

# TIANJIN BRIGHEN PHOTONICS TELECOMUNICATION DEVICE EXPERT



## **Optical Passive Device Series**

Polarization Patch Cord Polarization Micro-Optics Components Micro fiber Coupler Micro Faraday Rotating Mirror Micro Fiber Isolator Micro Polarization Circulator Micro gain flattening filter Micro fiber optic mirror Micro inline Polarizer Micro fiber composite device Fiber Grating Expanded Beam Tactical Connector Assembly

## **Optical Active Device Series**

DFB Laser For Gas Detection Gas Detect Sensor Laser

## **Optical Source and Optical Amplifier Series**

Optical Source Module ASE Optical Source Narrow linewidth laser DFB Laser Module Raman Fiber Amplifier Pulsed Optical Source Pulse Amplifier Bidirectional Pulse Amplifier 2W Optical Amplifier SOA Fiber Amplifier

## Laser Doppler Speed Meter Systems

## WWWEREGEEENPHOTONICS. COM

**Brochure Version 2020** 

# **Polarization Patch Cord**

Polarization Patch Cord including various connector types. Widely used in the field of optical fiber sensing.

#### Features:

- I Polarization stable
- I Various connector types

#### Applications:

- I Fiber gas detection system
- I Passive device production testing
- I Optical fiber sensing
- I Telecommunication

#### Specifications:



Sp	ecification	PARAMETERS						
Wa	velength(nm)	1550 1310 980/1060 850 780					633	
Inse	rtion Loss (dB)	≤(	).3	≤0.5	≤0.8	≤0.8	≤1.5	
Return Loss	UPC	≥50dB						
(dB)	APC	≥60dB						
Extinction	Р	≥25	≥25	>22	≥22	≥22	≥20	
Ratio (dB)	А	≥23	≥23	223				
Operating Temperature		-20 ~ +70						

# **Polarization Micro-Optics Components**

Polarization Micro-Optics including various connector types. Widely used in the field of optical fiber sensing.

### **1064nm Series Technical Parameters**



## 1310/1550nm polarization maintaining device:

Parameter	Polarization splitting/combiner		F	Faraday rotating mirror	Online polar	Online polarizer		Polarization fiber Collimator	
Working wavelength (nm)	1310,1480	0,1550		1310,1480,1550	1310,1550	1310,1550		1310,1550	
Bandwidth (nm)	±40			±15	±40		±	30	
Typical insertion loss (dB) @23°C	≤0.5			≤0.5	≤0.5		≤0	).25	
Extinction ratio (dB)	≥22(for	PBS)		≥20	≥28		≥	23	
Rotation angle (degree)	1			45±1	/			/	
Return loss (dB)	≥50			≥50/50	≥50/50		≥60		
Size (mm)	Φ5.5×L	<l34< td=""><td>Φ5.5×L34</td><td colspan="2">Φ5.5×L34</td><td colspan="2">Φ3.2xL10 or Φ2.4xL12</td></l34<>		Φ5.5×L34	Φ5.5×L34		Φ3.2xL10 or Φ2.4xL12		
Parameter	Polarization WDM		Polarization-iso multiple		Diate/WDM Pol		larization-Isolate/polarization litting/Combining Multiplexer		
				Single stage	Dual stage	Si	ngle stage	Dual stage	
Bandwidth (nm)	1310/1550	1480/1550	)	1310,1550			1310,1480,7	1550	
Working wavelength (nm)	±40	±20		±20	)				
Insertion loss (dP)	≤0.6(T)	≤0.6(T)		IL related to CR	IL related to CR		<0.7	<0.9	
	≤0.4(R)	≤0.4(R)		(EL ≤0.8)	(EL ≤0.9)		20.7	≤0.9	
Splitting ratio	1	/		1%,2%,3%,5%	6,10%,50%		/	/	
Extinction ratio (dB)	≥20	≥20		≥20(Type B) ≥23(Type F)	≥20(Type B) ≥23(Type F)		≥20(for P	BS)	
Isolation(dB)	≥30(T)≥12(R)	≥30(T)≥12(I	R)	≥28	≥45		≥25	≥42	
Return loss (dB)	≥50	≥50		≥50	≥50		≥50	≥50	
Size (mm)	Φ5.	5×L35		Φ5.5×L35		Φ5.5×L35			

Devenenter	Pol	olarization Circulator		Polarization Isolator,			Polarization Beam Splitter		
Parameter		1x2		Monopole		Bipolar	1x	2	2x2
Working wavelength (nm)		1310,1550		1310,1480,7	1550			1310	,1550
Bandwidth (nm)		±20		±15				±	40
Typical insertion loss (dB) @23°C		≤0.9		≤0.6	≤0.8		IL related to (	CR (EL ≤0.7)	IL related to CR (EL ≤1.0)
Extinction ratio (dP)		<b>`</b> 22		≥20(Type B)	≥2	20(Type B) ≥20(Ty		/pe B)	≥18(Type B)
		222		≥23(Type F)	≥2	23(Type F)	≥22(T)	/pe F)	≥20(Type F)
Isolation (dB)		≥40		≥32		≥52		/	/
Splitting ratio	Splitting ratio		/			/	1/99,2/98,5/95, 10/90,50/50		5, 10/90,50/50
Return loss (dB)		≥55		≥55/50		≥55/50 ≥5		0	≥50
Size (mm)		Ф5.5×L35		Φ5.5×L34		Φ5.5×L35			
Daramator		Polarization		Faraday rotating				Pola	rization fiber
Farameter		splitting/combine	er	mirror					Collimator
Working wavelength (nm)	)	1064		1064 106		64 1064		1064	
Bandwidth (nm)		±20		±5		±40		±30	
Typical insertion loss (dB) @23°C		≤0.8		≤1.1		≤0.8		≤0.3	
Extinction ratio (dB)		≥22(for PBS)		≥20		≥28		≥23	
Rotation angle (degree)		/		45±1		/		/	
Return loss (dB)		≥50		≥50/50		≥50/50		≥60	
Size (mm)		Φ5.5×L34		Ф5.5×L34		Φ5.5×L34		Φ3.2xL10 or Φ2.4xL12	

