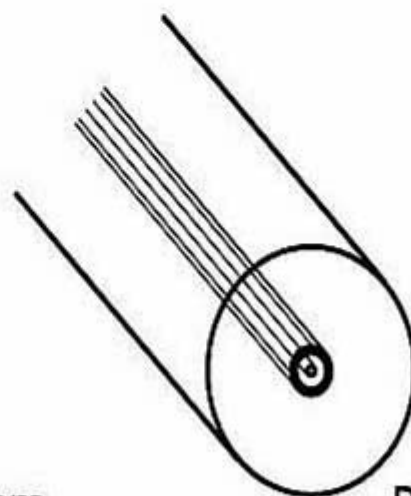
Mnogorodovno  
GI vlakno  
50/125 $\mu$ m  
62.5/125 $\mu$ m



Enorodovno  
NZDSF vlakno  
velik Aeff jedra  
3.7ps/nm.km @ 1550nm



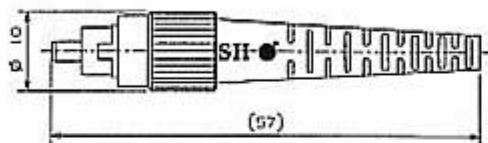
Enorodovno  
SI vlakno  
9/125 $\mu$ m  
17ps/nm.km @ 1550nm



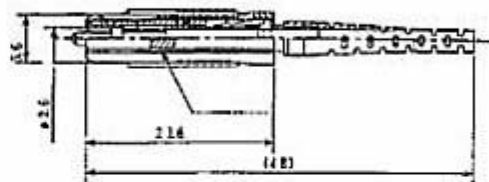
Enorodovna  
posebna vlakna  
Er<sup>3+</sup> dopirana  
DCF -80ps/nm.km

Slika 2 - Uveljavljene zvrsti svetlobnih vlaken.

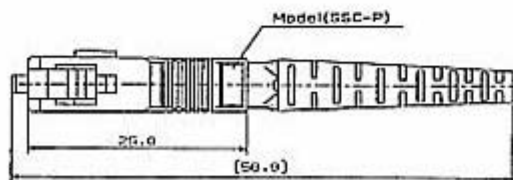
# FC



# MU



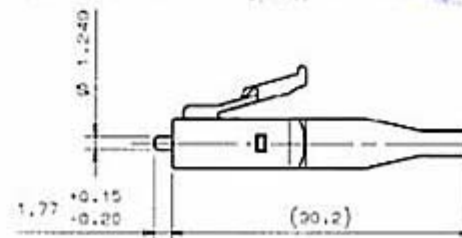
# SC



## spojke



# LC



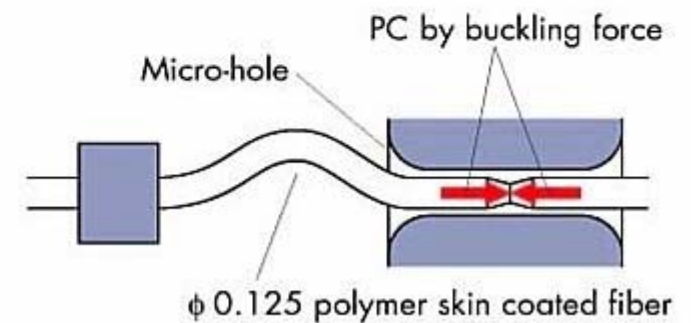
Slika 3 - Najpogostejši enojni vlakenski konektorji.

(1.25) Zirconia Ceramic Type Ferrules			
	<b>LCZ-1A Series</b> (Singlemode) <a href="#">lcz-1a.pdf</a>		<b>MUZ-1A Series</b> (Singlemode) <a href="#">muz-1a.pdf</a>
	<b>LCNZ-1A Series</b> (Singlemode Angle) <a href="#">lcnz-1a.pdf</a>		<b>MUNZ-1A Series</b> (Singlemode Angle) <a href="#">munz-1a.pdf</a>
(2.5) Zirconia Ceramic Type Ferrules			
	<b>SZ-3A Series</b> (Singlemode Pre-Dome) <a href="#">sz-3a.pdf</a>		<b>SNZ-1A Series</b> (Singlemode Angle) <a href="#">snz-1a.pdf</a>
	<b>SNZ-3A Series</b> (Singlemode Pre-Angle) <a href="#">snz-3a.pdf</a>		<b>SFZ-3A Series</b> (Singlemode Funnel) <a href="#">sfz-3a.pdf</a>
Zirconia Ceramic Type Stick			
	<b>ZS-3A Series</b> (Singlemode Stick) <a href="#">zs-3a.pdf</a>		<b>ZFS-3A Series</b> (Singlemode Funnel Stick) <a href="#">zfs-3a.pdf</a>
Zirconia Ferrule Stub Assembly			
	<b>ZSS-33A Series</b> (1.25mm Singlemode Stub) <a href="#">zss-33a.pdf</a>		<b>ZSS-34A Series</b> (2.5mm Singlemode Stub) <a href="#">zss-34a.pdf</a>

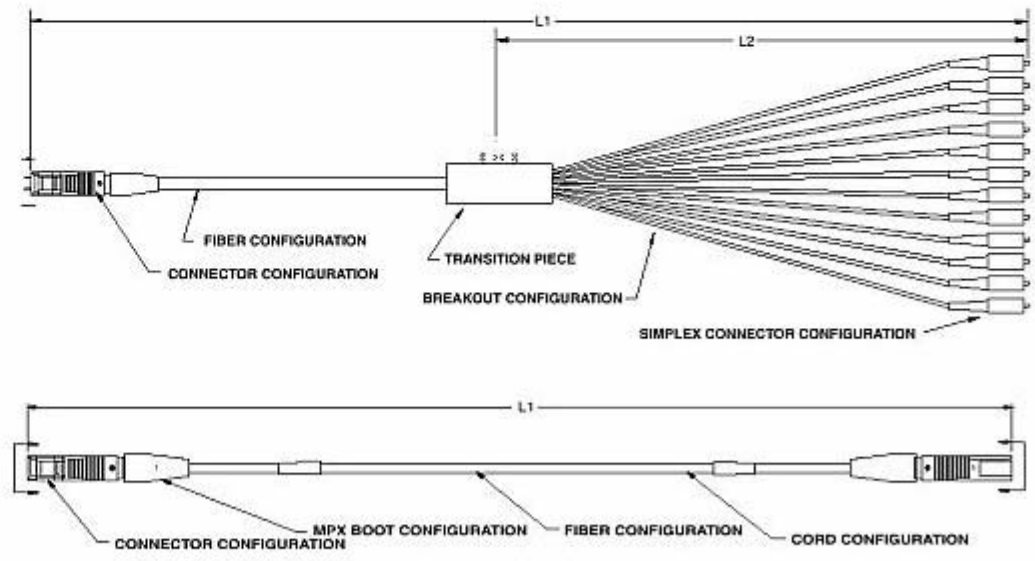
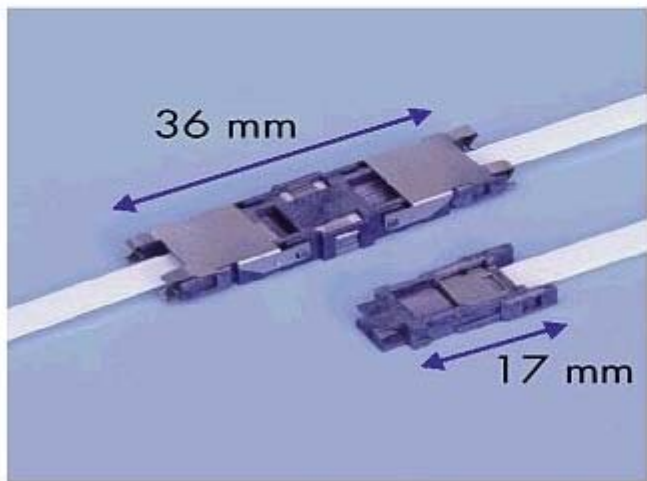
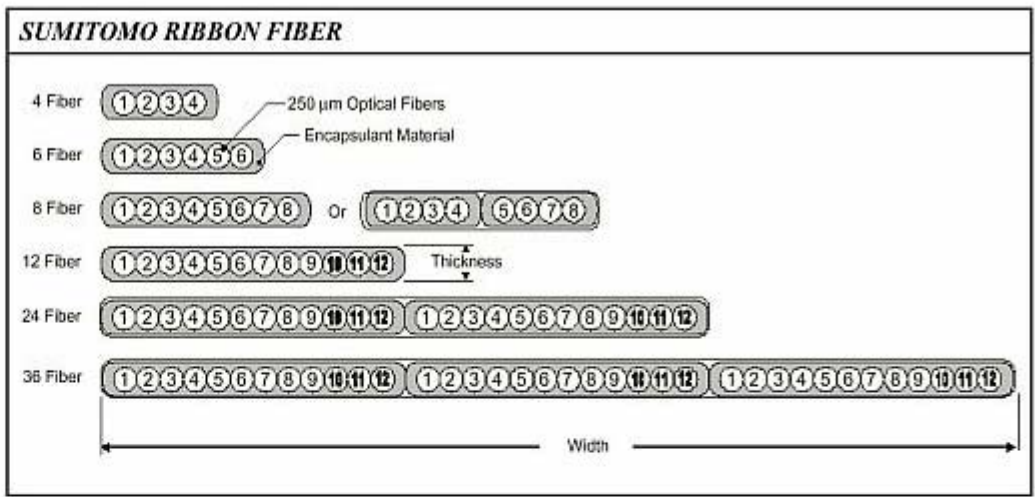
## plastične ferule



