Fiber Bragg Grating (FBG) Series Products

YOFC
Smart Link Better Life.

Yangtze Optical Fibre and Cable Joint Stock Limited Company (also known as 'YOFC'), formally known as 'Yangtze Optical Fibre and Cable Co., Ltd.', is a Sino-foreign joint venture enterprise registered and established in Wuhan, Hubei Province in May 1988. After 25 years development, the company was restructured itself to be a foreign-funded joint stock company in December 2013 and was eventually renamed 'Yangtze Optical Fibre and Cable Joint Stock Limited Company', including 3 key shareholders - China Huaxin Post and Telecommunication Economy Development Center, Draka Comteq B.V and Wuhan Yangtze Communications Industry Group Co., Ltd.

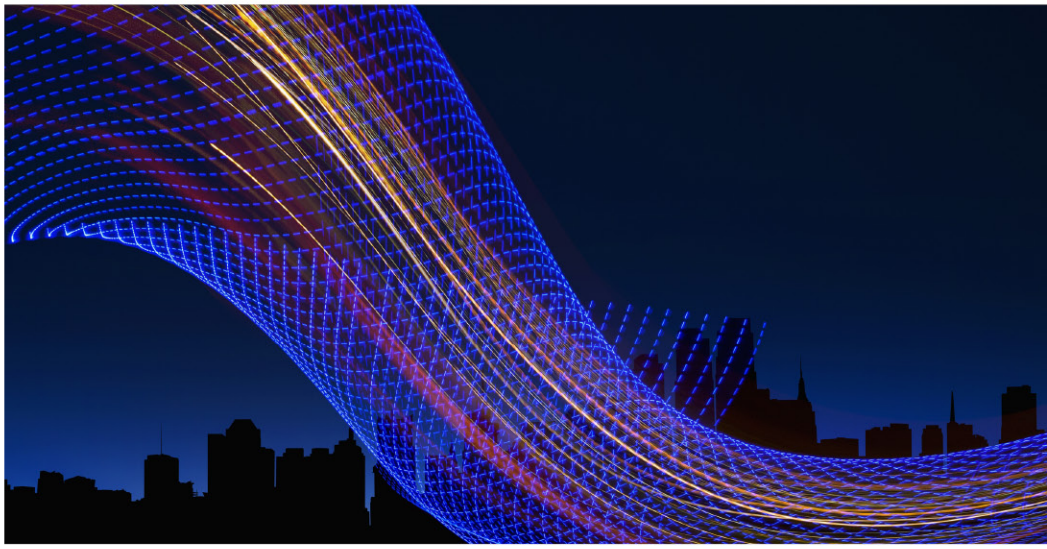
YOFC was successfully listed on the main board of Hong Kong Exchanges and Clearing Limited on December 10, 2014, becoming the company listed in Hong Kong that focuses on optical fibre preform, optical fibre and cable, and other related products. According to the report from the CRU (the Commodity Research Unit), a third-party authoritative consultancy agency in the world, by the end of 2016, YOFC's optical fibre preform has obtained a 22.5% global market share, optical fibre, a 17.3% global market share, and optical cable, a 14.9% global market share.

YOFC is mainly producing and selling different types and standards of optical preform, optical fibre and optical cable that widely installed in telecommunication industry, customized specialty fibre and cable, RF coaxial cable and accessories. YOFC also provides the integrated system, project design and services. In addition, YOFC is equipped with a full series of fibre and cable and solutions, providing a variety of different products and solutions for world's telecom industry and other industries (e,g. Publicity, Transportation, Oil & Chemistry and Medication) and offering its products and services to over 70 countries and regions around the world.

Through introduction, digestion, absorption and innovation since its establishment, YOFC has carried out a way to successfully revitalize national industry. So far, it has obtained over 300 national-granted patents and several foreign invention patents from Europe, US and Japan, etc. including PCT authorization. These achievements have driven YOFC to honour the following award & reputation: National Enterprise Technical Center, Innovative Enterprise, National First Batch Intelligent Manufacturing Pilot Demonstration Enterprise, National Manufacturing Industry Single Championship Demonstration Enterprise, etc. Moreover, YOFC was granted the Second Class National Science and Technology Progress Award (twice) and the China Quality Award, etc. In addition, YOFC was nominated the support organization for National Key Laboratory in optical fibre and cable preparation technology and it is also one of the significant members in ITU-T and IEC in setting national standards.

