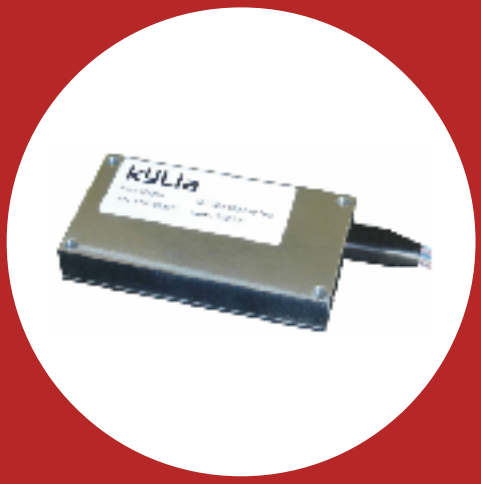
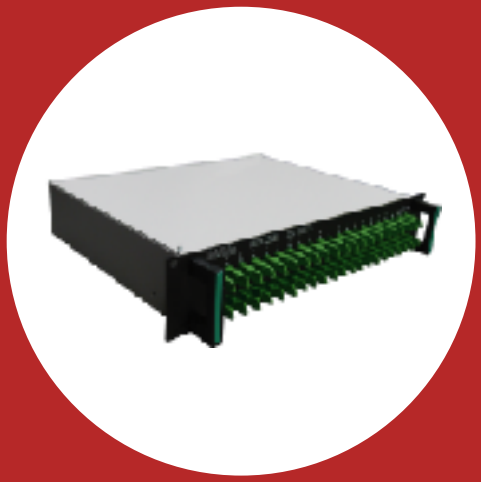
kylia

DWDM Mux/Demux product range

passively athermal DWDM & Ultra DWDM



Polarization Maintaining DWDM



tunable Mux/Demux range

rev 10.00

athermal DWDM Mux / Demux

benefits

- no temperature control required
- optical plug and play

features

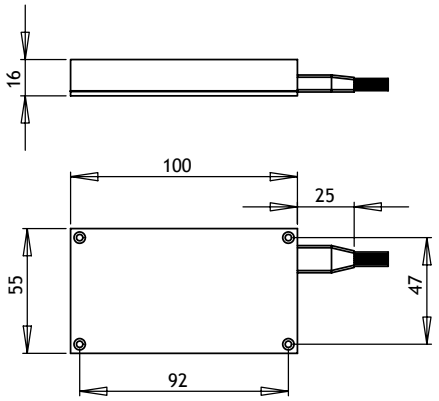
- passively athermal
- small footprint
- high isolation
- low insertion loss
- PM option available
- Telcordia GR-1209 and GR-1221 compliant¤

applications

- replacement of TFF / AWG
- increasing existing network capacity (10 Gbit/s, 2.5 Gbit/s)
- DWDM PON
- OADM

			gaussian						flat top					
parameter		unit	≤ 16 channels			≤ 48 channels			≤ 16 channels			≤ 32 channels		
spacing		GHz	50	100	200	50	100	200	50	100	200	50	100	200
insertion loss	guaranteed	dB	4.0	3.5	4.0	5.0	5.0	6.0	6.5	6.0	6.5	7.5	7.0	8.0
	typical		2.5	2.5	3.0	3.0	2.5	4.5	5.5	5.0	5.5	6.0	5.5	6.5
IL uniformity		dB	1.0	1.0	1.0	1.5	1.5	1.5	1.0	1.0	1.0	1.5	1.5	1.5
PDL		dB	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4
channel center accuracy	guaranteed	GHz	± 2.5	± 3.75	± 6.25	± 3.12	± 6.25	± 7.5	± 2.5	± 3.75	± 6.25	± 3.12	± 6.25	± 7.5
	typical		± 1.25	± 2	± 3.12	± 2	± 3.75	± 4	± 1.25	± 2	± 3.12	± 2	± 3.75	± 4
bandwidth @-1dB		GHz	> 14	> 28	> 56	> 14	> 28	> 56	> 23	> 46	> 92	> 21	> 42	> 84
bandwidth @-3dB		GHz	> 24	> 48	> 96	> 24	> 48	> 96						
passband		GHz	± 6.25	± 12.5	± 25	± 6.25	± 12.5	± 25	± 6.25	± 12.5	± 25	± 6.25	± 12.5	± 25
adjacent crosstalk		dB	30	30	30	30	30	30	25	25	25	25	25	25
non-adjacent crosstalk		dB	40	40	40	40	40	40	40	40	40	40	40	40
cumulative crosstalk		dB	25	25	25	22	22	22	23	23	23	21	21	21