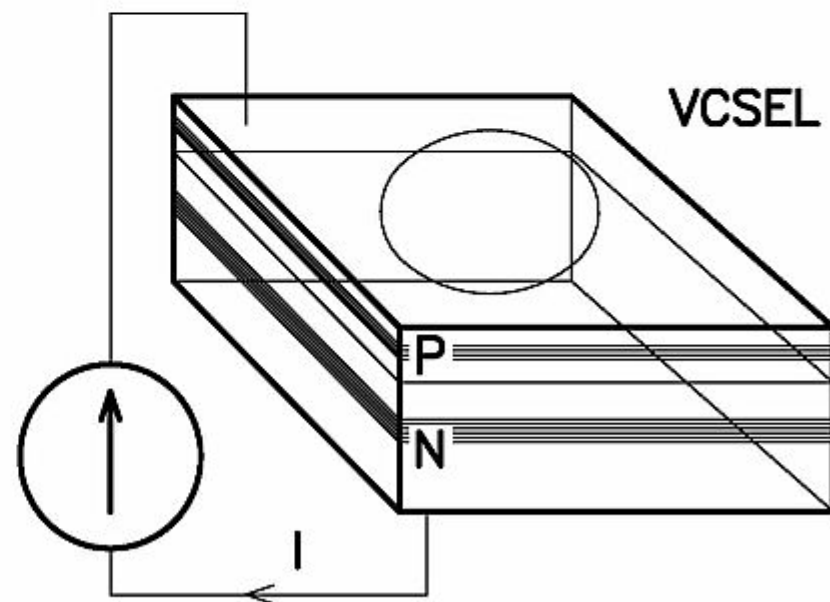
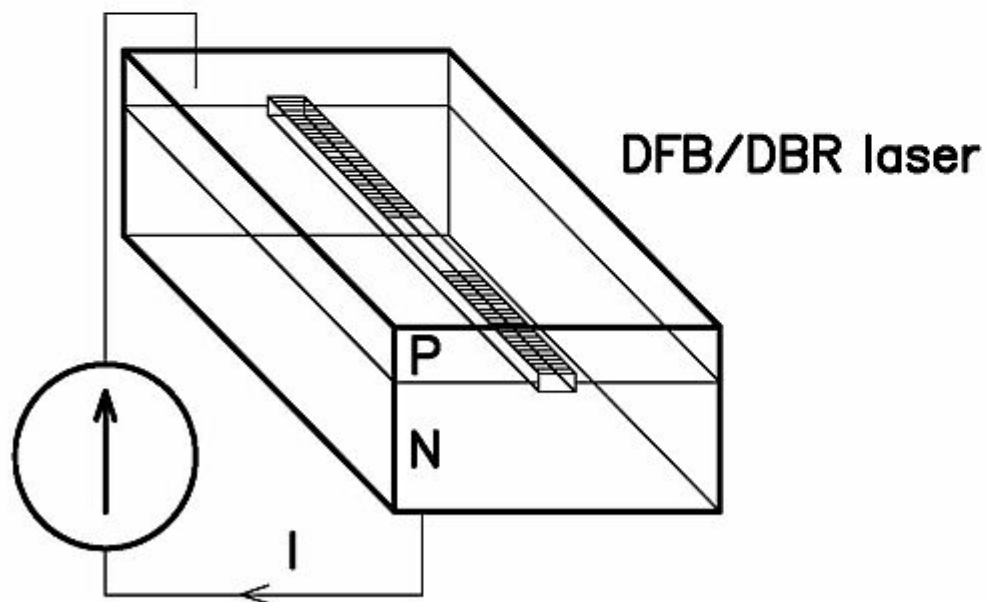
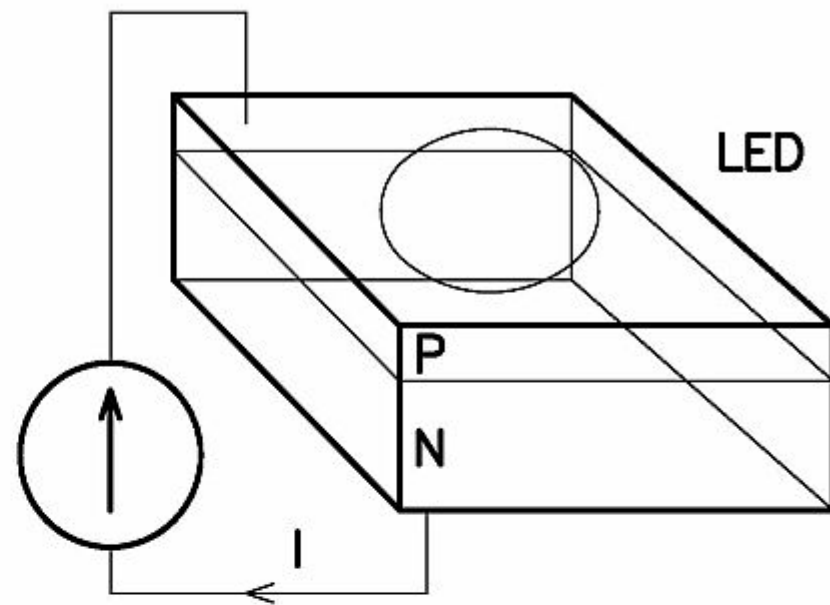
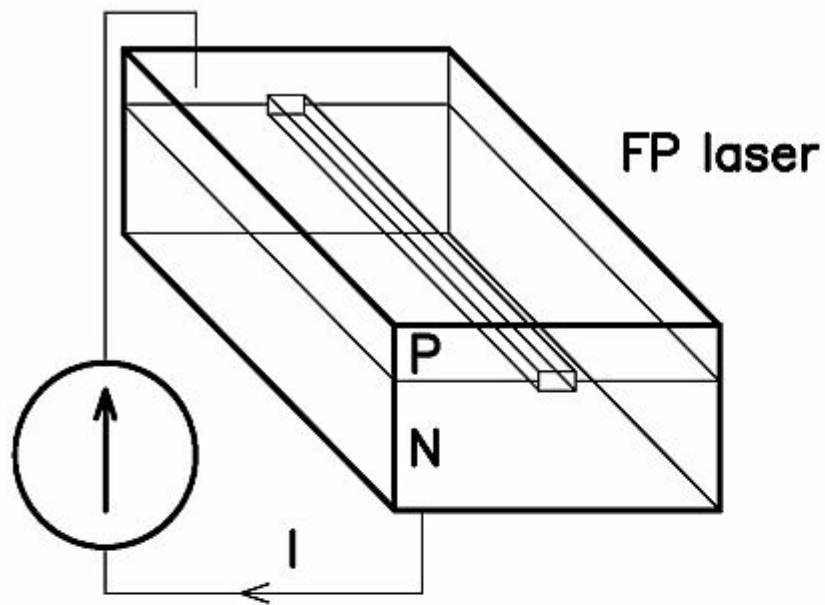
## konektor brez ferule



Slika 4 - Ferule vlakenskih konektorjev.

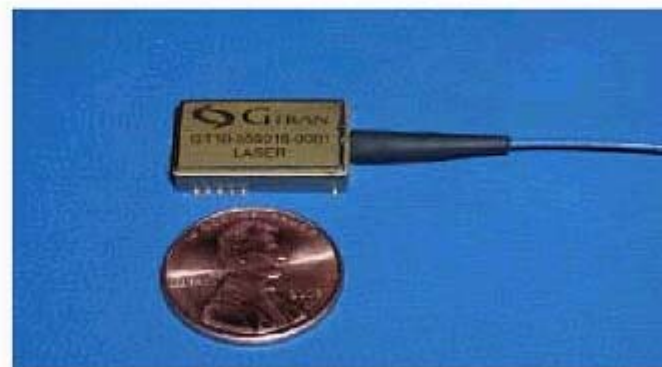
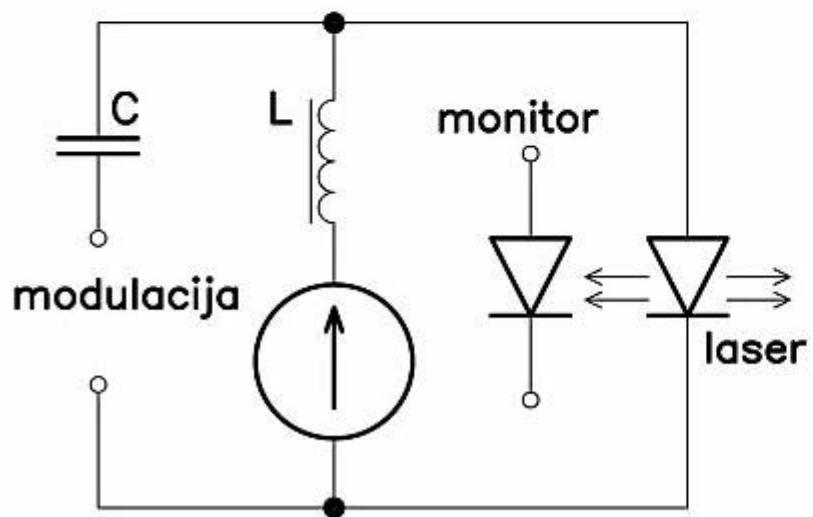


Slika 5 - Trakovi (ribbon) svetlobnih vlaknen.