# Micro fiber Coupler

Traditional FBT couplers are widely used in the field of optical communication and optical sensing, but usually the FBT coupler has a package size of 3.0×25mm or more, and the spectral width and polarization-preserving extinction ratio are limited, so that the FBT coupler is in some The application of a particular scenario is limited.

Compared to the FBT coupler, the micro-optical coupler has a smaller size, a higher spectral width, and an excellent extinction ratio retention performance.



#### Features:

- I Smaller size φ2.5X15mm
- I Fiber type is optional
- I Split ratio is optional
- I Wide spectral range with low additional loss
- I High reliability
- Specifications:

- I Optical fiber communication system and fiber sensing system.
- I EDFA, MSA, HALF-MSA
- I Optical fiber test system
- I CATV system

Specifications	Unit	Parameters		
Center wavelength	nm	1310 or 1550		
Wavelength bandwidth	nm	λ	Ac ± 40	
Features		1 × 2	2 × 2	
Additional loss	dB	≤0.6 ≤0.8		
Consistency	dB	≤0.4 ≤0.6		
Split ratio		1:99~50:50		
Return loss	dB	≥50	≥50	
Extinction Ratio	dB	≥20	≥18	
Maximum withstand power	mW	300		
Operating temperature	°C	-5 to +70		
storage temperature	°C	-40 to +85		
Package size	mm	Φ2.5×L16 / Φ2.0× L15		
Fiber type		SMF-28 or PM Panda fiber		

# Micro Faraday Rotating Mirror

The Faraday rotating mirror rotates the polarization of the incident light by 90 degrees. Our newly designed Faraday rotating mirrors have smaller dimensions, better optical performance and higher reliability.



### Applications:

- I EDFA
- I Optical communication system
- I CATV system
- I Fiber laser
- I Optical sensing system

### Features:

- I Small size package φ2.5X8mm
- I low insertion loss
- I Low TDL, Iow WDL, Iow PDL.
- I High stability and reliability

Specifications					
Parameter	Unit	Value			
Center Wavelength (λc)	nm	1310 or 1550			
Operating Wavelength Range	nm	λc ± 15			
Faraday rotation angle @ 23℃	o	90 ± 1			
Max. Insertion Loss	dB	0.6			
PDL	dB	0.1			
Power handling	mw	< 500			
Min. Packaging size	dB	φ2.5 X 8mm			
Max. Tensile Load	N	5			
Operating Temperature	°C	-5 to +70			
Storage Temperature	°C	-40 to +85			
Fiber Type		SM fiber or PM Panda fiber			

# Micro fiber Isolator

Fiber optic isolator have been widely used in the field of optical communication and optical sensing. We design and manufacture micro-miniature isolator that achieve the world's smallest size while maintaining excellent optical performance and high reliability.



#### Applications:

- I EDFA
- I Optical communication system
- I CATV system
- I Fiber laser
- I Optical fiber sensing system

### Features:

- I Compact package φ2.5X15mm (optional φ2.0X15mm)
- I low insertion loss
- I Low TDL, Iow WDL, Iow PDL
- I High stability and reliability

Specifications	Unit	Parameters		
Center wavelength	nm	1310 or 1550		
Wavelength bandwidth	nm	λc ±	15	
Features		Single Stage	Dual Stage	
Insertion loss	dB	≤0.4	≤0.6	
Isolation @all wave and temp. range	dB	≥20	≥40	
Polarization dependent loss	dB	≤0.1		
Temperature dependent loss	dB	≤0.1		
Polarization mode dispersion	ps	< 0.1		
Extinction ratio @ polarization separator	dB	> 26		
Power margin	mw	< 5	00	
Return loss	dB	≥50	≥55	
Package size	dB	φ2.5X15mm/	2.0 X 15mm	
Operating temperature	°C	-5 to +70		
storage temperature	°C	-40 to +85		
Fiber type		SM fiber or PI	И Panda fiber	

# **Micro Polarization Circulator**

Micro Polarization Circulator Widely used in the field of optical fiber sensing.



#### Features:

- I High reliability
- I Low insertion loss
- I High return loss
- I High extinction ratio

## Applications:

- I Optical amplifier
- I Optical fiber communication system
- I Optical sensing field

Specification	Unit	Min.	Typical	Max.		
Working wavelength	nm	1310/1550±30				
Insertion loss (full temperature)	dB		0.6	0.8		
Isolation (full temperature)	dB	20	22			
Extinction ratio (full temperature)	dB	18	20			
Return loss (full temperature)	dB		≥55			
Directional (full temperature)	dB		≥55			
Maximum power	mW	500				
Fiber type		SM	1F PMF or Specify			
Operating temperature	°C	-40 to 70				
storage temperature	°C	-40 to 85				
Package size	mm		Ф2.5х L20			

# Micro gain flattening filter

Micro gain flattening filter applied in the optical fiber amplifier, Television and fiber-optic Laser etc.