general specifications	
fibre type	Coreguide SMF-28
cable type	900µm
frequency range	S+C+L (1460 to 1610nm)
PMD	< 0.2 ps
directivity	50 dB
chromatic dispersion	± 10 ps/nm
return loss	30 dB (40 dB typ.)
operating temperature range (OTR)	-5°C to +70°C
IL thermal stability over OTR	± 0.5 dB
wavelength thermal stability over OTR	< 1 pm/°C (100 GHz spacing)
storage temperature range	-40°C to +85°C
TELCORDIA compliant	GR-1209 and GR-1221



ordering information

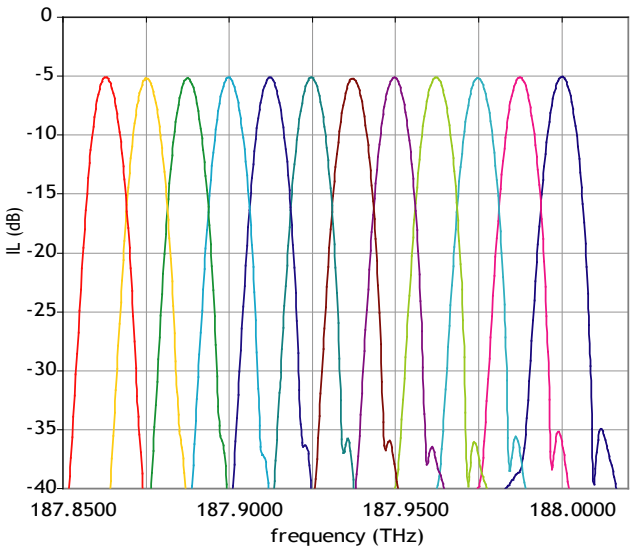
mics - [ ] / [ ] / [ ] / [ ] / [ ] / [ ]

number of channels	spacing in GHz	shape G : gaussian F : flat top	common fibre connector	individual fibres connectors	minimum frequency in THz

Ultra DWDM Mux / Demux

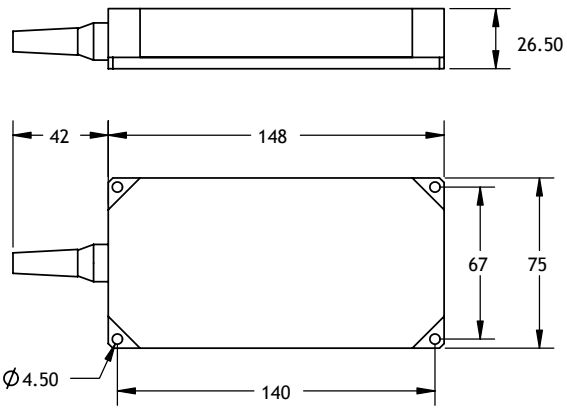
benefits	features	applications
large channel count over short frequency rangeno temperature control required	ultra dense spacing down to 12.5 GHz	submarine networks
optical plug and play	any specific spacing: 33 GHz, 37.5 GHz...	non ITU standard networks
	PM option available	ultra dense networks
	flat top option available	

			gaussian			
parameter		unit	≤ 16 channels		≤ 48 channels	
spacing		GHz	12.5	25	12.5	25
insertion loss	guaranteed	dB	6.5	5.0	7.5	6.0
	typical		5.5	4.0	6.5	5.0
IL uniformity		dB	1.0	1.0	1.5	1.5
PDL		dB	0.3	0.3	0.4	0.4
channel center accuracy	guaranteed	GHz	± 1.25	± 2.5	± 1.75	± 3.12
	typical		± 0.75	± 1.25	± 1	± 2
bandwidth @-1dB		GHz	> 3.5	> 7	> 3.5	> 7
bandwidth @-3dB		GHz	> 6	> 12	> 6	> 12
ITU passband		GHz	± 1.56	±3.12	±1.56	± 3.12
adjacent crosstalk		dB	28	28	28	28
non-adjacent crosstalk		dB	40	40	40	40
cumulative crosstalk		dB	24	24	22	22