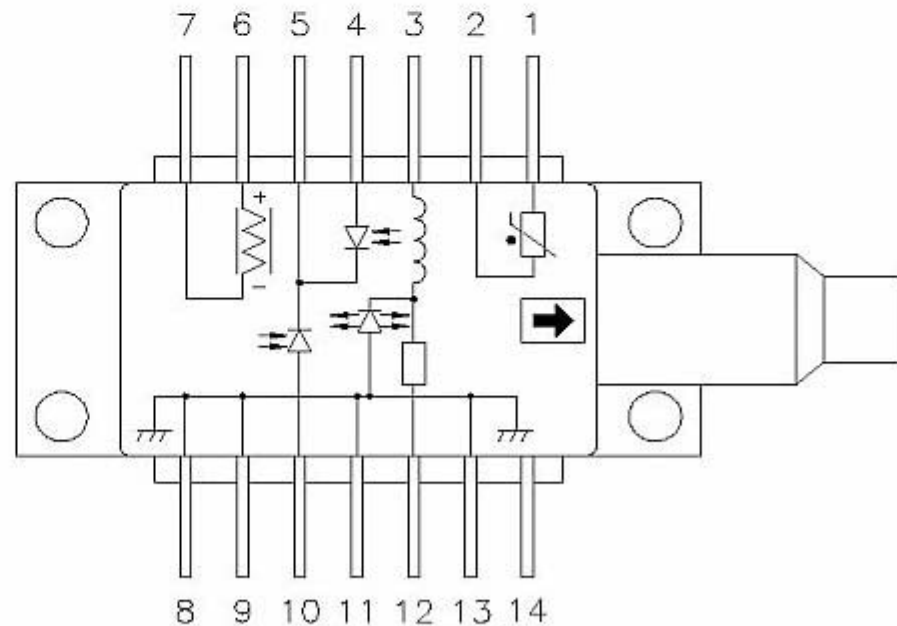
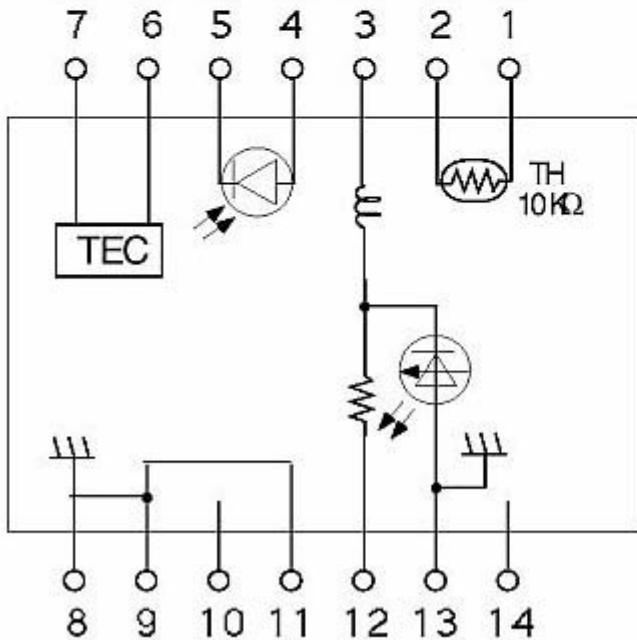
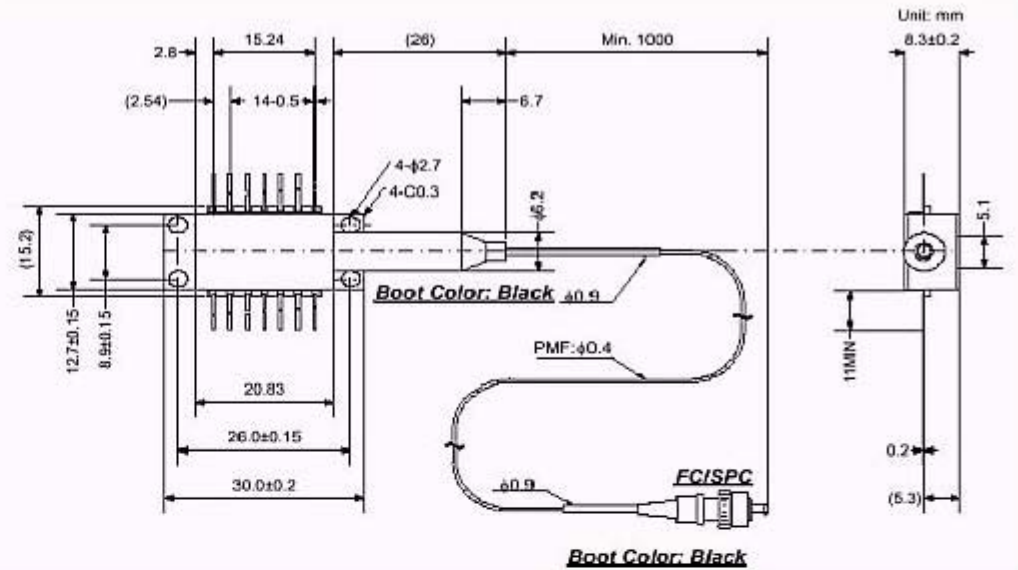
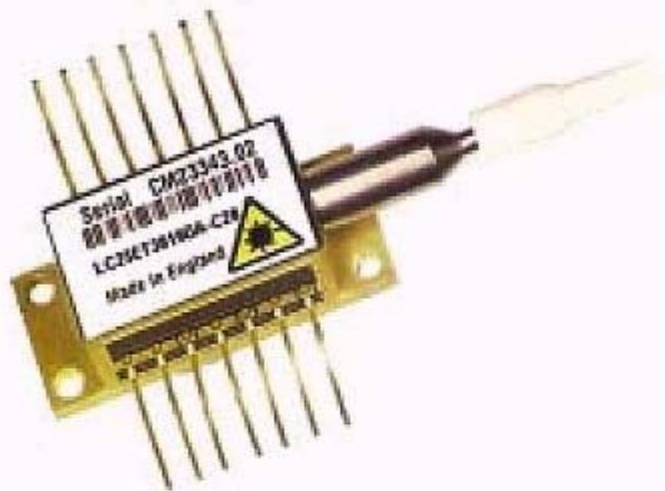


Slika 6 - Polprevodniški izvori svetlobe.