#### Features:

- I Low insertion loss
- I Low PDL & WDL
- I Spectral gain flat

## Specifications:

- I optical fiber amplifier
- I Wavelength division multiplexing system
- I cable television
- I fiber-optic laser

Specifications	Unit	Parameters
Wavelength range	nm	1530~1565/1570~1610
Peak insertion loss	dB	0.7
Correction error	dB	0.6
Temperature Coefficient	nm/°C	0.006
Polarization dependent loss	dB	0.1
Return loss	dB	50
power	mW	500
Operating temperature	°C	-5 to +70
storage temperature	°C	-40 to +85
Package size	mm	Φ2.5*15

# Micro fiber optic mirror

The compact fiber optic mirror is uniquely designed with very high reflectivity and low temperature sensitivity for fiber sensing applications.



#### Features:

- I Small size φ1.6X5mm
- I Customize fiber type
- I Wide spectral range, high reflectivity
- I High reliability and stability



#### Applications:

- I ASE Optic source
- I Fiber optic galvanometer
- I Optical fiber sensing system

Parameter		Unit	Value
Center Wavelength (λc)	nm		1064nm, 1310nm, 1550nm
Operating Wavelength Range	nm		$\lambda c \pm 40$
Max. Reflection Loss	dB		0.25
Variation over temperature	dB		< 0.1
Min. Extinction Ratio	dB		> 26
Fiber type			Single mode fiber or PM fiber
Fiber length	m		> 1.0
Dimension	mm		φ1.6 X 5
Operation temperature	°C		-40 ~ 75
Storage temperature	°C		-45 ~ 85

# **Micro Inline Polarizer**

An in-line polarizer converts natural light into linearly polarized light or enhances the extinction ratio of linearly polarized light. The polarizer is designed and manufactured by patented technology and has the smallest size in the world. The wavelength covers 400nm~2000nm, which can be widely used in optical fiber sensing systems and high-speed traffic systems.



#### Features:

- I Compact package φ2.5X15mm (φ2.0X15mm optional)
- I low insertion loss
- I Low TDL, Iow WDL, Iow PDL
- I High stability and high reliability

- I EDFA
- I Optical communication system
- I CATV system
- I Fiber laser
- I Optical fiber sensing system

Specifications	Unit	Parameters
Center wavelength (λc)	nm	405nm, 532nm1310nm,1550nm,2000nm
Wavelength bandwidth	nm	λc ± 30
Insertion loss	dB	≤0.5
Extinction Ratio	dB	≥28
Return loss	dB	≥55
Power margin	mw	500
Package size	dB	2.5 X 15mm (2.0 X 15mm)
Operating temperature	°C	-5 to +70
storage temperature	°C	-40 to +85
Fiber type		SM fiber or PM Panda fiber

# Micro fiber Composite Device

In the optical path design of a typical EDFA, ASE source, several passive components are typically included: Tap, Isolator, WDM, GFF. Our composite devices are designed with a unique design that achieves a three-in-one or four-in-one design intent, including GFF+ ISO + WDM, WDM + ISO + GFF + TAP and WDM + ISO + GFF + PMCIR, which can be extremely Reduce overall package size and simplify production processes.

Our original ultra-small 2in1 and 3in1 devices have achieved the industry's smallest package size (φ2.5 X 20mm) and excellent performance.



#### Features:

- I Smaller size
- I Fiber type is optional
- I Excellent optical performance
- I High stability and high reliability

#### Specifications:

3in1 WDM+ISO+GFF

Specif	fications	Unit	Typical	Max.		
	Pump Channel	dB		0.6		
Insertion Loss	Signal Channel	dB	1.2	1.6		
Return loss (f	ull temperature)	dB	Į	55dB		
TDL (full t	emperature)	dB		0.2		
PDL (full temperature)		dB	0.15			
PMD (full temperature)		ps	0.1			
Operating temperature		°C	-40 ~ 70			
storage temperature		°C	-45 ~ 85			
Package size		mm	2.5×20			
Fiber type		Corning Hi1060				
		Corning G652D/G657A etc.				
		Fibercore SM1500				

- I Small size EDFA
- I Small size ASE light source

### 4in1 WDM+ISO+GFF+TAP

Specifications		Unit	Typical	Max.	
	Pump Channel	dB		0.6	
Insertion Loss	Signal Channel	dB	4.2	4.5	
	Tap Channel	dB	3.5	3.6	
Return loss (fu	III temperature)	dB	55	dB	
TDL (full temperature)		dB	0	.2	
PDL (full temperature)		dB	0.15		
PMD (full temperature)		ps	0.1		
Operating temperature		°C	-40 ~ 70		
storage te	emperature	°C	-45 ~ 85		
Package size		mm	2.5×20		
Fiber type		Corning Hi1060			
		Corning G652D/G657A etc.			
		Fibercore SM1500			

### 4in1 WDM+ISO+GFF+PMCIR

Specifi	ications	Unit	Typical	Max.
	Signal Channel	dB	4.2	4.5
Insertion Loss	CIR Channel	dB	1.0	1.2
Return loss (fu	ull temperature)	dB	55	dB
TDL (full te	emperature)	dB	0	.2
PDL (full te	PDL (full temperature)		0.15	
PMD (full temperature)		ps	0.1	
Operating	temperature	°C	-40 ~ 70	
storage temperature		°C	-45 ~ 85	
Package size		mm	mm 2.5×25	
		Corning Hi1060		
Fibe	r type	dB	55	dB
		dB	0	.2

# Micro WDM + ISO Composite Device

In the optical path design of a typical EDFA, ASE source, several passive components are typically included: Tap coupler + Isolator + 980/1550 WDM + GFF + Isolator + Tap coupler. Our composite devices are designed with a unique design that achieves a three-in-one or four-in-one design intent, including TAP + ISO or WDM + ISO, which can be extremely Reduce overall package size and simplify production processes.