12.5 GHz mux/demux typical response

general specifications	
fibre type	Coreguide SMF-28
cable type	900µm
frequency range	S+C+L (1460 to 1610nm)
PMD	< 0.2 ps
directivity	50 dB
chromatic dispersion	± 10 ps/nm
return loss	30 dB (40 dB typ.)
operating temperature range	-5°C to +70°C
IL thermal stability over OTR	± 0.5 dB
storage temperature range	-40°C to +85°C
TELCORDIA compliant	GR-1209 and GR-1221



ordering information

mics - [ ] / [ ] / [ ] / [ ] / [ ] / [ ]

number of channels	spacing in GHz	shape G : gaussian F : flat top	common fibre connector	individual fibres connectors	minimum frequency in THz

Frequency tunable DWDM Mux / Demux

features

continuous frequency tunabilitymanual version available

PM option available

flat top option available

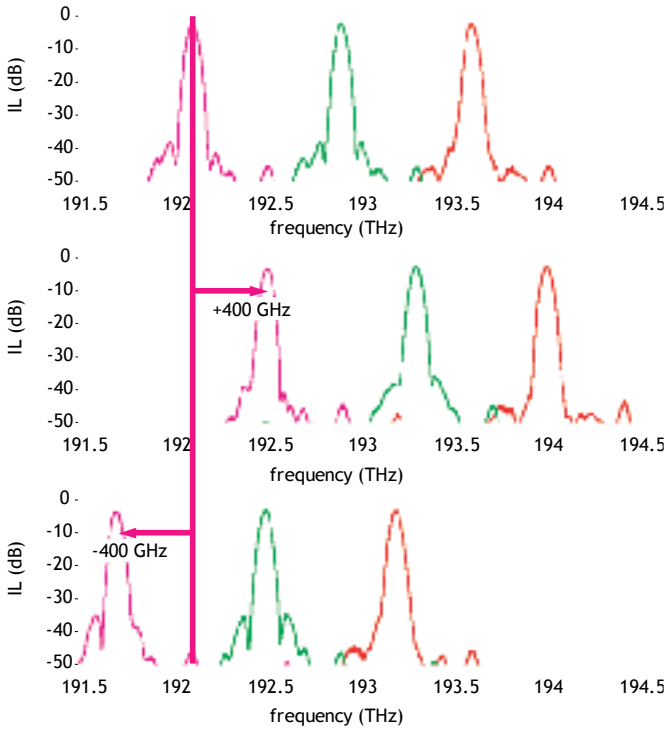
applications

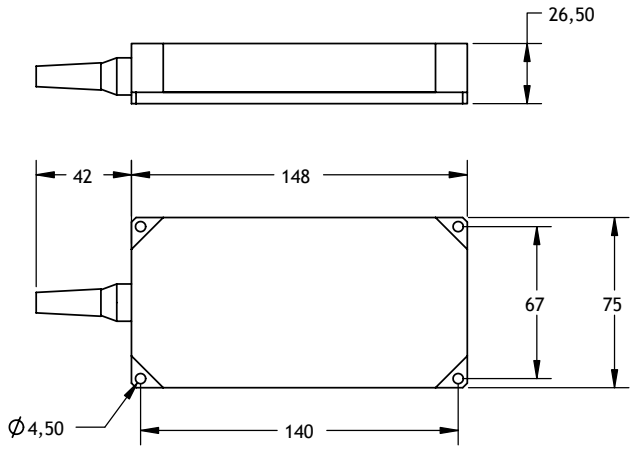
reconfigurable networks : ROADM, eROADM

laser drift compensation grid optimization

mics+ allows a frequency tunability up to 800 GHz (for a 100 GHz spacing mux/demux). The piloted version makes mics+ an ideal component to be implemented into reconfigurable networks (ROADM, eROADM). mics+ can be supplied upon customer request : channel count, spacing, tuning range...