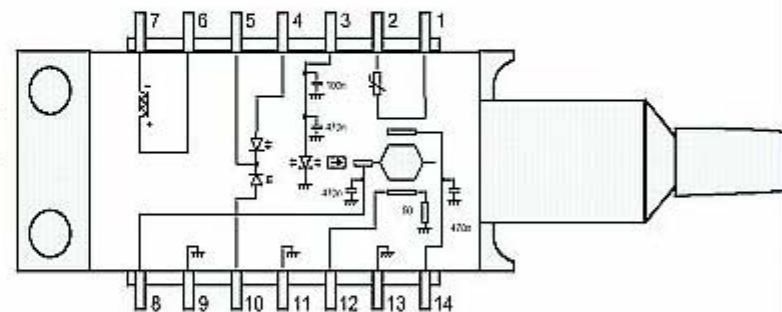
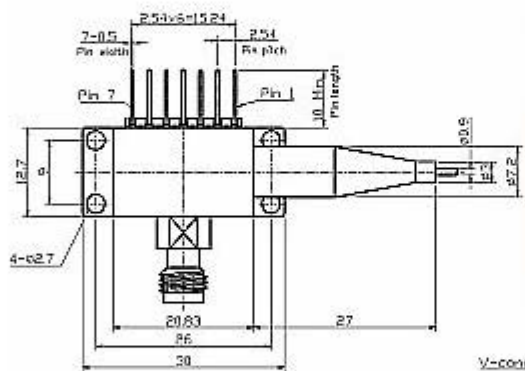
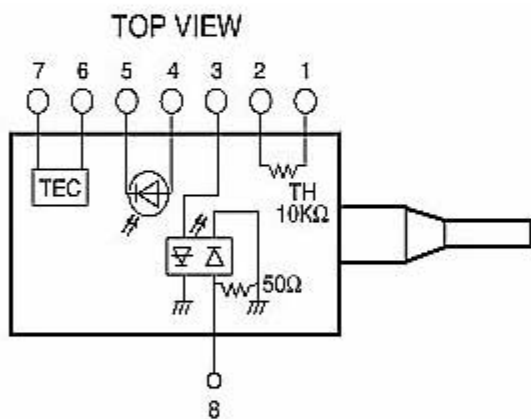
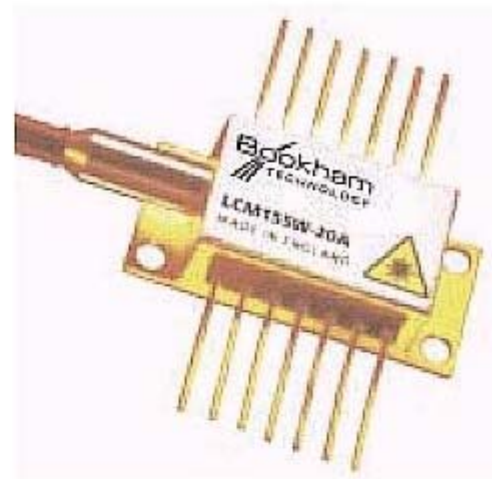
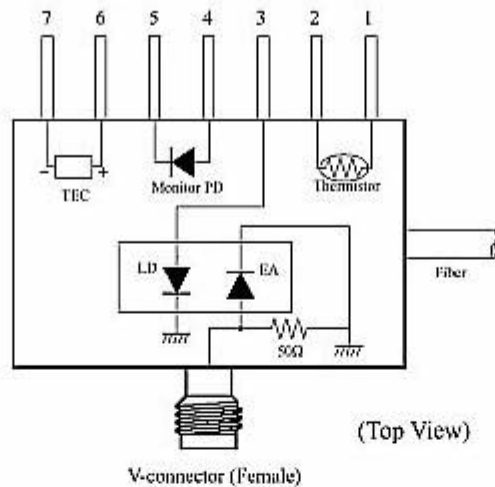
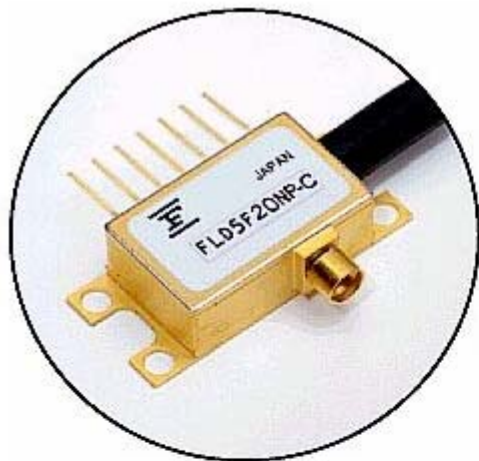




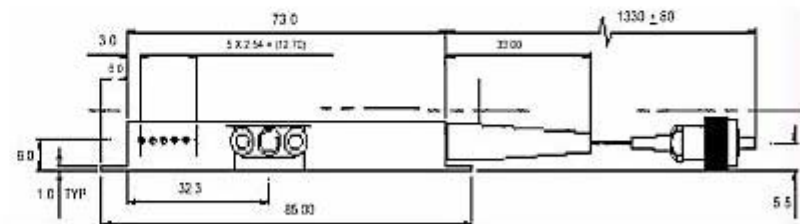
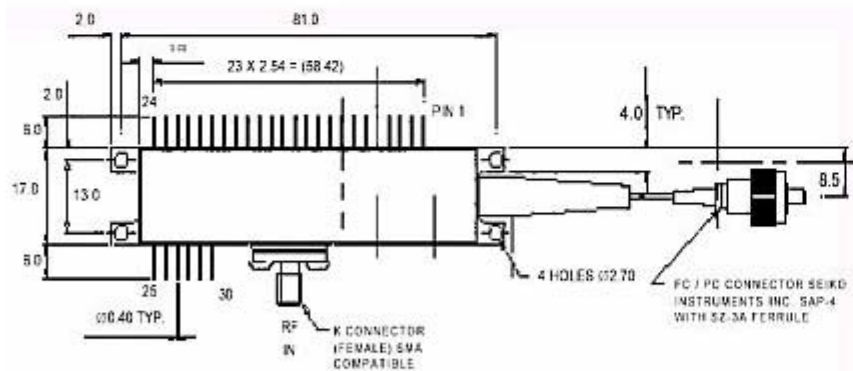
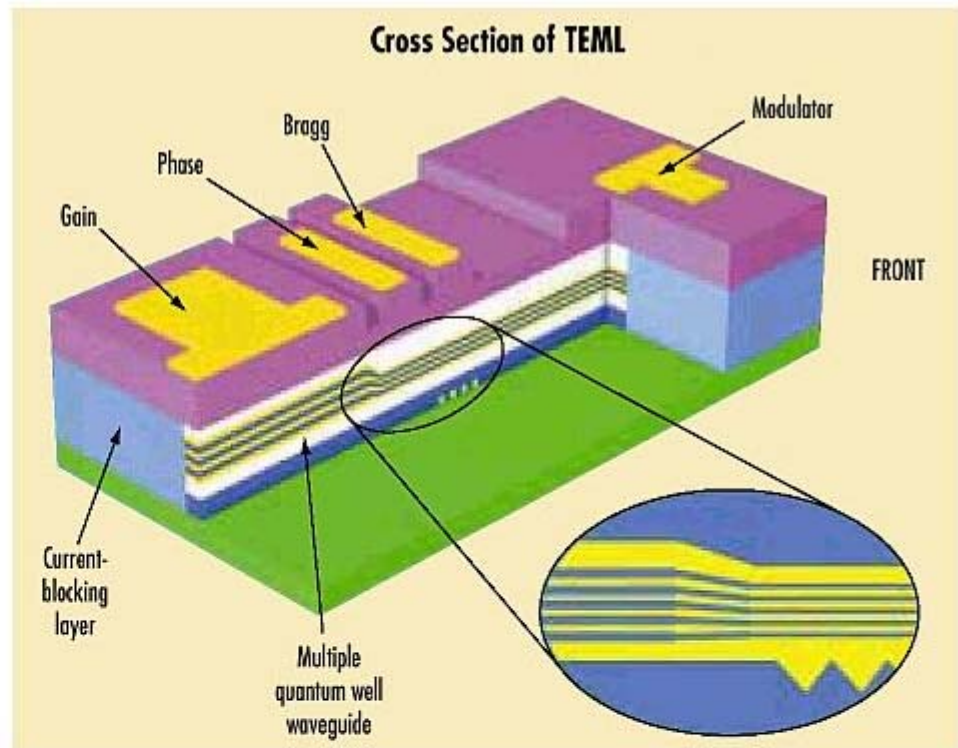
Slika 7 - Neposredno modulirani FP in DFB laserji.



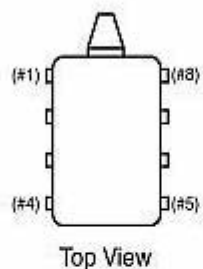
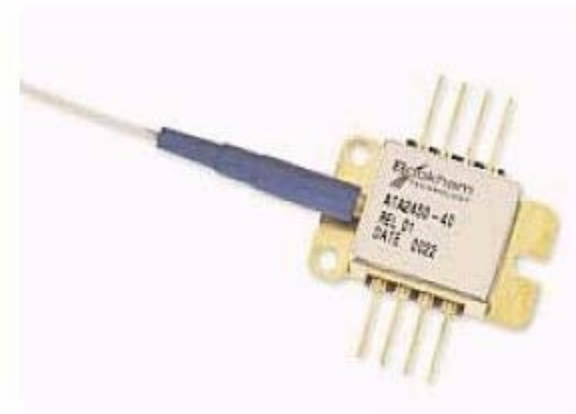
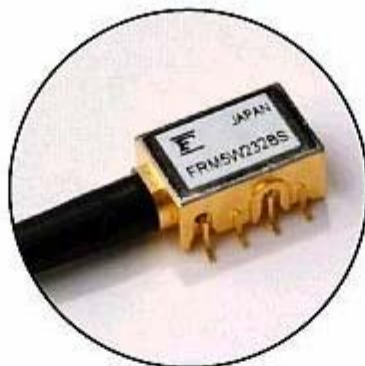
Slika 8 - Temperaturno stabilizirani DFB laserji z ozko spektralno črto.



Slika 9 - Oddajniki z vgrajenim modulatorjem.