Adhering to the mission of 'Smart Link Better Life', YOFC devotes itself to becoming the leader in information transmission and smart links through its core value 'Client Focus Accountability Innovation Stakeholder Benefits', and places its layout aggressively in 5 domains: preform, fibre and cable connotative growth, technological innovation and intelligent manufacturing, international region expansion, relative diversification and capital management.

Contents

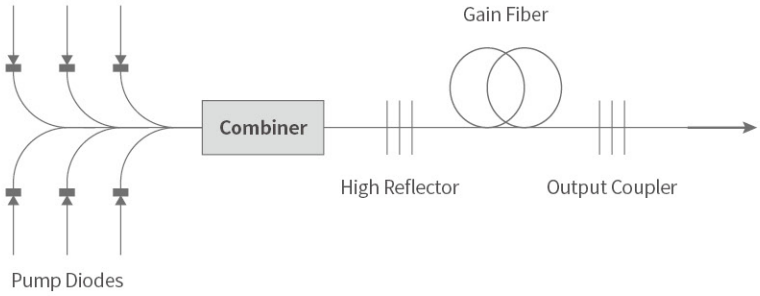


FBG for Fiber Laser(10/130)

FBG based on High Reflector and Output Coupler are designed for laser cavity in industrial fiber lasers. FBGs in Double-Clad fiber and PM fiber are available.

Features

- Center wavelength: 1030nm to 1080nm
- High reflector(>99%) with 0.1 to 2nm bandwidth
- Output coupler(8-12%) with 0.1 to 2nm bandwidth
- Wavelength mismatch less than 0.2nm



Application

- Fiber lasers used in cutting, welding and marking

Parameter

Product Type	AFBG-DC/PM-1060		
Parameters	**Specifications**		**Unit**
Grating Type	High Reflector	Output Coupler	
Center Wavelength @25 °C	1064±1		nm
Wavelength Mismatch	<0.2		nm
Reflectivity	>99.5	10±2	%
Reflection Bandwidth @50%	2.0~3.0	0.6~1.0	nm
Side Mode Suppression Ratio	>15	>15	dB
Fiber Type	Double-clad 10/130, PM980, HI1060 and customer required		
Maximum Pump Power Through the Grating	100		W
Pigtails Length	0.5m on each side		

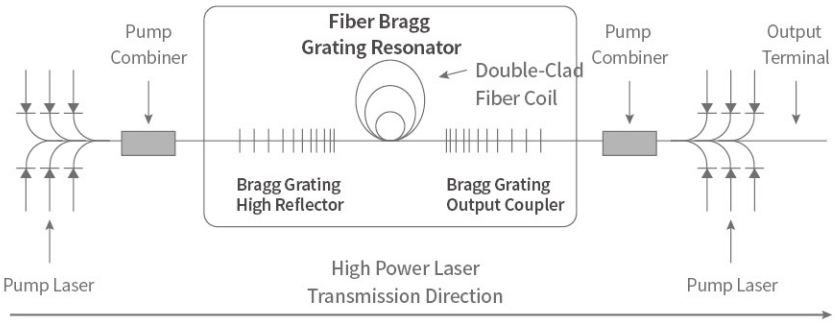
Note: 1.Centre wavelength λ_c is available as requested from 1030nm to 1080nm
2.Peak reflectivity @λ_c is available as requested from 0.5% to 99.5%
3.Reflection bandwidth(FWHM) is available as requested from 0.1nm to 3.0nm

FBG for High-Power Fiber Laser(20/400)

FBG based on High Reflector and Output Coupler are designed for laser cavity in industrial fiber lasers. FBGs in Double-Clad fiber and PM fiber are available.

