

# WAYOPTICS

Way Optics

High Performance AWG Mux/Demux Chip:8" Wafer Process

**AWG**  
(Arrayed Waveguide Grating)  
&  
PLC splitter

8 inch Si & Quartz wafer



# CWDM MUX

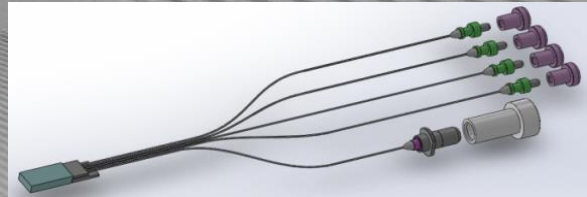
High Performance AWG Mux/Demux Chip:8" Wafer Process

## Features

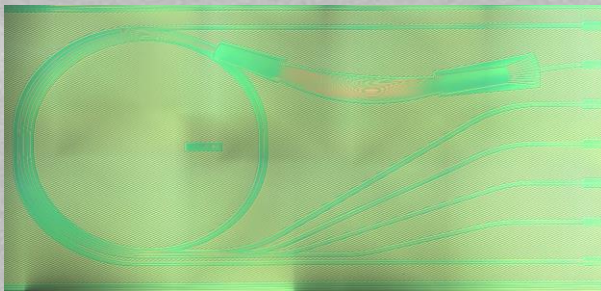
- KrF(248nm) Laser Lithography Technology
- 8 inch Silicon Semiconductor Process
- High Delta Technology
- Spot Size Converter(SSC) Technology
- State of Art Design and Process
- Low Insertion-Loss
- High Crosstalk
- Small Polarization Dependence Loss
- Customize SSC Available

## Applications

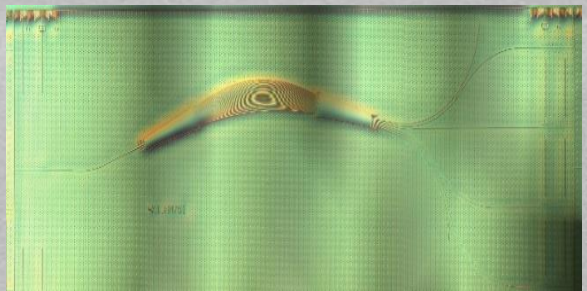
- Data Center
- 5G Application



## Mux 500

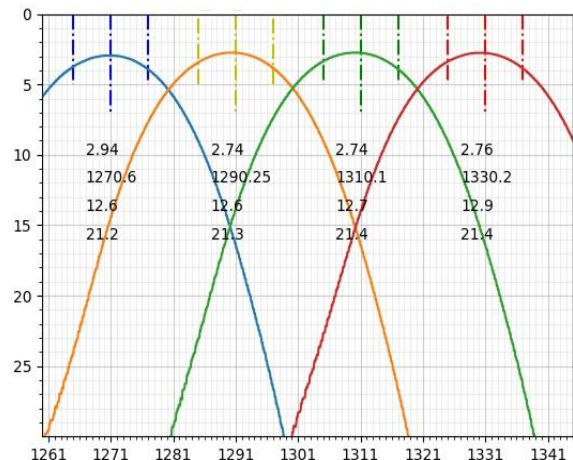


## Mux 750



## Mux Specification

Parameter	Unit	Value	
Channel Spacing	nm	20 (3543GHz)	
Channel No.	Ch	4	
Center wavelength	nm	1271 1291 1311 1331	235.87THz 232.22THz 228.67THz 225.24THz
Insertion Loss	dB	<3.0	
1-dB Bandwidth	nm	>10	
Output Spacing	μm	500 or 750	
Size		7.1x3.0mm 6.6x2.7mm	



# CWDM DEMUX

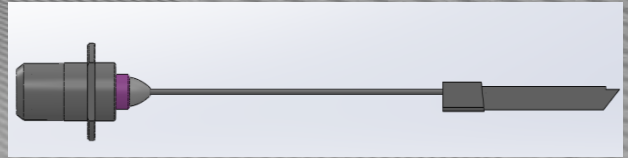
High Performance AWG Mux/Demux Chip:8" Wafer Process

## Features

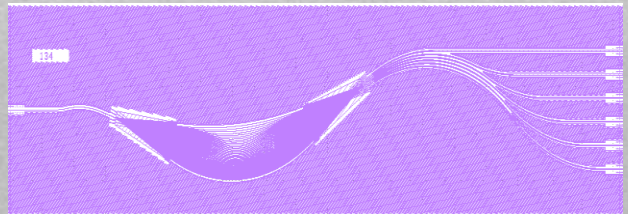
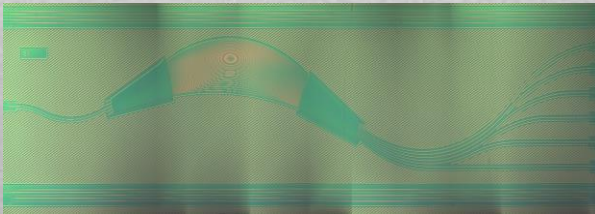
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## Applications

- Data Center
- 5G Application

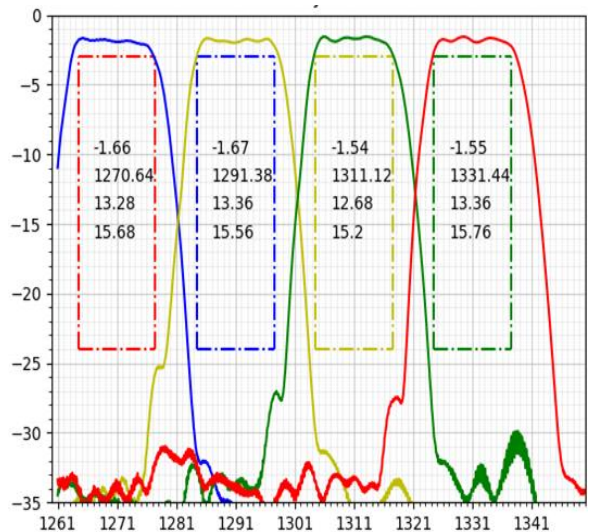


## Demux 250



## Demux Specification

Parameter	Unit	Value	
Channel Spacing	nm	20	
Channel No.	Ch	4	
Center wavelength	nm	1271	235.87THz
		1291	232.22THz
		1311	228.67THz
		1331	225.24THz
Insertion Loss	dB	<2.0	
1-dB Bandwidth	nm	>12	
Adj. Channel Crosstalk	dB	>21	
Non-Adj. Channel XL	dB	>30	
PDL	dB	<0.7	
Output Spacing	um	250	
Size		9.6x2.2mm	

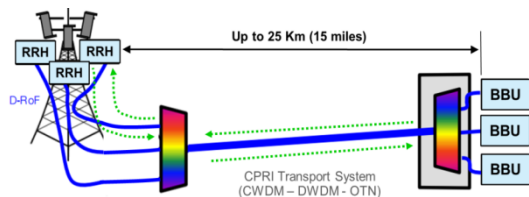


# LAN WDM MUX/DEMUX

High Performance AWG Mux/Demux Chip:8" Wafer Process

## Features

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- 8 inch Silicon Semiconductor Process
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## Applications

- Data Center
- 5G Application

## LAN WDM Mux



## Specification

		Parameter			
Channel spacing			800		
Channel ITU Wavelength(nm)	ch1		1294.53	1295.56	1296.59
	ch2		1299.02	1300.05	1301.09
	ch3		1303.54	1304.58	1305.63
	ch4		1308.09	1309.14	1310.19
Insertion loss(dB)	Premium grade	IL			1.5
	Standard grade				1.9
Passband flatness(dB)					0.5
Adjacent Channel Isolation (dB)	Demux	15adj	25		
	Mux		15		
Non-adjacent channel isolation (dB)	Demux	15non-adj	35		
	Mux		15		
Directivity (dB)		DIR	50	55	
Polarization Dependent Loss (dB)		PDL			0.5
TDL compared with IL in room temperature (dB)		DPL			0.5
Optical power handling(mW)					300
Return Loss(dB)		RL	45	50	
Operating temperature ( °C)			-5		80
Storage temperature( °C)			-40		85
Pair connector Loss (dB)	PC Type				0.3
	APC Type				0.4