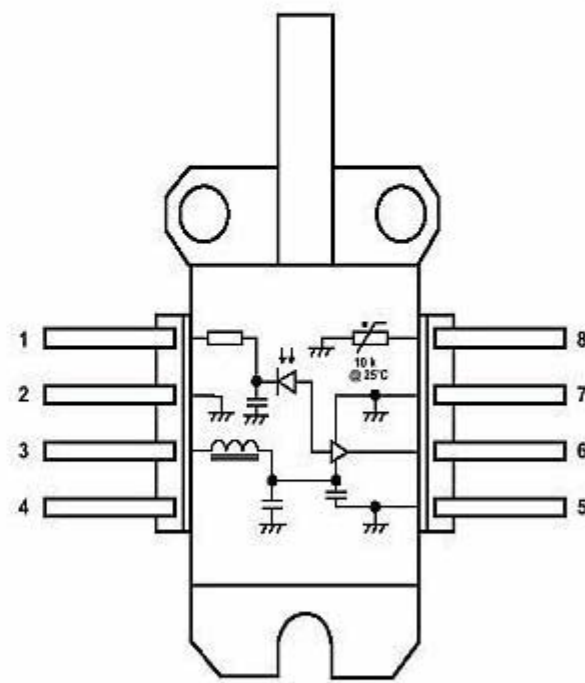


Slika 10 - Oddajnik z nastavljivo valovno dolžino.

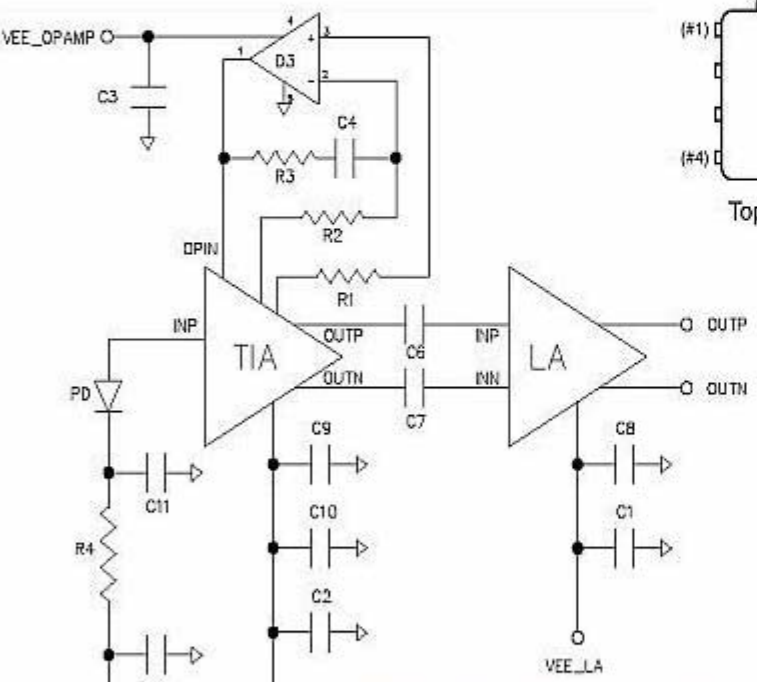


- Pin Description
1. VPD
  2. GROUND
  3. DATA
  4. GROUND
  5. THERMISTOR
  6. -DATA
  7. GROUND
  8. VDD

## 2.5Gb/s APD

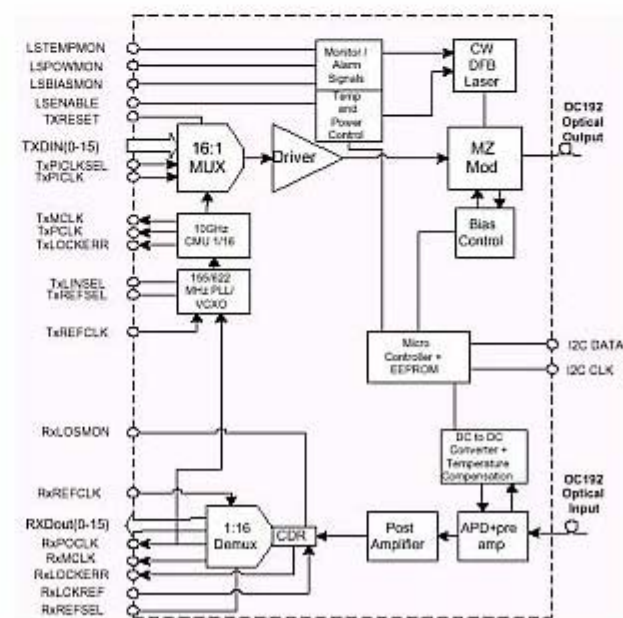
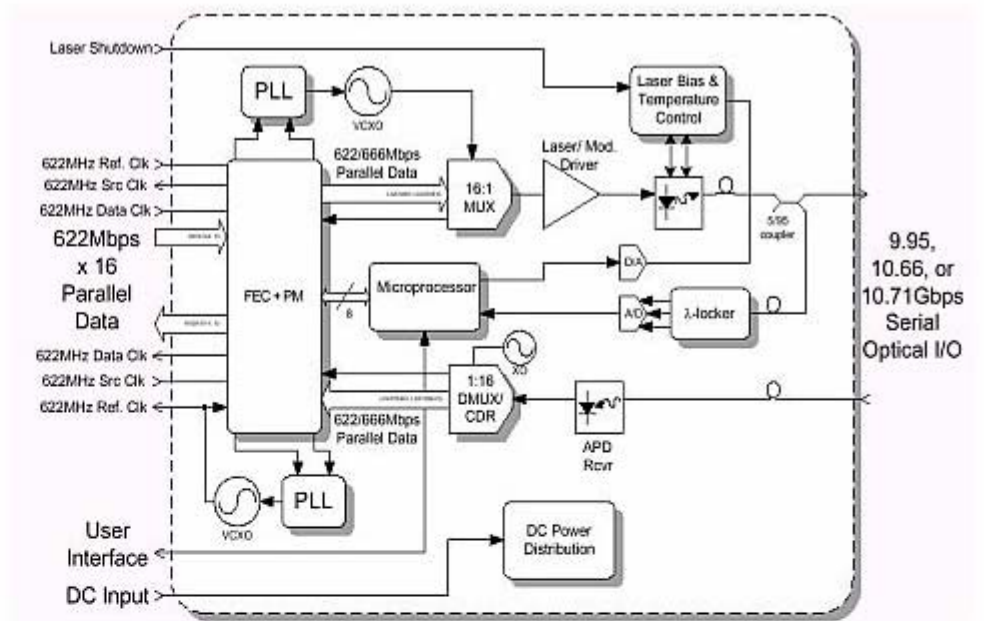


## 2.5Gb/s APD

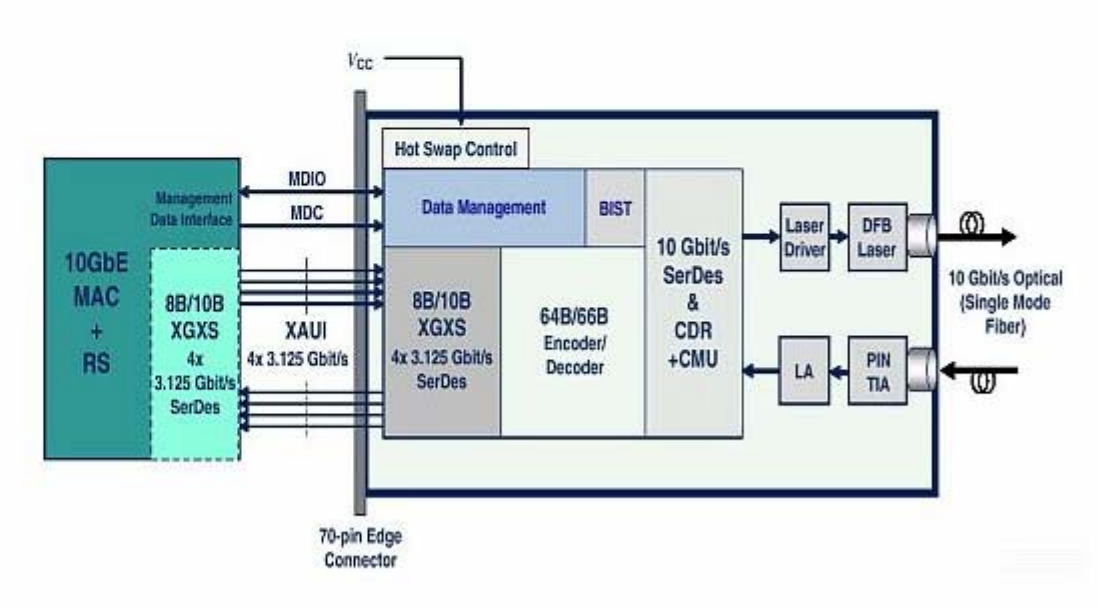
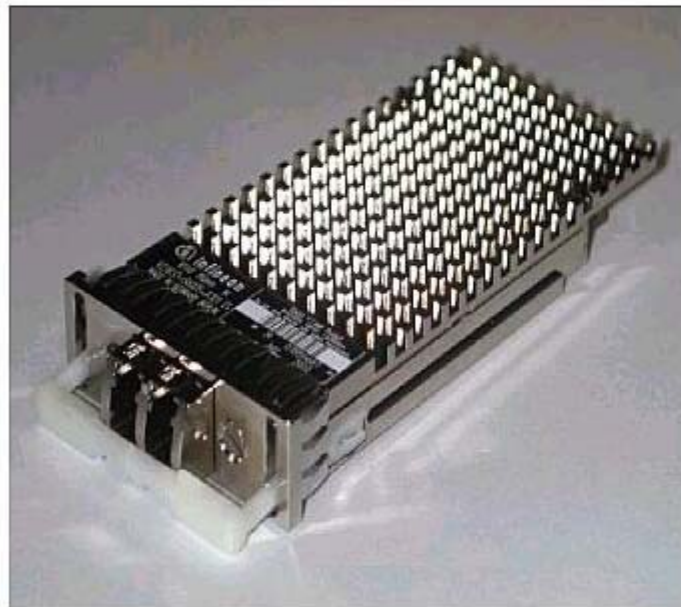
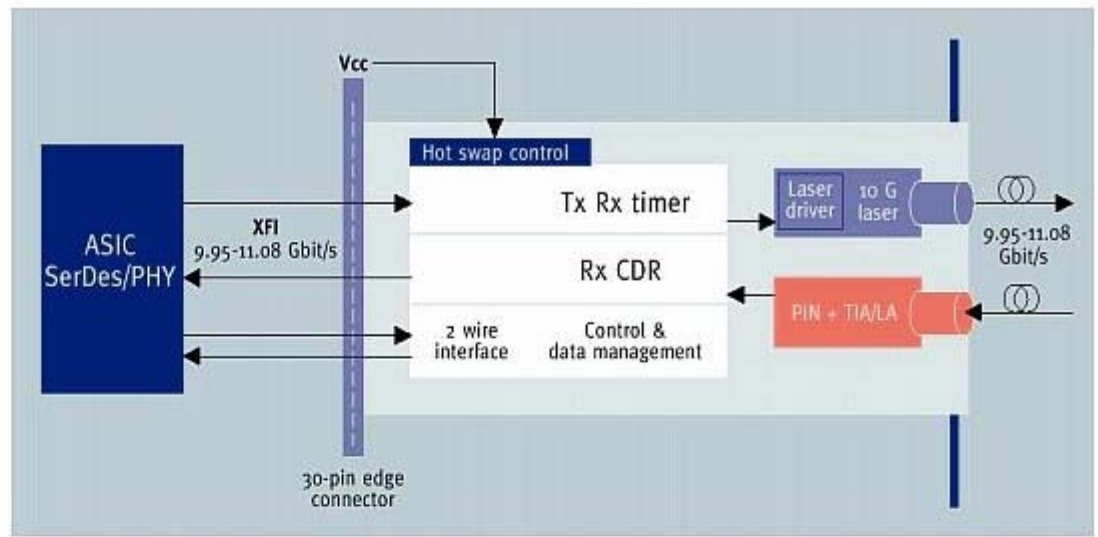
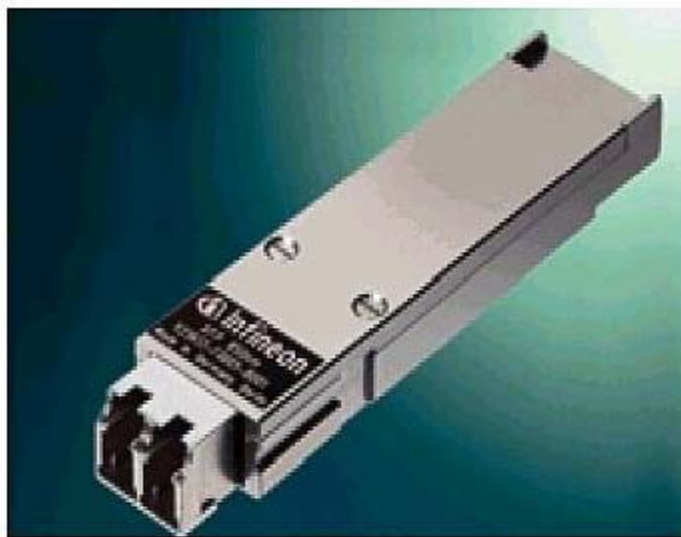


## 10Gb/s PIN

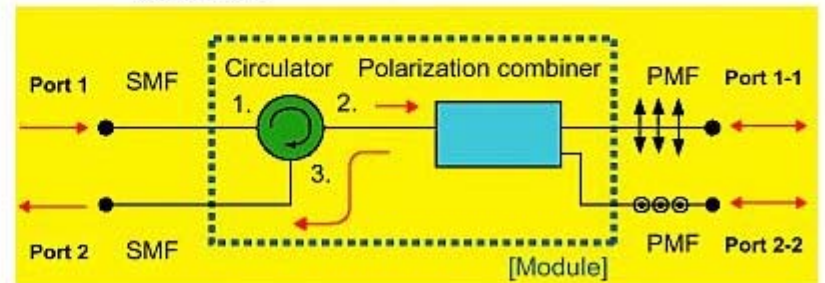
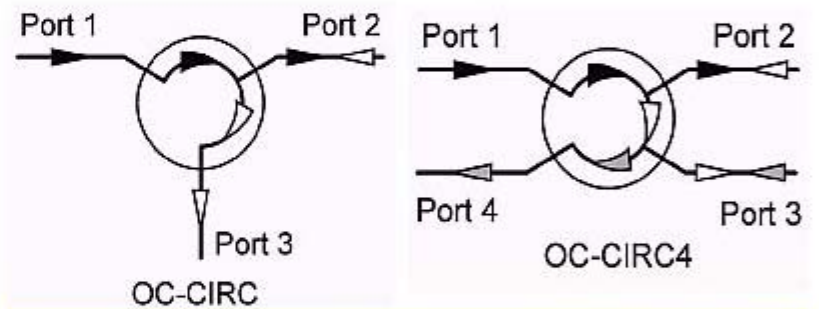
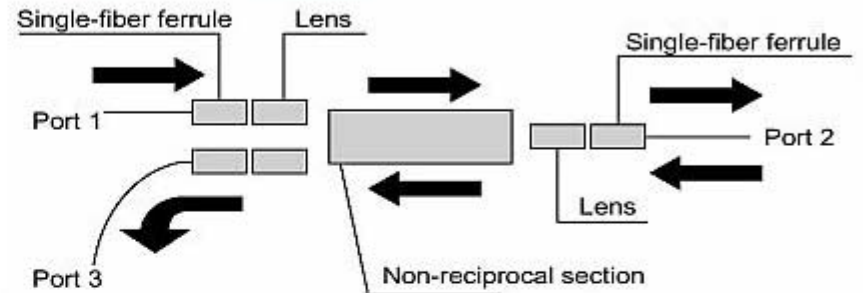
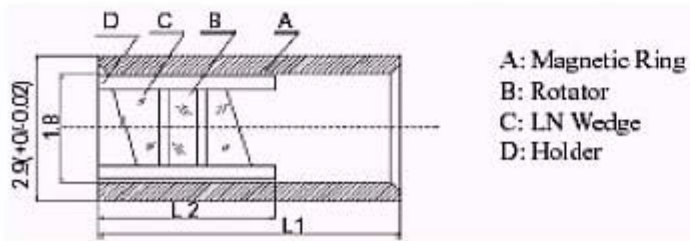
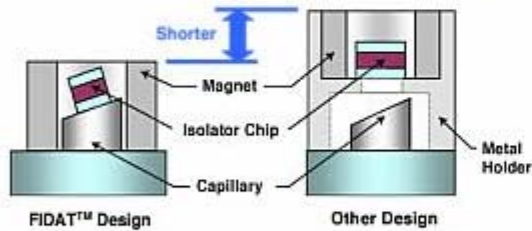
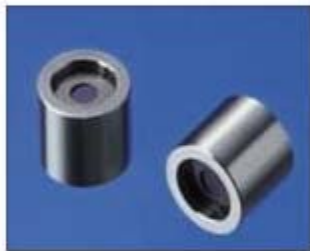
Slika 11 - Svetlobni sprejemniki PIN in APD.



Slika 12 - SDH sprejemniki/oddajniki.

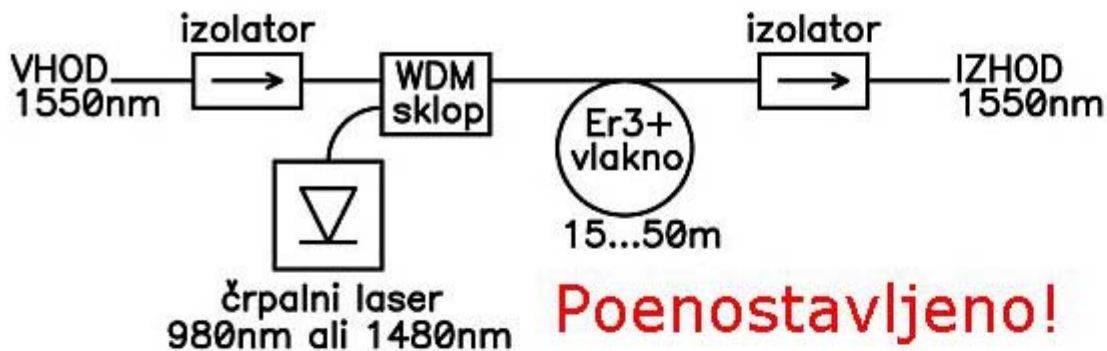


Slika 13 - Ethernet sprejemniki/oddajniki.