Features

- Center Wavelength: 1080±1nm
- High Reflector(⩾ 99.5%) with 2.0nm to 3.0nm bandwidth
- Output coupler(8%~12%) with 0.6nm to 1.0nm bandwidth
- Wavelength mismatch less than 0.2 nm



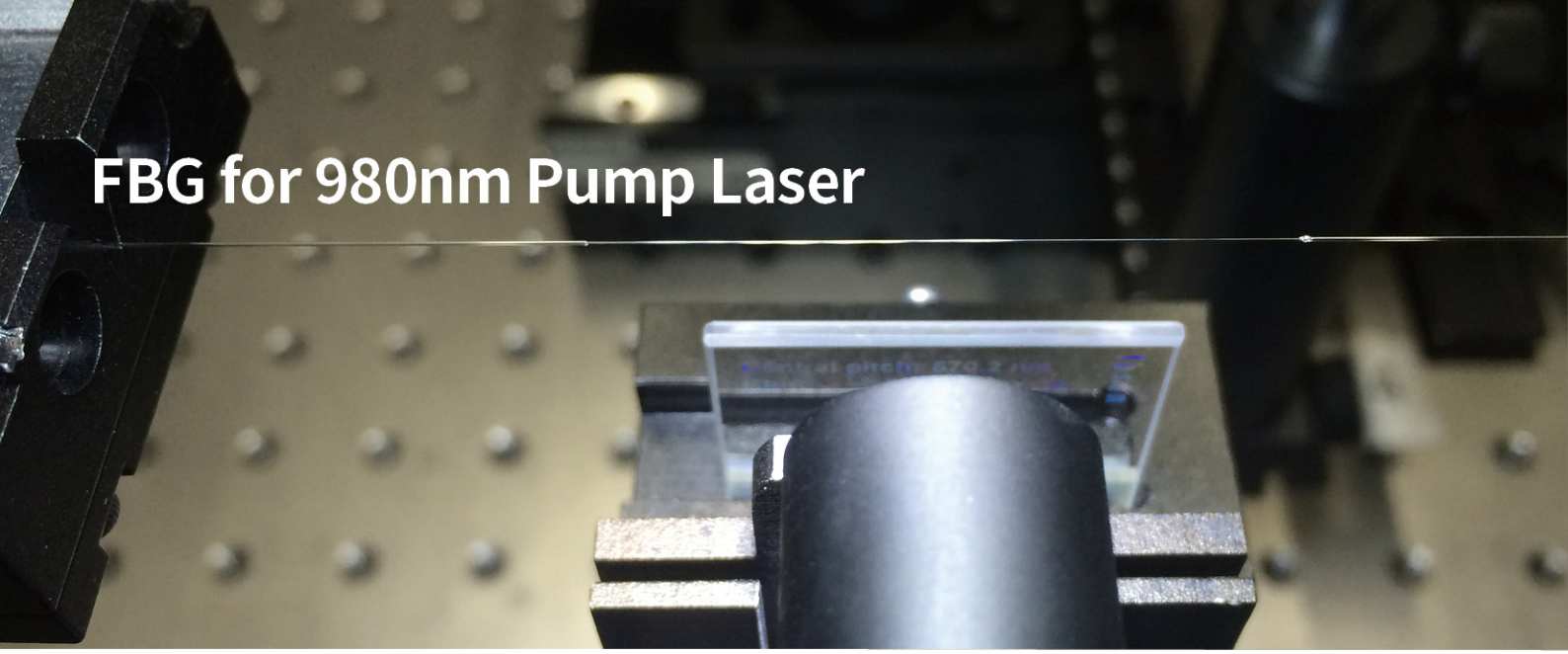
Application

- High-power fiber lasers used in cutting, welding and marking

Parameter

Product Type	AFBG-DC-1080		
Parameters	**Specifications**		**单位**
FBG Type	HR	OC	
Center Wavelength λ_c@ 25 °C (Referenced to air)	1080±1	1080±1	nm
Wavelength Mismatch(OC Relative to HR)	<0.2		nm
Peak Reflectivity	>99.5	10±2	%
Reflection Bandwidth	3.0±0.3nm	1.0±0.1nm	nm
Side Mode Suppression Ratio (SMSR)	>15	>15	dB
Fiber Type	As requested		
Maximum Pump Power Through the Grating	1000		W
FBG Length	1.5m for each side or as requested		m