# DWDM MUX/DEMUX

High Performance AWG Mux/Demux Chip:8" Wafer Process

## Features

KrF(248nm) Laser Lithography Technology  
8 inch Silicon Semiconductor Process  
High Delta Technology  
Spot Size Converter(SSC) Technology  
State of Art Design and Process  
Low Insertion Loss  
High Crosstalk  
Small Polarization Dependence Loss  
Customize SSC Available

## Applications

WDM Channels Add/Drop Systems  
WDM Networks & Systems  
CATV Fiber Optical Links  
Accessing LAN & WAN Networks  
Long Haul & Short-Distance Applications



## Specification

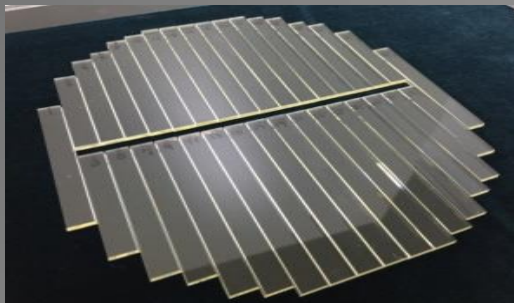
parameters	Note	Min	typical	max
Operating Wavelength Range (nm)			1520 ~ 1570	
Center Wavelength (nm)			ITU	
Channel Spacing (GHz)			100	
Channel Bandwidth (nm)				
Max Insertion Loss (dB)	8Ch		2.5	3
	8Ch with Upgrade		2.5	3
Passband Ripple (dB)				0.5
Adjacent Channel Isolation (dB)		25		
Non-Adjacent Channel Isolation (dB)		40		
Isolation of Upgrade Port (dB)	if UPG	12		
	required			
PDL (dB)				0.2
PMD (ps)				0.1
Optical Power (mW)				500
Directivity(excluding upgrade port) (dB)		50		
Return Loss(All Ports) (dB)		45		
Operating Temperature		0		70
Storage Temperature		-40		80

# PLC Splitter

High Performance AWG Mux/Demux Chip:8" Wafer Process

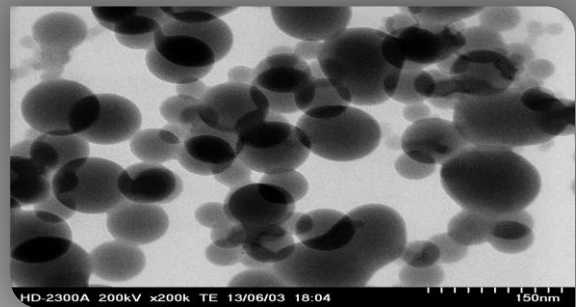
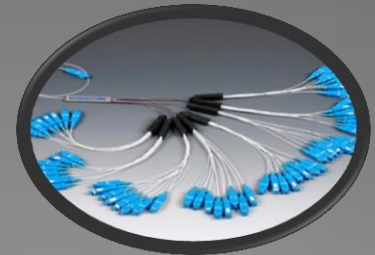
## Features

- Broadband Operation Wavelength
- Low Insertion Loss
- Low PDL
- Compact Design
- Good Channel-to-Channel Uniformity
- High Reliability and Stability



## Applications

FTTH



## Specification

Operating Wavelength(nm)							
1 x N PLC Splitter			1 x 4	1 x 8	1 x 16	1 x 32	1 x 64
Insertion Loss	(dB)	MAX (P/S)	7.0/7.4	10.5/11.0	13.5/13.9	16.5/17.2	21/21.5
Uniformity	(dB)	MAX	0.8	1	1.4	1.6	2
Return Loss	(dB)	MIN			55		
P D L	(dB)	MAX	0.2	0.3	0.3	0.3	0.4
2 x N PLC Splitter			2 x 4	2 x 8	2 x 16	2 x 32	---
Insertion Loss	(dB)	MAX	7.6	11	14.8	17.9	---
Uniformity	(dB)	MAX	1	1.2	1.5	1.8	---
Return Loss	(dB)	MIN			55		---
P D L	(dB)	MAX	0.3	0.3	0.3	0.3	---
Fiver Type			ITU G652A, G652B, G652C, G652D; G657A <sub>1</sub> , G657A <sub>2</sub> , G657B <sub>2</sub> , G657B <sub>3</sub>				
Temperature Stability		MAX	0.5				
(-40 ~ 85°C)	(dB)						
Operation Temperature (°C)			-40 ~ 85				
Storage Temperature (°C)			-40 ~ 85				

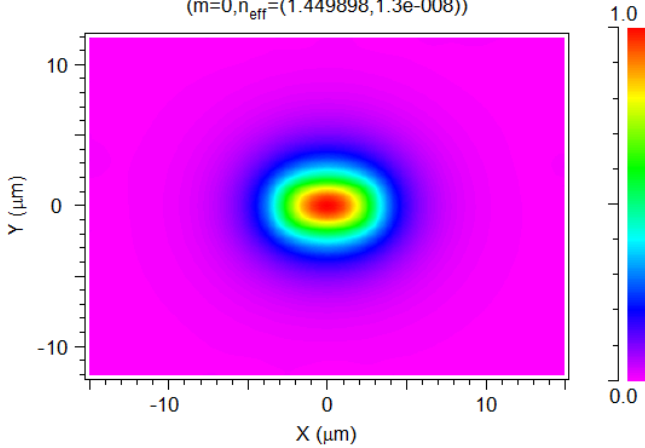
# Mode Field Dia

High Performance AWG Mux/Demux Chip:8" Wafer Process

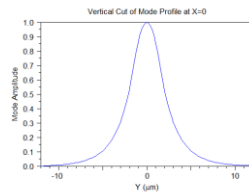
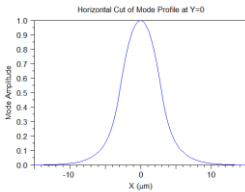
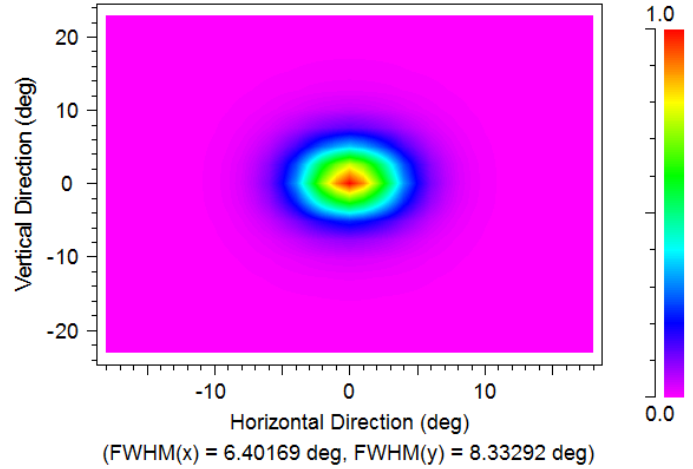
## Mode Size(Input)

$E_x$  Mode Profile

( $m=0, n_{\text{eff}}=(1.449898, 1.3e-008)$ )