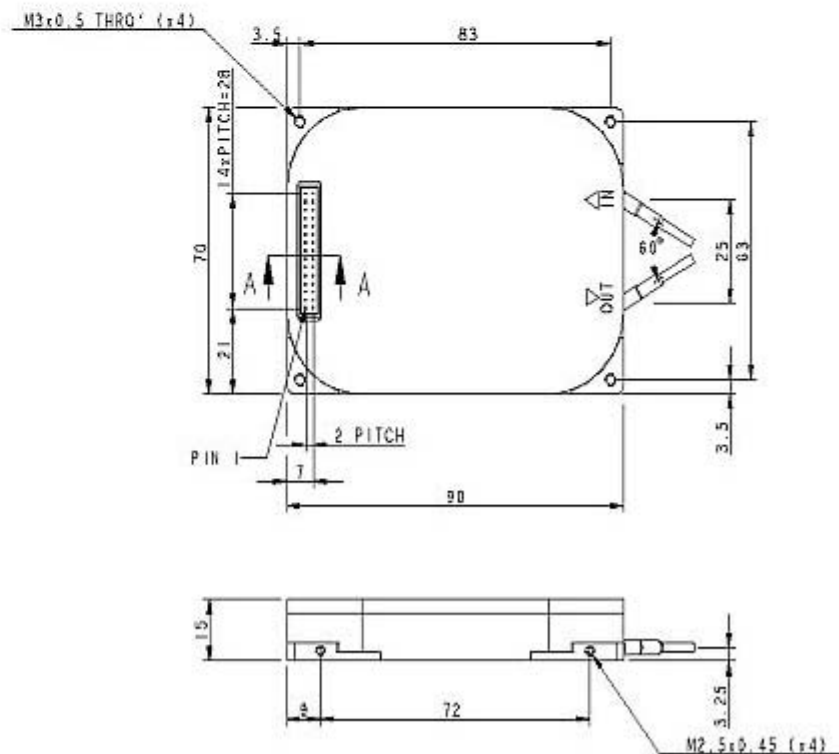
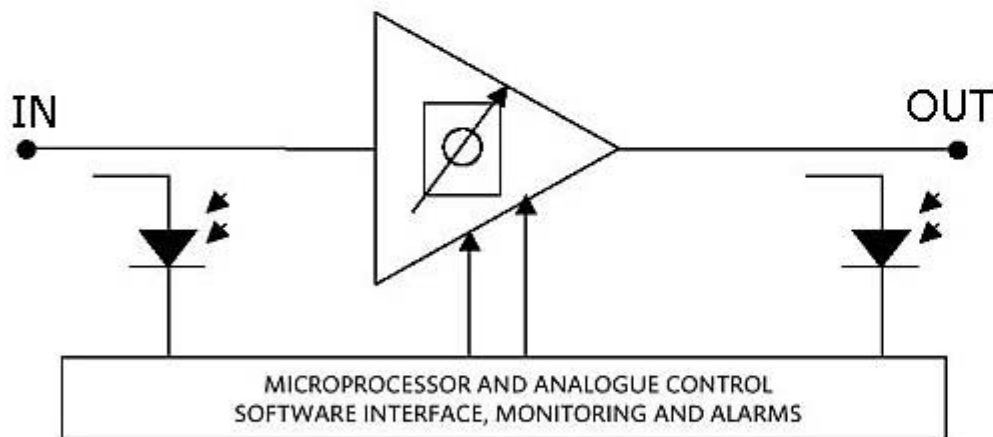


Slika 14 - Optični izolatorji in cirkulatorji.

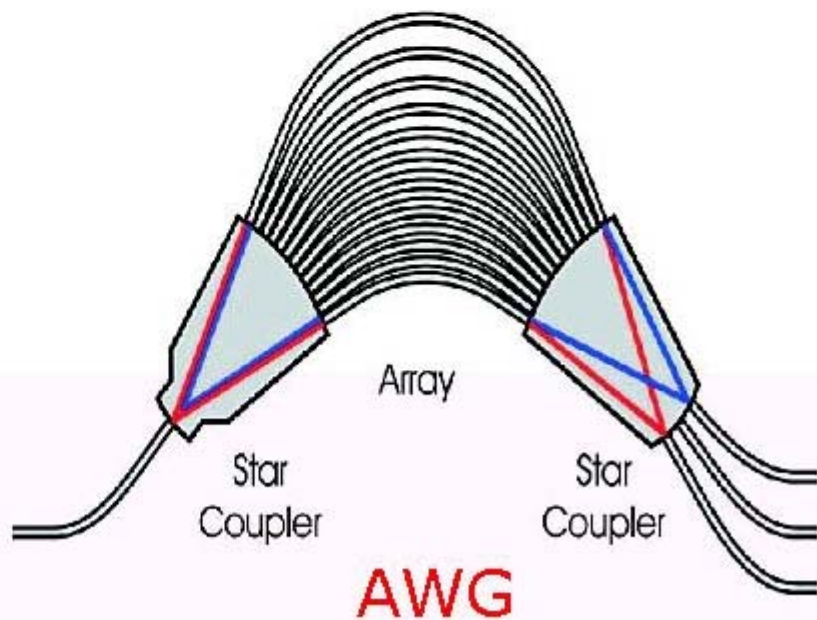
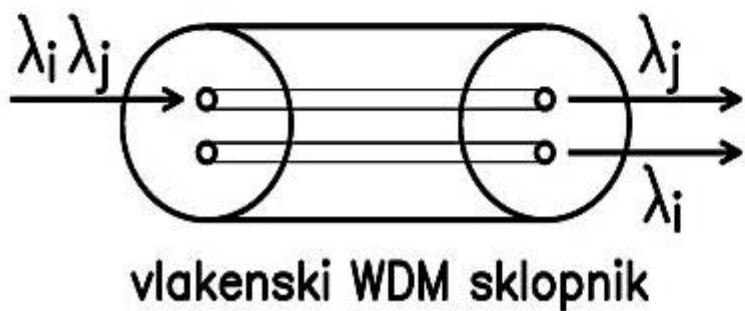
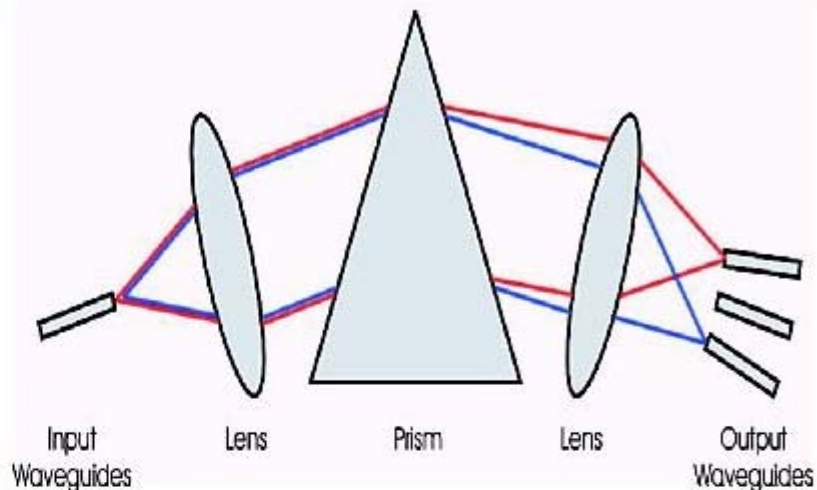
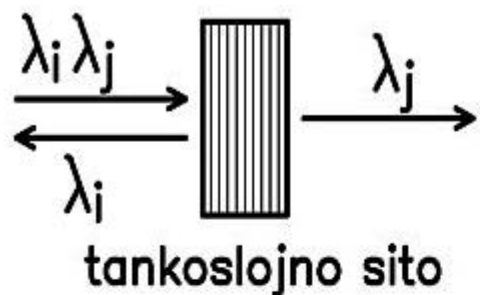