Note: 1. Centre wavelength λ_c is available as requested from 1079nm to 1081nm
2. Peak reflectivity @λ_c is available as requested from 0.5% to 99.5%
3. Reflection bandwidth(FWHM) is available as requested from 0.6nm to 3.0nm
4. The fiber type is available as request



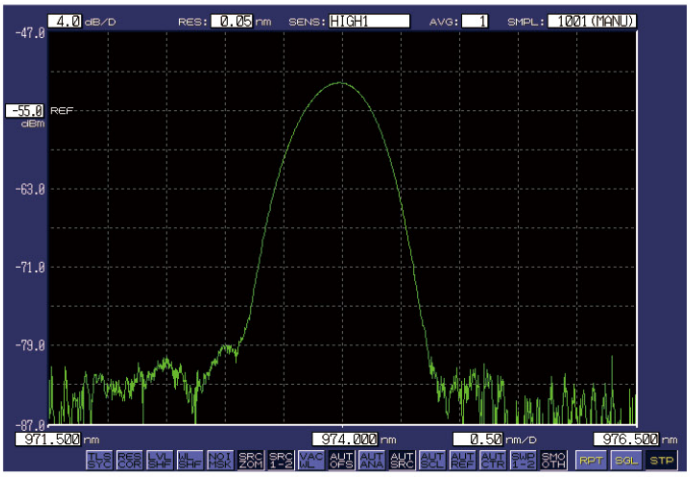
FBG for 980nm Pump Laser

The Fiber Bragg Grating (PMFBG/SMFBG) for 980nm pump laser is written by UV light within the PM980 polarization maintaining fiber (PMF) or SM980 single mode fiber (SMF) core. The PMFBG/SMFBG as pigtail is connected to the 980nm pump laser diode, providing external cavity feedback, which make the pump laser wavelength locked at the center wavelength of PMFBG/SMFBG. Due to the low temperature sensitivity of FBG, the stability of 980nm pump laser wavelength can be greatly improved, and the temperature control of 980nm pump laser is unnecessary. As the PMFBG/SMFBG narrows the bandwidth of the 980nm pump laser output, the ratio of the output power within the erbium ion absorption band can be increased , thereby increasing the efficiency and the stability of the EDFA pump.

Features

- High–precision control of the reflective wavelength, within ±0.25nm
- High-precision control of the reflectivity, within ± 0.5%
- Side lobe suppression ratio up to -25 ~-30dB by apodization, better than the industry standard
- PMFBG is better than SMFBG at extinction ratio and locking of output wavelength. With the enhancement of EDFA power, the output spectrum of the pumped laser using PMFBG is more stable, which makes the gain of EDFA more stable

Spectrum of Grating Reflection

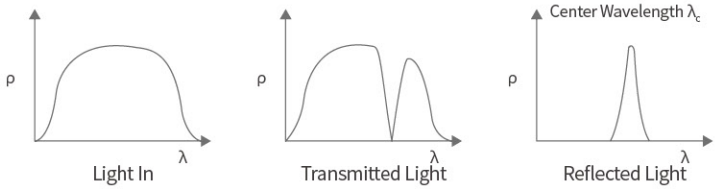


Application

- PMFBG/SMFBG for 980nm pump laser is used for locking of output wavelength. Due to the low temperature sensitivity of FBG, the stability of output wavelength and the efficiency of 980nm pump laser can be greatly improved

FBG

Spectrum Response



Parameter 1

Product Type	AFBG-PMF/SMF-974			
Parameter	**Min**	**Typical**	**Max**	**Unit**
Centre Wavelength λ_c@ 25 °C (measured “in air”)	973.75	974	974.25	nm
Peak Reflectivity @ λ_c	1.5	2	2.5	%
Reflectivity Bandwidth (FWHM)	0.4	0.5	0.6	nm
Side Lobe Suppression Ratio Compound (SLSR)			-25	dB
Proof Test Level (>8 sec pull test)	150			kpsi
Bending Radius	15			mm
Operating Temperature Range	-20		75	℃
Shift in λ_c Over Temperature	0.01			nm/K
Grating Region Length	50			mm
Grating Type	Apodized			
Fiber Type	PMF/SMF			
Maximum Pump Power Through the Grating	1			W
Fbg Length	3m~ 4m or As requested			