Our original ultra-small 2in1 and 3in1 devices have achieved the industry's smallest package size (φ2.5 X 20mm) and excellent performance.



ASE composite device for FOG

#### Features:

- I Smaller size
- I Fiber type is optional
- I Excellent optical performance
- I High stability and high reliability

#### Specifications:

#### 2in1 WDM+ISO

Speci	fications	Unit	Parameter	
	Pump Channel@980nm	dB	0.6	
Insertion Loss	Signal Channel@1550nm	dB	1.2	
Isolatio	n@ 980nm	dB	>15	
Isolatio	n@1550nm	dB	>40	
Reti	urn loss	dB	55dB	
TDL (full temperature)		dB	0.2	
PDL (full temperature)		dB	0.15	
PMD (full temperature)		ps	0.05	
Operating temperature		°C	-5 ~ 70	
storage	temperature	°C	-45 ~ 85	
Pack	Package size		2.5×20	
		Corning Hi1060		
Fib	er type	Corning G652D/G657A etc.		
		Fibercore SM1500		

- Small size EDFA
- I Small size ASE light source

# Fiber Grating & Sensor

We can provide the full range of fiber grating and fiber grating sensors, high measurement accuracy, long-term stability, anti-mechanical fatigue and convenient installation. They can be widely used in aerospace, bridge tunnel, subway, electric power, petroleum, construction, Monitoring areas such as mines and natural disasters.

#### Features:

- I High measurement accuracy
- I long-term stability
- I Anti-mechanical fatigue and convenient installation

#### Applications:

- I Fiber gas detection system
- I Passive device production testing

- I Optical fiber sensing
- I Telecommunication
- I Aerospace
- I Bridge tunnel
- I Subway
- I Electric power
- I Petroleum

### Specifications:

### **Ordinary Grating technical parameters:**

Specification	Min.		Typical	Max.
Grating length (mm)	2	5	10	20
Center wavelength (nm)	1510		1550	1590
Reflectivity(%)	1		>80	99
3dB spectral width (nm)	1	0.6~0.7	< 0.3	0.1~0.15
Side mode suppression ratio (dB)	15		-	-
	-55		85	125
remperature measurement range (°C)	-55		300	350
Temperature sensitivity factor (pm/°C)	-		10	-
Strain measurement range (με)	-		±10000	-
Strain sensitivity coefficient (pm/με)	-		1.2	-
Tensile strength screening (kpsi)			75 / 150 / 200	
Fiber type	9/125		5 SMF, Acrylate or Polyimic	de
Pigtail length (m)	-		1	-
Connector type			FC/APC, FC/PC	

### Fiber grating Array Technical parameters:

Specification	Min.	Typical	Max.
Grating length (mm)	1		40
Center wavelength (nm)	1510	1550	1590
Reflectivity(%)	1	>80	99
3dB spectral width (nm)	-	< 0.3	-
Side mode suppression ratio (dB)	15	-	-
T //	-55	85	125
Temperature measurement range (°C)	-55	300	350
Strain measurement range (με)	-	±10000	-

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Tensile strength screening (kpsi)	Single point 100 / 150, overall 70				
Fiber type	9/125 SMF, Acrylate or Polyimide				
Pigtail length (m)	- 1 -				
Connector type	FC/APC, FC/PC				

## Polymer material packaging strain sensor technical parameters:

Specification	Min.		Typical	Max.
Number of sensor arrays	1		-	40 (customized)
Center wavelength (nm)	1510		-	1590
Reflectivity(%)	1		>80	99
3dB spectral width (nm)	-		< 0.3	-
Side mode suppression ratio (dB)	15		-	-
Strain measurement range (με)			±5000 / ±10000	
Strain sensitivity coefficient (pm/με)	-		1.2	-
Strain test linearity (%)	-			0.5
Strain test hysteresis error (%)			0.5	
Strain test repeatability (%)	-	-		0.5
	-55		-	85
Operating temperature range (°C)	-55		-	125
Temperature sensitivity factor (pm/°C)	-		10	-
Base material			Polymer Materials	
Dimensions (mm × mm × mm)			25×5×1	
Installation method			Glue stick	
Fiber type	9/125 SM		F, Acrylate or Polyimide, 0.9mm	Glass Casing
Pigtail length (m)	-		1	-
Connector type			FC/APC, FC/PC	

## Probe temperature sensor technical parameters:

Specification	Min.	Typical	Max.	
Center wavelength (nm)	1510	-	1590	
Reflectivity(%)	1	>80	99	
3dB spectral width (nm)	-	< 0.3	-	
Side mode suppression ratio (dB)	15	-	-	
Temperature measurement range (°C)	-55	-	85	
	-55	-	275	
Temperature sensitivity factor (pm/°C)	-	10	-	
Temperature test linearity (%)	-	-	0.5	
Temperature test hysteresis error (%)	-	-	0.5	
Temperature test repeatability (%)	-	-	0.5	
Base material		Stainless Steel		
Dimensions ( $\Phi$ ×L) (mm)	30×2			
Fiber type	9/125 SMF, Polyimide, 0.9mm Glass Casing			
Pigtail length (m)	- 1 -			
Connector type	FC/APC, FC/PC			