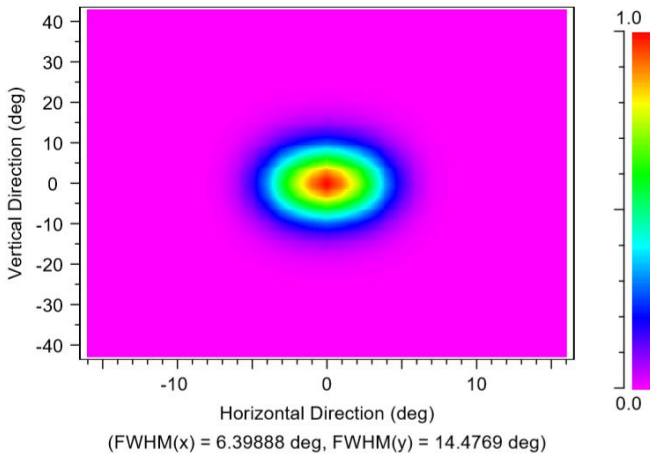


Far Field Intensity Profile



## Mode Size(Output)

Far Field Intensity Profile



# Dicing Line

High Performance AWG Mux/Demux Chip:8" Wafer Process

## Process



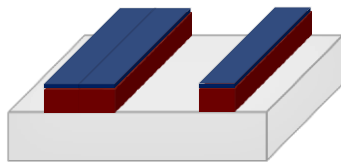
Quartz



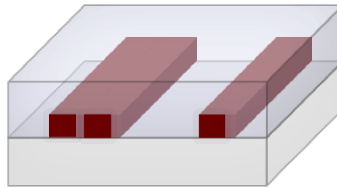
Core layer



KrF (248nm) Lithography



Etching



Over Cladding

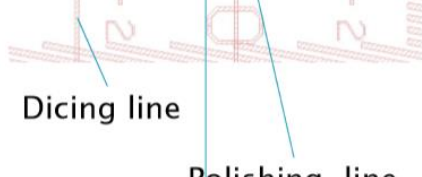
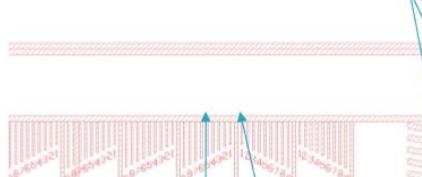
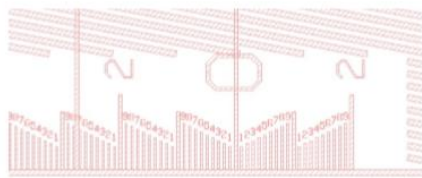


Near field

## Dicing Polishing Line

INPUT SIDE

OUTPUT SIDE

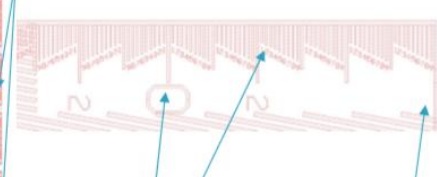


Dicing line

Polishing line

-30~0 OK

DEMUX CHIP BAR



Polishing line

0 ~ +200um OK

Dicing line



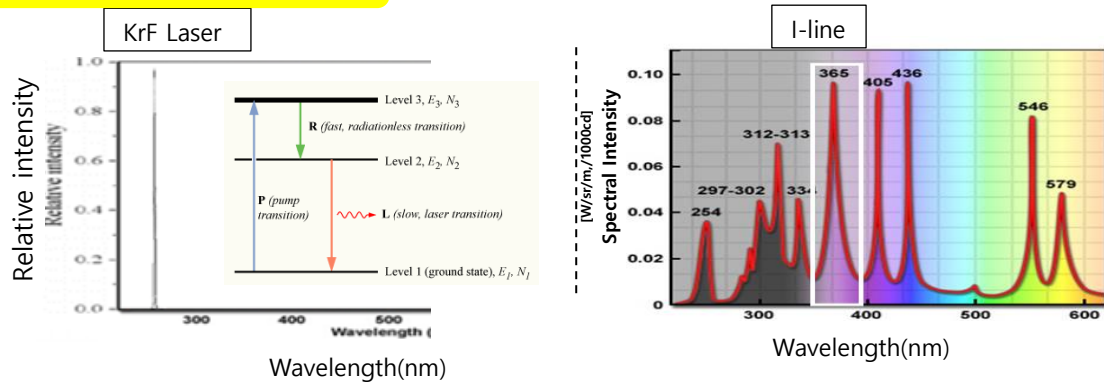
# KrF Laser vs Hg Lamp

High Performance AWG Mux/Demux Chip:8" Wafer Preprocess

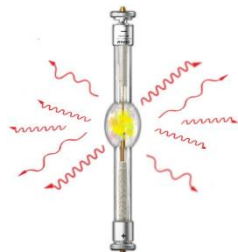
## KrF Laser VS Hg Lamp

	KrF Laser Scanner	Hg Lamp
Light source	KrF Excimer Laser	Hg Arc Lamp
Wavelength	248±0.1nm	365±10nm
Light	Coherent Light Stimulated Light	Spontaneous Emission Light
Minimum linewidth	180nm	500nm
Equipment price	5M\$(US)	0.2M\$(US)
PR profile	Excellent	Good
Quality	Ultra Very Good	Good
BARC	Use	Not use

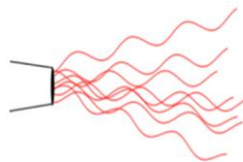
## Wavelength



## Light



Hg lamp



Incoherent LED Light



Coherent Laser Light  
KrF laser