parameter	unit	16 ch. / 100 GHz spacing
frequency tunability	GHz	≤ ± 400
insertion loss	dB	4.0
IL uniformity	dB	1.0
PDL	dB	0.3
channel center accuracy	GHz	± 3
bandwidth @-1dB	GHz	> 28
bandwidth @-3dB	GHz	> 48
ITU passband	GHz	± 12.5
adjacent crosstalk	dB	28
non-adjacent crosstalk	dB	40
cumulative crosstalk	dB	23
fibre type		Core guide SMF-28
cable type		900µm
frequency band	nm	S+C+L (1460 to 1610)
PMD	ps	< 0.2
directivity	dB	50
chromatic dispersion	ps/nm	± 10
return loss	dB	30 (40 typ.)





ordering information

mics+ - [ ] / [ ] / [ ] / [ ] / [ ] / [ ] / [ ] / [ ]

number of channels	spacing in GHz	tuningrange in GHz	shape G : gaussian F : flat top	fibre type SM : SMF-28 PM : Panda PM	common fibre connector	individual fibres connectors	minimum frequency in THz

Frequency + spacing tunable DWDM Mux / Demux

benefits

complete grid modularityultra wide frequency range

features

spacing tunability

frequency tunability

motorized and manual versions available

PM option available2U rack packaging

application

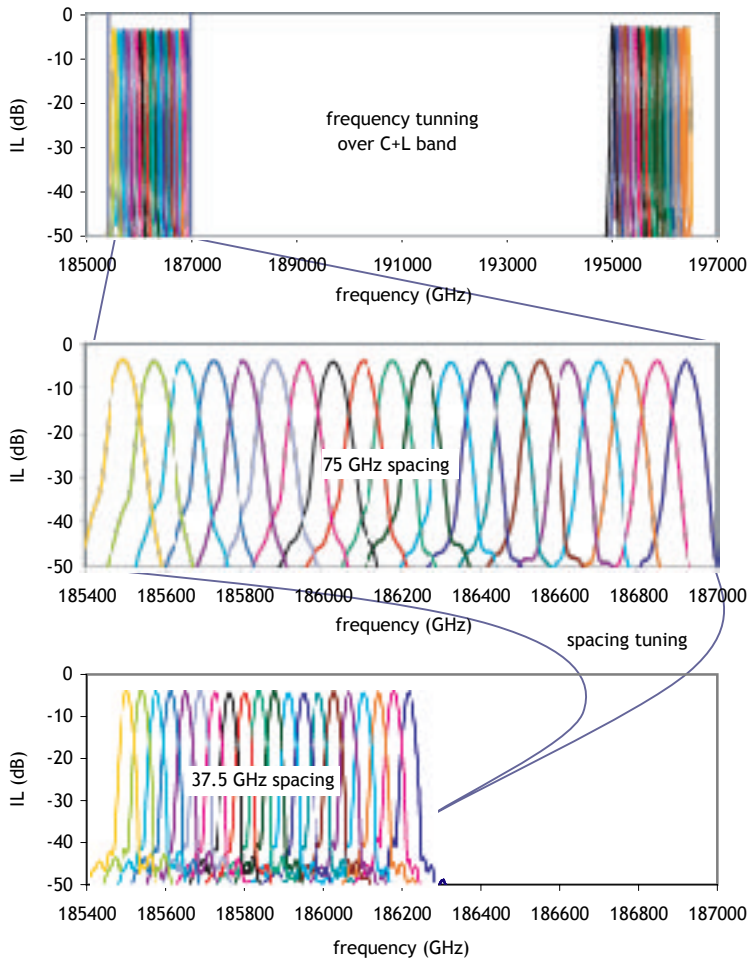
network testing

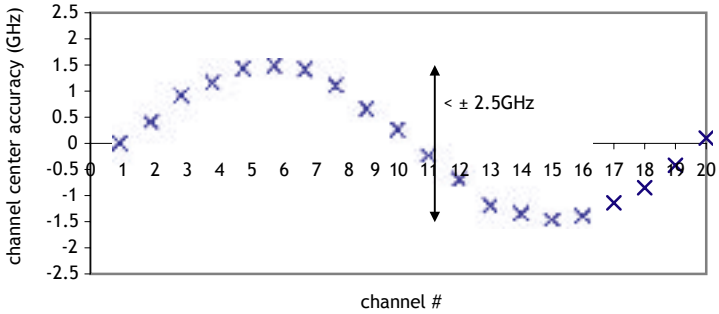
grid optimization

t-mics is an instrument available in 2 versions :
manual version : spacing and frequency can be tuned by using two micrometer heads
computer piloted version : spacing and frequency are controlled using a user friendly software for active setup and fast tunability

number of channels	unit	< 20 channels
frequency tuning range	GHz	C+L band
polarization dependent loss (PDL)	dB	< 0.5
insertion loss uniformity	dB	< 1.5
bandwidth @-3dB	GHz	> 0.45 x spacing
adjacent crosstalk	dB	28
non-adjacent crosstalk	dB	40
cumulative crosstalk	dB	23
return loss	dB	30 (40 typ.)
PMD	ps	< 0.2
directivity	dB	50
chromatic dispersion	ps/nm	± 10

spacing range (GHz)	insertion loss (dB)	channel center accuracy (GHz)
12.5 to 25	< 8	± 1
25 to 50	< 6.5	± 2
37.5 to 75	< 5.5	± 2.5
50 to 100	< 5	± 3





ordering information

t-mics - [ ] / [ ] / [ ] / [ ] / [ ] / [ ]

configuration	number of channels	spacing range	fibre type	common fibre	individual fibres
M : manual P : piloted	10 to 20	in GHz	SM : SMF-28 PM : Panda PM	connector	connectors

PM Mux / Demux

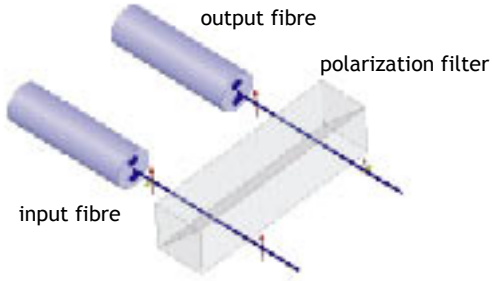
benefits	features	applications
no temperature control required	PER > 19dB	test bench for telecom networks and components
optical plug and play	high isolation	PM networks
better OSNR	low insertion loss	polarization multiplexing
	flat top option available	
	rack packaging available	

parameter		unit	40 ch. / 100 GHz spacing
fibre type			PM Panda
PER	19dB PER configuration	dB	20
	15dB PER configuration		15
insertion loss	guaranteed	dB	5.0
	typical		2.5
IL uniformity		dB	1.5
PDL	19dB PER configuration	dB	NA
	15dB PER configuration		0.4
channel center accuracy	guaranteed	GHz	± 6.25
	typical		± 3.75
bandwidth @-1dB		GHz	> 28
bandwidth @-3dB		GHz	> 48
ITU passband		GHz	± 12.5
adjacent crosstalk		dB	30
non-adjacent crosstalk		dB	40
cumulative crosstalk		dB	22
cable type			900µm
frequency band		nm	C+L (1520 to 1610)
PMD		ps	< 0.2
directivity		dB	50
chromatic dispersion		ps/nm	± 10
return loss		dB	30 (40 typ.)
operating temperature range		°C	-5 to +70
storage temperature range		°C	-40 to +85

PM option is available for each product of KYLIA mux/demux range. Specifications on request for any channel count and spacing.

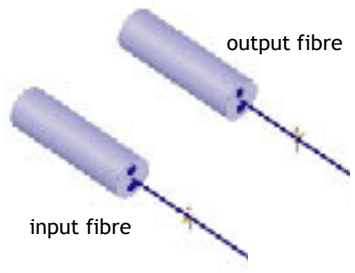
19dB PER configuration

Using a polarization filter, KYLIA garantees a PER > 19dB. In this configuration, the mux/demux can only be used with input beam polarization oriented along the slow axis.



15dB PER configuration

Without polarization filter, KYLIA garantees a PER > 15dB. In this configuration, the mux/demux can be used with input beam polarization oriented along both axis, or even as a SM mux/demux.



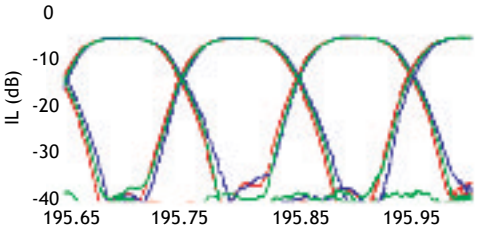
ordering information

mics - PM - [ ] / [ ] / [ ] / [ ] / [ ] / [ ] / [ ]

PM config 15:15 dB PER 19: 19 dB PER	number of channels	spacing in GHz	shape G : gaussian F : flat top	common fibre connector	individual fibres connectors	minimum frequency in THz

Free space technology

DWDM Mux/Demux



typical response KYLIA flat top mics

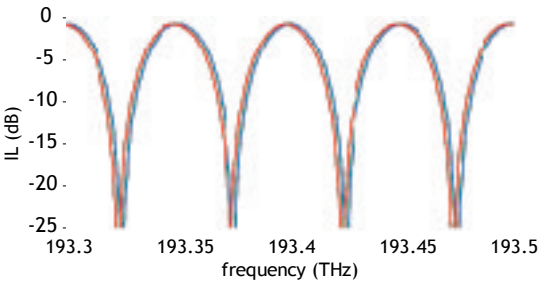
— -5°C — 25°C — 70°C

athermal design

Athermal behaviour is achieved thanks to propagation of light through inert gas in an hermetic packaging.

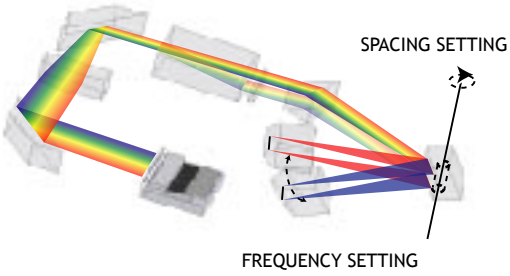
Athermal design enables to save costs: no feedback circuitry is required while designing interface boards. Integration process is reduced to plug and play.

Phase demodulator



typical response KYLIA interferometer mint-1x2

— 0°C — 25°C — 70°C



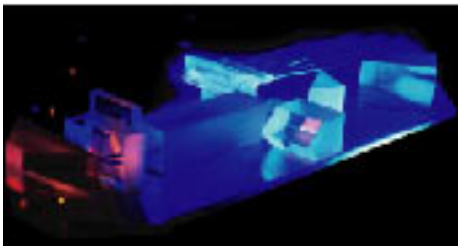
t-mics intrinsic design

versatil technology

KYLIA declines its components and instruments into tunable versions for more flexibility.

Integration of external technologies is made easy thanks to free space propagation: inclusion of photodiodes, laser diodes or piezo electric elements gives new features to classical products. A simple Mach-zender interferometer becomes a D(Q)PSK receiver thanks to an external tracking laser line device and the tunable feature.

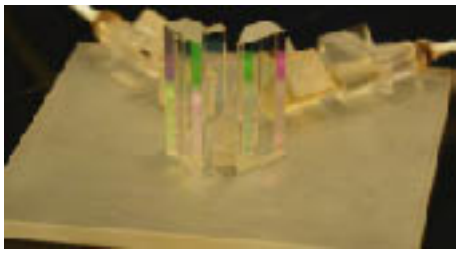
tunable mint 1x2 for D(Q)PSK demodulation



Mics has been successfully tested against Telcordia GR-1209-CORE and Telcordia GR-1221-CORE

reliable and performant

Propagation through free space minimizes insertion losses. KYLIA optical solutions are ▫ designed to withstand the most extreme environment.

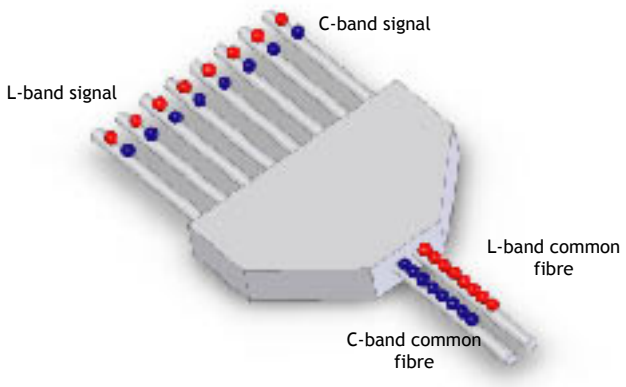


mint 2x4 for coherent detection

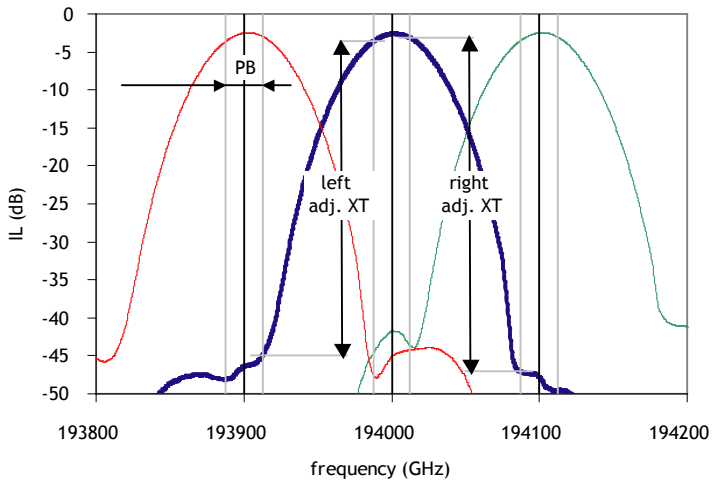
mics cyclicity

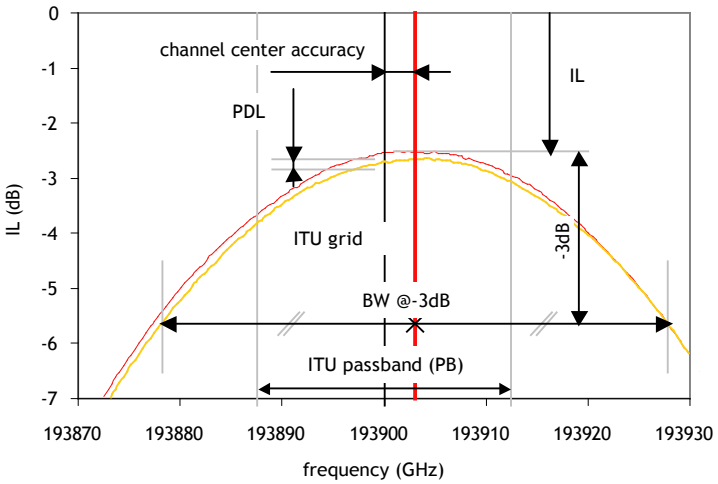
Specific cyclicity of KYLIA technology allows to propose a large range of devices for new reconfigurable network.

As an example, the same device can be used in two separate frequency bands.



specification definitions





ITU passband	PB	GHz	passband over which other parameters are measured. PB = ± 0.125 x spacing : for a 100 GHz spacing mux/demux, PB = ± 12.5 GHz.
insertion loss	IL	dB	maximum transmission of the mux/demux inside PB.
polarisation dependent loss	PDL	dB	maximum IL variation over all states of polarization (SOP) within PB.
insertion loss uniformity		dB	maximum IL variation between channels over SOP.
bandwidth @-1dB	BW @-1dB	GHz	passband width at 1dB level below the peak of transmission curve.
bandwidth @-3dB	BW @-3dB	GHz	passband width at 3dB level below the peak of transmission curve.
channel center accuracy		GHz	difference between the center of the BW@-3dB and the ITU frequency.
adjacent crosstalk	adj. XT	dB	difference between the minimum transmission within PB and the maximum transmission within PB of the two adjacent channels.
non-adjacent crosstalk	non-adj. XT	dB	difference between the minimum transmission within PB and the maximum transmission within PB of all non-adjacent channels.
cumulative crosstalk	cum. XT	dB	cumulative sum of all adjacent channels and non-adjacent channel crosstalk values.
return loss	RL	dB	ratio of the optical power launched in an input port to the optical power returning to the same port (other fibres pigtailed).
directivity		dB	ratio of the optical power launched in an input port to the optical power returning to any other input port.
chromatic dispersion	CD	ps/nm	maximum change rate of group delay versus wavelength within PB.
polarization mode dispersion	PMD	ps	maximum group delay between polarization states within PB.

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