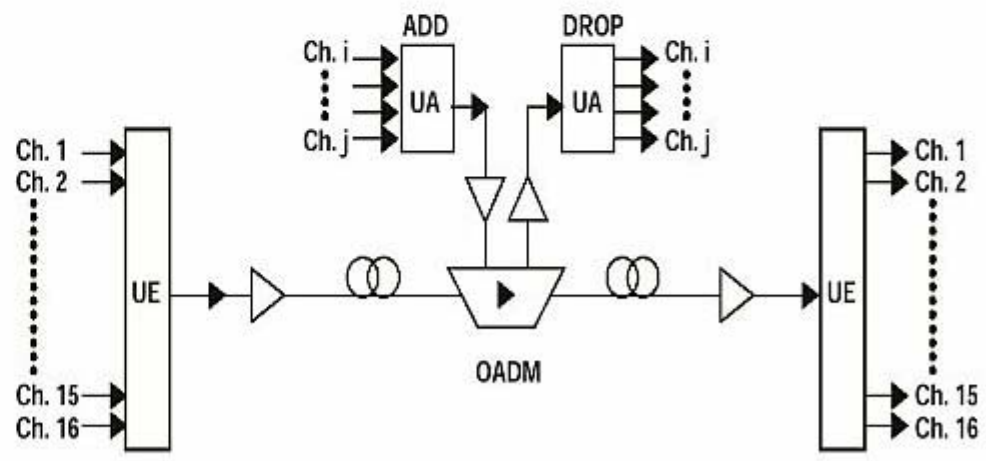
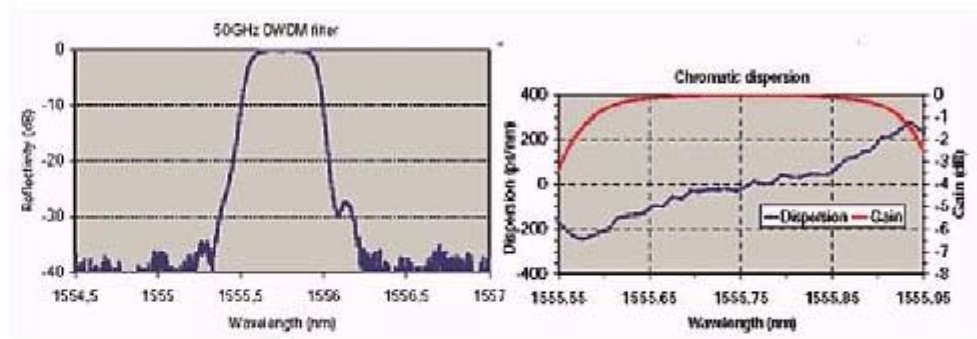
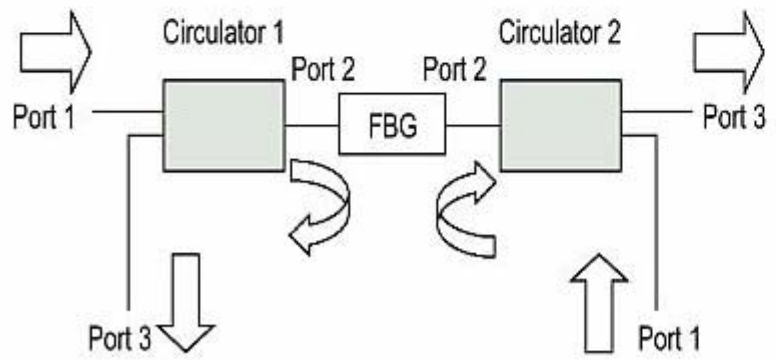
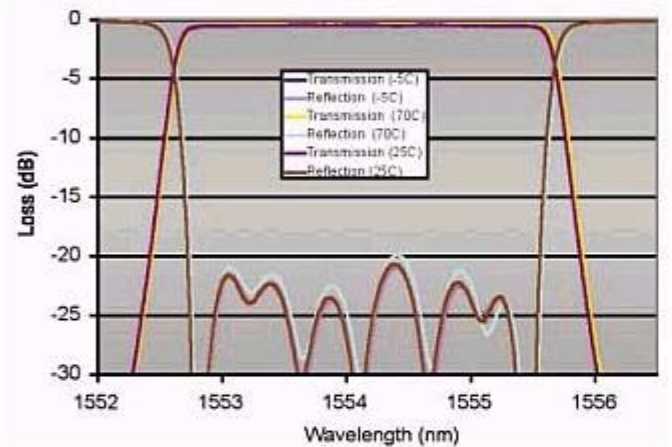
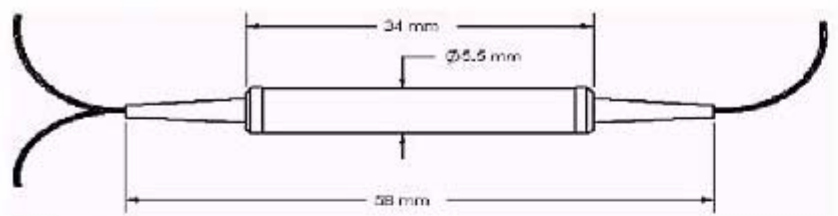
**Poenostavljeno!**



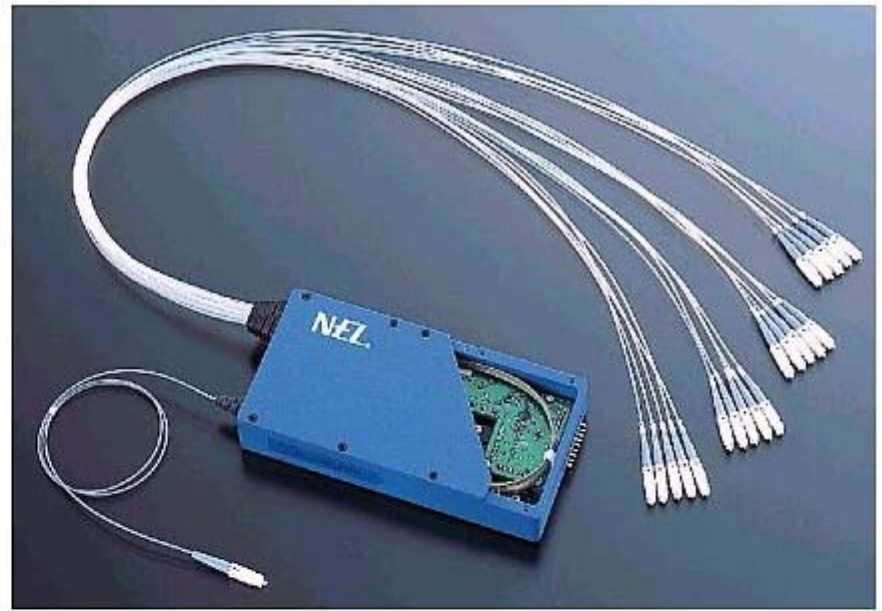
Slika 15 - Erbijevi optični ojačevalniki.



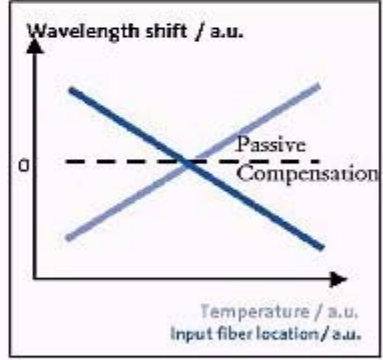
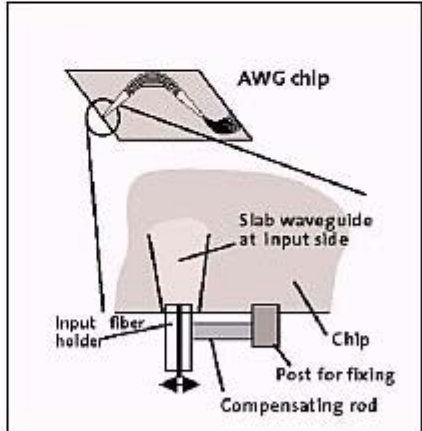
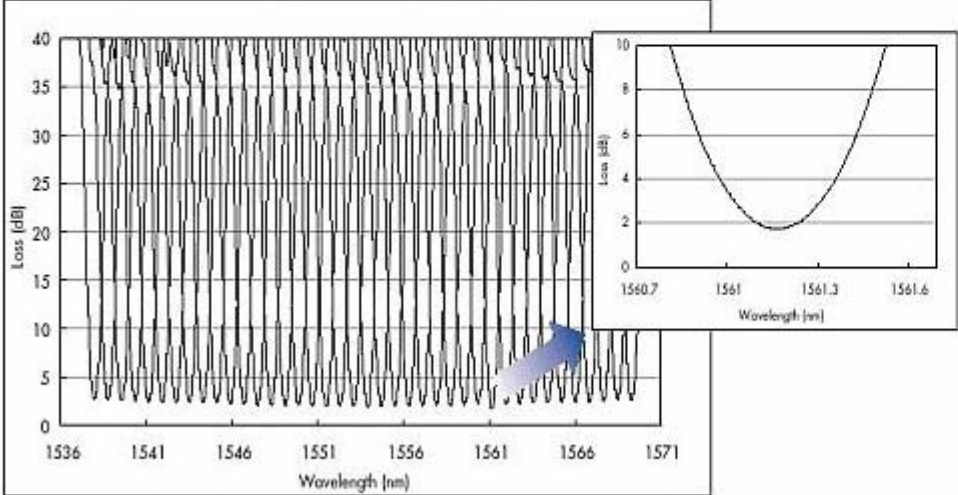
Slika 16 - Sita in kretnice za valvnodolžinsko razvrščanje (WDM).



Slika 17 - Tankoslojna sita in vlakenske uklonske mrežice.



100 GHz Spacing, 40 channels, Gaussian



Slika 18 - Kretnice z valovodno razvrstitevno strukturo (AWG).