## Expanded Beam Tactical Fiber Optic Cable Assembly (Junior Style meet M83526 Interface)

Junior expanded beam fiber optical connectors have been designed for use in the most demanding harsh environment applications including military tactical communications, outside broadcast, petrochemical plant, mining, and offshore systems. The connectors are terminated using an epoxy-polish ferrule termination process with standard fiber optic termination tools and equipment. the terminated ferrules are simply inserted into the expanded beam housing and fixed in place via a spring and cover-plate. Ferrule alignment to the lense is achieved by our unique optical alignment technology with ultra-low insertion loss and very high return loss. In the event of the connector suffering severe damage in use, the connector design enables replacement of the expanded beam insert, connector front body and grip ring without the need to re-terminate the fibers.

The Junior expanded beam connectors offer high performance, flexibility and cost effectiveness, combined with a simple termination process allowing rapid in-field termination and repair.

#### **Features:**

- I Neutral Ferrule locked structure with high reliability and stability
- I Designed by neutral structure and does not distinguish between hermaphrodite connector, Plug and socket
- I Wall-seal connect structure, can be coupled with 1 or 2 or 4 fibers in a time
- I Designed by Reinforced casing with 316L stainless steel
- Use G-lens to expand the beam size

Junior 4CH plug- Junior 4CH plug Assembly



Items	Parameter	Note
Insertion Loss	SM fiber @1310/1550nm: -1.3dB Max. (Typical -0.6dB)	
	MM fiber @850/1310nm: -0.8dB Max. (Typical -0.35dB)	
Determediate	> 50dB (Typical 55dB) for SM	
Return Loss	> 20dB for Multimode	
Durability	3000 Matings Minimum	
Temperature Range	-45 to +85℃	
Water Immersion	15m for 24 hours (Plug & Bulkhead, Mated & Open Face)	
Free Fall Resistance	500 Falls from 1.2m height	
Vibration	20-500Hz, 3 directions, 0.75mm	
	amplitude@ 10g acceleration	
Shock	50g 11ms Half Size	
Crush Resistance	6.7kN	
Corrosion Resistance	500 Hours Salt Spray	
Cable Retention	1500N (Cable Dependant)	
Compositor Chall Material / O-1-	Black anodised Aluminum or Stainless	
Connector Shell Material / Color	Steel Grip & Boot: Black or Olive Green	

# InGaAs PIN Photodiode

#### Features:

- I Planar semiconductor design and dielectric passivation
- I 2-pin coaxial mini packaging ,SM pigtail without connector
- I Superior noise and photoelectric performance
- I Hermetical packaging and 100% purge burn-in
- I Applied for optical fiber communication system.

#### ELECTRO-OPTICAL CHARACTERISTICS(T=25°C):

PARAMETERS	SYMBOL	TEST CONDITIONS	MIN	ТҮР	MAX	UNIT
Wavelength	λ		1000		1650	nm
Dark Current	ID	Ee=0, VR =5V		0.2	1	nA
Responsivity	Re	VR =5V, λ=1310nm	0.85	0.90		A/W
Responsivity	Re	VR =5V, λ=1550nm	0.90	0.95		A/W
Capacitance	С	f=1MHz,case grounded VR=5V Ee=0		7	8	pF
Operating voltage	Vopr			-5	-15	v
Rise& fall time	Tr、Tf	-5V			3	ns

#### ABSOLUTE MAXIMUM RATINGS(T=25°C):

PARAMETERS	MIN	MAX	UNIT
Reverse Voltage		25	V
Forward Current		10	mA
Operating Temperature	-40	+85	°C
Storage Temperature	-40	+85	°C
Lead Solder Temperature		260	°C
Lead soldering duration		10	s

#### PRECAUTIONS:

a .ESD protection is imperative. Use of grounding straps, anti-static mats, and other ESD protective equipment is recommended when handling or testing an InGaAs PIN photodiodes.

b.Fiber pigtails should be handled with less than 10N pull and with a bending radius greater than 15 mm.

#### Dimension:



## **DFB Laser For Gas Detection**

Temperature-controlled pigtail laser series, using DFB laser with quantum well structure, built-in semiconductor refrigerator, standard package technology to realize butterfly tail fiber package, compact structure, small size, widely used in optical fiber communication field; semiconductor refrigeration Under the high-precision temperature control, the laser has high power stability and high wavelength stability, which makes the laser widely used in the field of optical fiber sensors.

#### Below Wavelengths Available (and we can provide more wavelengths):

Gas	Absorption wavelength	Gas	Absorption wavelength
HF	1268.7nm/ 1273nm / 1278nm	H2S	1578nm
H2O	1368.59nm/ 1392nm	CO2	1572.3nm/ 1580nm / 2004nm
HBr	1343nm	C2H4	1620nm / 1627nm
NH3	1512nm/ 1531nm	CH4	1647nm / 1650.9nm / 1653.7nm/ 1660nm
C2H2	1532.68nm	HCI	1742nm
со	1567nm	O2	764nm VCSEL

#### Features:

- I Using quantum well structure DFB semiconductor laser chip with stable wavelength and high output power
- I Hermetic temperature control package Package: BF14 pigtail, TF8 space, TO39 and other customization

#### **Applications:**

- I Fiber gas detection system
- I Passive device production testing for gas detection