Parameter 2

Product Type	AFBG-PMF/SMF-976			
Parameter	**Min**	**Typical**	**Max**	**单位**
Centre Wavelength λ_c@ 25 °C (measured “in air”)	975.85	976	976.15	nm
Peak Reflectivity @ λ_c	2.5	3	3.5	%
Reflectivity Bandwidth (FWHM)	0.6	0.65	0.7	nm
Side Lobe Suppression Ratio Compound (SLSR)			-25	dB
Proof Test Level (>8 sec pull test)	150			kpsi
Bending Radius	15			mm
Operating Temperature Range	-20		75	℃
Shift in λ_c Over Temperature	0.01			nm/K
Grating Region Length	50			mm
Grating Type	Apodized			
Fiber Type	PMF/SMF			
Maximum Pump Power Through the Grating	1			W
Fbg Length	3m~ 4m or As requested			

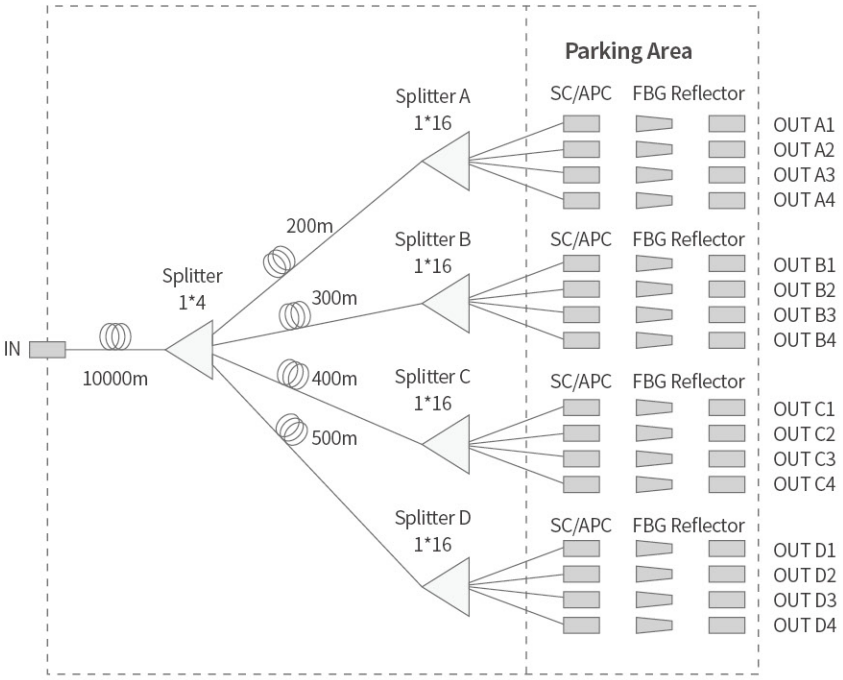
Note: 1. Centre wavelength λ_c are available as requested from 973nm to 976nm
2. Peak reflectivity @λ_c are available as requested from 0.5% to 10%
3. Reflectivity bandwidth(FWHM) are available as requested from 0.1nm to 1.0nm

OTDR FBG Reflector

YOSC's FBG Reflector is based on Fiber Bragg Grating technology with wide bandwidth and low insertion loss to reflect OTDR test signal. When the optical measurement system generates a certain range of wavelength to a Passive Optical Network(PON) which can pass through the FBG, the FBG will reflect its own intrinsic reflection wavelength at 1644.5nm-1655.5nm.

Features

- High precision of reflectance at test wavelength
- Low insertion loss at traffic wavelength
- Easy to install
- Exceptional reliability and environmental stability
- Applicable for FTTH、FTTB、FTTC
- Compatible with GPON、EPON、GEPON、10GEPON、NGPON



Applications

- Create high reflectance and wide working bandwidth at the termination of a PON without disturbing traffic
- