

Security Level:

Required Guard band for 100G EPON coexistence

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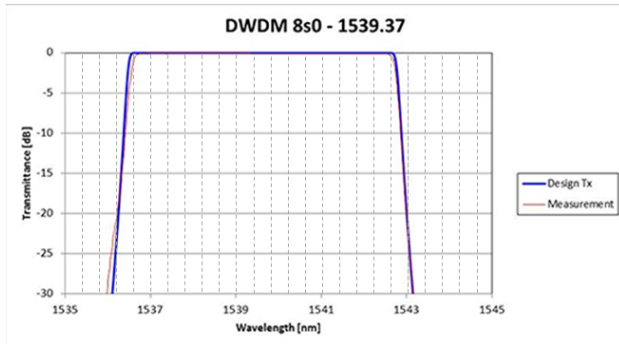
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Background

- Coexistence capability with previous generation PONs is an important factor for wavelength plan decision.
- Capability to coexist with pervious PONs is always better, if other things are equal.
- GPON coexistence is concern what should give it a look. (effenberger_3ca_1_0117.pdf)
- This contribution analyzes the required guard band for 25G EPON coexists with previous PONs.

Transition band of thin film filter

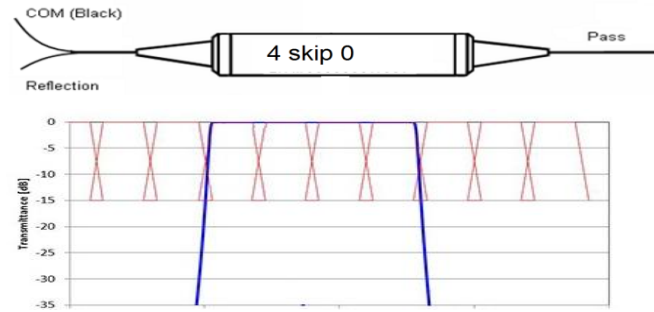
8 skip 0 100G DWDM filter



Pass Bandwidth	5.92nm@0.25dB
Peak Insertion Loss within Pass Band	0.2dB

Source: <https://www.iridian-optical-filters.com/product/dwdm-8s0-1539-37/>

Packaged 4 skip 0 100G DWDM filter

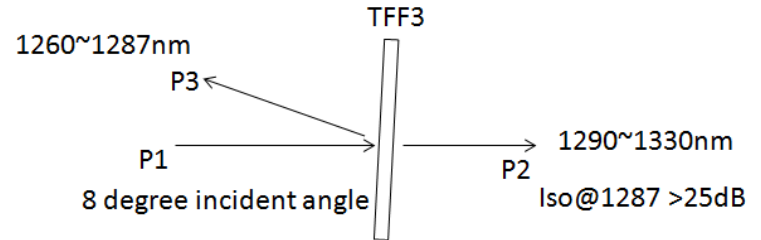
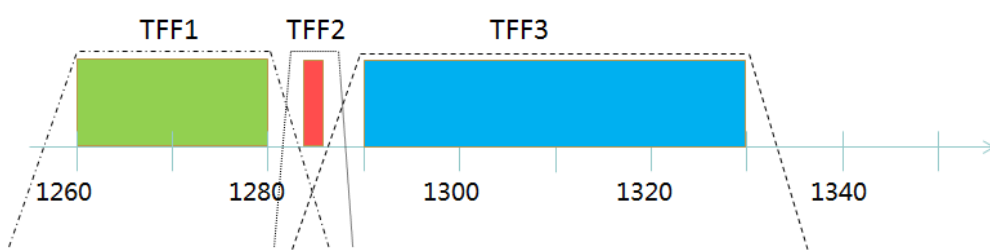


Pass Bandwidth	2.62nm@0.5dB
Max Insertion Loss in Pass Band	<1dB

Source: <http://www.auxora.com/doce/product-detail-53.html>

- The pass band width of 4 skip 0 DWDM filter is more than 2.6nm, that of 8 skip 0 is more than 5.8nm, while the transition band can be less than 0.6nm
- The insertion loss of the filters above is comparable with traditional DWDM filter.
- One wafer can be diced to thousands film filters, the cost of such filters is still small compared with 25G transceivers.

The transition band of 40/20nm BPF



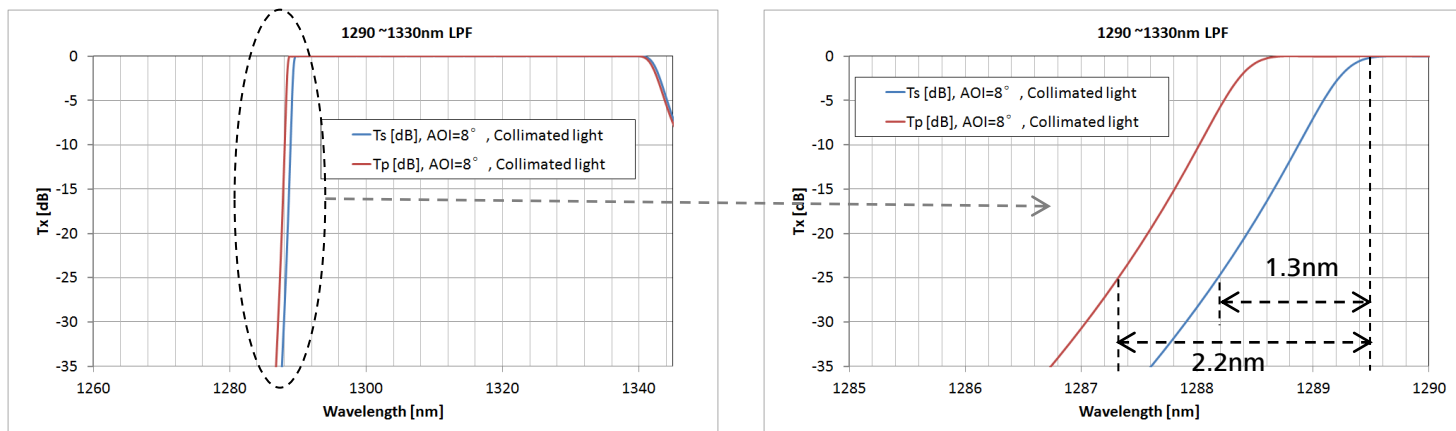
A survey to film filter vendors:

what's the minimal required transition band for thin filter 3 (TFF3)

- Vendor 1: 2.5nm transition band is challenging for a 40nm wide pass band filter, 1nm relaxation will be better for volume products (from 0.3dB to 25dB).
- Vendor 2: Less than 3nm is feasible for mass volume products with good yield (from 0.2dB to 25dB).

40nm wide pass band filter design

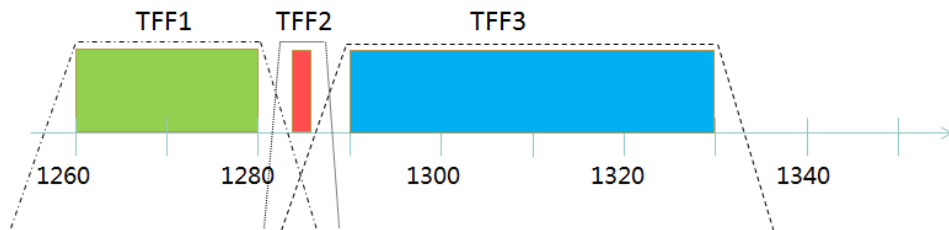
--from vendor 2



Specification			
Pass band	1290~1330nm	Adjacent Channel Isolation	25 dB
Reflect band	1260~1287 & 1333~1450nm	Passband Ripple	0.15 dB
Passband Max IL	0.2dB	Reflectband Ripple	0.1 dB
Reflectband Max IL	0.15dB	PDL	0.05dB
Filter Thickness:	1(+0.1/-0.1) mm	Filter Size	1.4*1.4(+0.1/-0.1) mm

- Using an external WDM filter, a 3nm guard band is feasible to separate a 40nm signal (such as GPON upstream wavelength) with a 3nm wide signal (such as 25G upstream) without serious concerns.

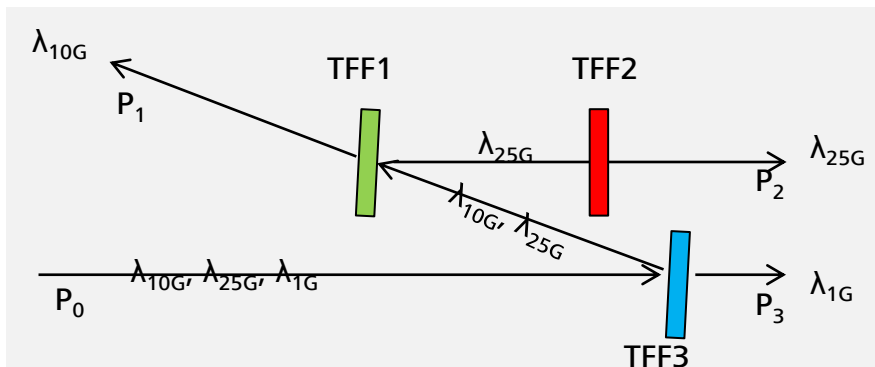
Separation 25G upstream with GPON and 10G EPON upstream wavelength



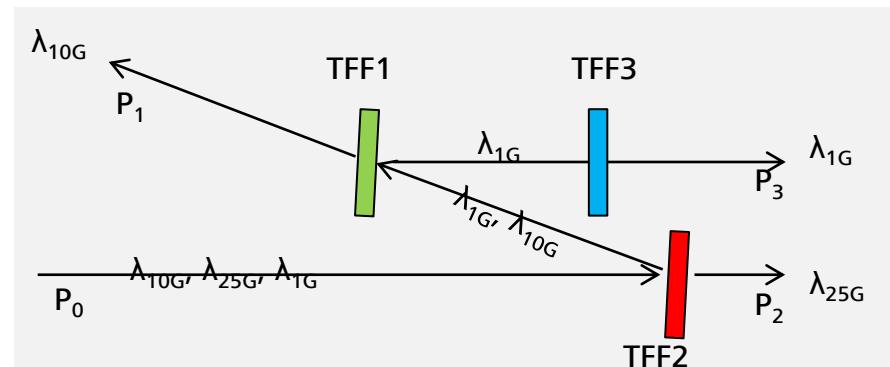
Required transition band:

- TFF1: >3nm
- TFF2: > 0.6nm
- TFF3: > 3 or 3.5nm

Option 1



Option 2



λ_{1G} : 1290~1330, λ_{10G} : 1260~1280, λ_{25G} : 1284~1287

- If one 25G upstream wavelength is in the middle of 1280~1290nm (such as 1284~1287nm), then 25G PON is able to coexist with both GPON and 10G PON

Summary :

- The transition band capability of thin film filter is analyzed
- If the 25G upstream wavelength is in the middle of 1280~1290nm, it can coexist with both 10G PON and GPON.

Thank you

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