#### Rated working conditions:

Parameter	Symbol	Value	Unit
Laser diode forward current	lf(LD)	100	mA
Laser diode reverse voltage	Vr(LD)	2	V
Backlight detector operating current	lf(PD)	2	mA
Backlight detector reverse voltage	Vr(PD)	20	V
Cooler operating current	ITEC	2.4	А
Cooler operating voltage	VTEC	2.9	V
Operating Temp.	Topr	-20~+70	°C
Storage Temp.	Tstg	-40 ~ +85	°C
Lead soldering Temp./time	Tsld	260/10	°C/s

#### Technical Parameter:

Parameter	Symbol	Testing Condition	Min	Тур	Max	Unit
Light output power	PO	cw	3	5	-	mW
Threshold current	lth	CW	-	12	18	mA
Working current	Іор	CW,5mW	-	-	50	mA
Operating Voltage	Vop	CW,5mW	-	1.5	2	v
Slope efficiency	η	CW,5mW	0.05	0.1	-	mW/mA
Peak wavelength	λc	CW,5mW,25°C	λc-1	λc	λc+1	nm
Side mode suppression ratio	SMSR	CW,5mW	35	-	-	dB
Spectral width (20dB)	Δλ	CW,5mW	-	0.2		nm
Wavelength stability	λs	CW,5mW,25°C	-0.1		+0.1	nm
Wavelength drift coefficient with temp.	Δλ/Τ	Stable operating current		0.1		°C
Wavelength drift coefficient with current	Δλ/Ι	Stable operating current		0.01		nm/mA
Thermistor	Rth	Ttherm = 25°C	9.5	10	10.5	kΩ

### Pin definition:

### General pin definition (N type)



### Special pin definition (S type)

Pin No.	Function	Pin No.	Function
1	Thermistor	8	NC
2	Thermistor	9	NC
3	Laser negative	10	NC
4	Backlight detector	11	Laser positive / receiver shell
5	Backlight detector negative	12	Laser negative
6	Refrigerator positive	13	Laser positive / receiver shell
7	Refrigerator negative	14	NC

#### Top view:



#### Dimension:



# High Power EDFA Fiber Amplifier - C Band

High Power EDFA Fiber Amplifier applied in the optical fiber amplifier, Television and fiber-optic Laser etc.

### Features:

- I High reliability
- I High output power
- I High stability
- I low noise index
- I LCD display, easy to operate

#### Applications:

- I Nonlinear research
- I Optical fiber sensing
- I High-speed fiber-optic communication
- I High power amplification
- I Other laboratory applications

Specifications	Unit	Min.	Typical	Max.
Wavelength range	nm	1530		1560
Input optical power range	dBm	-10		+10
Saturated output power @0dBm signal input	dBm	-	33	
Noise index @0dBm signal input	dB	-		6.5
Input/output isolation	dB	30		-
Output power stability (8 hours)	%	-		2
Output power adjustable range	%	10		100
range of working temperature	°C	0		40
Storage temperature range	°C	-40		+85
Operating Voltage	v		220V/50Hz	
rated power	w	100		
Pigtail connector type		FC/APC Connector		
Input and output pigtail type		SMF28		
Standard sizes		2U-E	Rack Mount 420*485	*105

# **SOA Optical Amplifier**

### Features:

- I 1310/1550 band light
- I Wide spectral range
- I Maximum rate supports 160G/s
- I High output power
- I Good temperature adaptability

#### **Applications:**

- I 40G/100G transmission system
- I Loss compensation
- I Line upgrade
- I Wavelength division multiplexing device test
- I Optical communication system

Specifications	Unit	Min.	Typical	Max.
Wavelength range (upstream)	nm	1290		1310
Wavelength range (downstream)	nm	1530		1570
Saturated output power	dBm	8		
Peak gain	dB	18.5		
Gain ripple	dB		0.2	
Drive current	mA		300	450
Thermistor	kΩ		10	
range of working temperature	°C	-20		65
Operating humidity range	%			90
Storage temperature range	°C	-40		85
Power supply type		DC+5V GND		
Pigtail connector type		FC/APC		
Input and output pigtail type		SMF28		

# **Optic Source Module**

A variety of optic source modules, including SLD optic source, ASE optic source, DFB optic source, FP optic source, etc., the product has the advantages of small size, light weight, strong environmental adaptability, wide band coverage and reliable working temperature. Different types of products can be customized according to the needs of the user system.

#### Features:

- I High reliability
- I Internal power control
- I High output power
- I Good temperature adaptability (-40°C ~ 60°C)

Optical connector

#### Specifications:

#### DFB **Specifications** Unit SLD ASE 1525 ~ 1565 450~1650 1270~1650 Working wavelength nm 1525-1605 **Output Power** dBm ≦13 ≦20 ≦100 Spectral width (normal temperature) ---8 ~ 110nm 40/80nm 1kHz ~ 0.2nm High bias: PER>28dB (40dB optional) polarization NA Low bias: DOP < 5% Power stability (15 minutes, constant dB 0.02 temperature) Power stability (8 hours, constant dB 0.05 temperature) Full temperature power stability % 5 6 range of working temperature °C -40~70 °C Storage temperature range -40~85 Relative humidity % 5~90, No condensation Dimensions 90×70×15 mm DC 5V power supply Electrical connector 10-pin connector or customized Pigtail type SM fiber

#### **Applications:**

- I Optical fiber sensing
- I Fiber passive device testing
- I Optical communication system
- I Other system integration

FC/APC or other connector

# High stability ASE source

High stability ASE source has been widely used in Fiber Optic Sensing.

In order to meet the requirements of different environmental conditions, the light source has undergone rigorous evaluation in the range of -45~70 °C, and the optical path device and the circuit device from the device to the module are strictly screened. The integrated precision temperature control technology inside the light source not only ensures the spectral stability of the light source, but also reduces the overall power consumption of the light source.

#### Features:

- I High reliability, meeting the GJB150 standard;
- I High temperature adaptability, working temperature range: -45~70°C
- I Gaussian spectral shape
- I Support output optical power is adjustable
- I High output optical power stability, best full temperature power stability less than 1%
- Average wavelength stability is good, the best full-temperature average wavelength stability is less than 20ppm

#### Applications:

- I Fiber optic gyroscope
- I Defense military research
- I Passive device testing, production
- I Biomedical imaging

Specifications	Unit	Min.	Typical	Max
Working wavelength	nm	1525	-	1565
	dBm	-	10	-
Output optical power	dBm	-	7	-
	dBm	-	5	-
Short-term power stability (single temperature) (1)	dB	-	0.05	-
Long-term output power stability (2)	dB	-	0.1	-
Full temperature power stability (-45~70°C)	%	-	3	5
Wavelength stability (single temperature)	ppm	-	3	5
	ppm		20	30
Wavelength stability (-45~70°C)	ppm		40	50
	ppm		80	100
working temperature	°C	-45	-	+70
Storage temperature	°C	-50	-	+85
Relative humidity	%	5	-	90
Bower consumption		Normal temp.	-	1.5
		Full temp.	-	3.5
power supply	-		DC 5V	
Electrical connector	-	5V-GND power Wire		
Pigtail type	-	SM fiber		
Optical connector	-	FC/APC or other connector		
structure size	mm	Re	ctangle: 90X70X15	
			Round: 79.5X15	

# ECL type Narrow linewidth laser

The ECL Type narrow linewidth laser uses a unique external cavity structure and advanced packaging technology, with narrow line width, low relative intensity noise and low phase noise;

The device uses a standard 14-pin butterfly package, with high output power, high stability, high reliability, and long service life.

#### Features:

- I Narrow line width;
- I Low RIN and phase noise;
- I High output optical power;
- I High stability

#### **Applications:**

- I Optical fiber communication, coherent detection;
- I Microwave photonics research
- I Lidar
- I Microwave photonics research

### Specifications: (Ambient temperature @25°C)

Specifications	Symbol	Min.	Typical	Max.	Unit	Remarks
Fiber output power	PO	5	-	-	mW	ECL
Center wavelength	λς	1530	-	1610	nm	ITUT wavelength, can be customized; ECL
Wavelength tuning range	-	-	30	-	pm	Temperature tuning
Working current	Іор	-	-	500	mA	
Threshold current	lth	-	50	80	mA	
Operating Voltage	Vop	-	2	3	v	
		-	30	60	kHz	
Discussion data	421		10	15	kHz	
Linewidth	ΔΛL		-	5	kHz	Lorenz
			-	2	kHz	
	-	-	35	-		ΔλL<60kHz, @200Hz
Dharanalaa	-	-	22	-	Urad/rt-	ΔλL<20kHz, @200Hz
Phase holse	-	-	8	-	HZ	ΔλL<5kHz, @200Hz
	-	-	4	-	Imopd	ΔλL<2kHz, @200Hz
Relative intensity noise	RIN	-	-150	-	dB/Hz	
Isolation	ISO	45	-	-	dB	
Polarization extinction ratio	PER	18	-	-	dB	Slow Axis (PMF), 23°C
Side mode suppression ratio	SMSR	50	-	-	dB	
Operating temperature	Тор	-5	-	70	°C	
Storage temperature	-	-40	-	85	°C	
TEC Working Current	-	1.2		А		
TEC Working Voltage	-	4			v	
Pin soldering temperature	-		260 (<10s)		°C	

## Dimension:



## Ordering info:

BF14	х	Х	I	Х	Х	х	x	Х
BF14:	ECL	Wavelength (nm):	linewidth:	Pin definition:	Fiber Length: m	09SMF: 900um SM	Output power: mW	Connector
Butterfly		ITU-T wavelength;	5: 5kHz	Type N	0.5: 0.5m	25SMF: 250um SM	10: 10mW	Туре:
14pin		Customized Wavelength	10: 10kHz		1: 1m	09PMF: 900um PM	15: 15mW	FC/APC
			35: 35kHz			25PMF: 250um PM	5: 5mW	FC/PC
						CS: Customize		

## ECL type Laser:



# Fiber Bragg Grating Demodulation Module

The T800 series grating demodulation module uses a tunable light source to measure the wavelength of the fiber grating, and the wavelength covers 1529~1569nm. The product has high integration, which is beneficial to system integration and low cost.

#### Features:

- I Compact structure
- I High wavelength accuracy and good repeatability
- I No moving parts, vibration is not sensitive

I Large operating temperature range

#### **Applications:**

I Optical communication system

Specifications	Parameters
Wavelength range (nm)	1529 ~ 1569
Number of channels	1, 2, 4, 8
Minimum detectable wavelength interval (nm)	0.5
Dynamic range (dB)	≥40
Wavelength resolution (pm)	1
Wavelength repeatability (pm)	≤ 5
Scanning speed (ms)	≤ 1000
Spectral resolution (pm)	20
Output power (dBm)	>-3
Communication Interface	RS485/ RJ45
Working temperature (°C)	0~50
Size (mm)	159×120×63

# **Optic Source Module**

A variety of optic source modules, including SLD optic source, ASE optic source, DFB optic source, FP optic source, etc., the product has the advantages of small size, light weight, strong environmental adaptability, wide band coverage and reliable working temperature. Different types of products can be customized according to the needs of the user system.

#### Features:

- I High reliability
- I Internal power control
- I High output power
- I Good temperature adaptability (-40°C ~ 60°C)

#### Specifications:

- I Optical fiber sensing
- I Fiber passive device testing
- I Optical communication system
- I Other system integration

Specifications	Unit	SLD	ASE	DFB	
Working wavelength	nm	450~1650	1525 ~ 1565 1525-1605	1270~1650	
Output Power	dBm	≦13	≦20	≦100	
Spectral width (normal temperature)		8 ~ 110nm	40/80nm	1kHz ~ 0.2nm	
		High bias: PER>28	3dB (40dB optional)	NA	
polarization		Low bias:	DOP < 5%	NA	
Power stability (15 minutes, constant temperature)	dB	0.02			
Power stability (8 hours, constant	dB	0.05			
temperature)					
Full temperature power stability	%		6	5	
range of working temperature	°C		-40 ~ 70		
Storage temperature range	°C		-40~85		
Relative humidity	%		$5 \sim 90$ , No condensation		
Dimensions	mm		90×70×15		
power supply			DC 5V		
Electrical connector	10-pin connector or customized				
Pigtail type	SM fiber				
Optical connector		FC/A	PC or other connector		

# Laser Doppler Speed Meter System

In relevant industrial automation production, precise length measurement and precise speed measurement and control are necessary to optimize the production process. This product can effectively improve product quality, product process, production efficiency, and also save the use of material costs.

Due to its "non-contact" measurement characteristics, there is no wear and tear, not only can the maintenance cost of the production line be minimized, but also the reliability and product quality of the assembly line can be significantly improved to ensure that your product specifications are accurate. Greatly reduce production costs, you can improve the company's competitive advantage, will provide you with accurate process control solutions.

The performance of the non-contact Laser Doppler Speed Meter is completely revolutionary and improved compared with the traditional contact speed measuring instrument. From the metallurgical industry and rolling mill products, to textiles, films, paper-making, cables, wires, wood, construction materials, and ink-jet printing, to rail transportation other than industrial production, non-contact laser Doppler Speed Meter The advantages are obvious. For example, in the field of rail transportation, the non-contact laser speedometer avoids speed errors caused by factors such as "idling", "slipping", and "wear". It obtains accurate and real-time speed data by continuously scanning the track, thereby calculating The accumulated mileage of the operation, the control system can grasp the accurate position information of the train in real time, and provide reliable data guarantee for the safe operation of the train.

### Features:

- I Using the all-fiber solution, product miniaturization
- I Using high precision and high speed AD sampling
- I High-speed FPGA solution, high precision and low noise
- I Use eye-safe infrared 1550 nm light source
- I Automatic detection of direction, can measure "0" speed
- I Reliable measurement on almost any surface
- I Anti-electromagnetic interference, reliable and stable

### Applications:

- I Industrial production
- I Rail transit
- I Metallurgical industry and rolling mill products

#### Parameter:

- I Minimum measuring speed (m/min): 0
- I Maximum measurement speed (m/min): 20000
- I Unit of measurement: m/s, m/min, ft/s
- I Precision: better than 0.05%
- I Repeatability error: better than 0.02%
- I Direction detection: Automatic direction detection
- I Signal output: AB pulse, RS232, RS422, RS485
- I Power supply voltage: 20 ~ 28 VDC
- I Power consumption: 5W
- I Protection level: IP67
- I Temperature range: 0-45°C (plus protection box can adapt to more harsh environment)
- I Anti-electromagnetic interference level: standard level four

			i	i		
LVJ-II	300	500	700	1000	1500	2000
Measuring distance (mm)	300	500	700	1000	1500	2000
Speed Measurement Range	"0~±1200	"0~±3000	"0~±8000	"0~±12000	"0~±20000	"0~±20000
	m/min"	m/min"	m/min"	m/min"	m/min"	m/min"
Measuring depth of field (mm)	35	50	70	100	200	200

#### Working Principle:

Laser Doppler Speed Meter uses the principle of differential laser Doppler to measure speed. The light emitted by the DFB laser is evenly split into two beams and emitted, and then converges again on the surface of the measured object. The detector receives the reflected light. When the measured object's lateral velocity is zero, the reflected light has the same frequency as the detected light; when the lateral velocity is not At zero, the reflected light will shift in frequency with respect to the probe light  $fp=(2\sin\varphi/\lambda)^*v$ . The speedometer solves the frequency shift through the fast Fourier transform and obtains the lateral velocity v of the measured object.



Comparative advantages of Laser Doppler Speed Meter:

Comparison of Laser Doppler Speed Meter with Traditional Measurement and Control				
Non-contact Laser Doppler Speed Meter	Contact wheel/ Code counter			
No abrasion, no slip, can be accurately measured and controlled in almost all environments	Slippage, abrasion, environment and other factors lead to speed and length errors			
High precision, meet various speed control in industry, improve production efficiency	Poor accuracy, too slow and too fast errors			
No moving parts, permanent calibration	Calibration, replacement of parts, and maintenance cause downtime, and the cost also increases			
Non-contact, will not bring any quality problems to the product	The scratches and damage caused by contact between the contact wheel and the product will affect the quality of the product			

Dimension:





Differential Laser Doppler Principle 上图:差分多普勒效应示意图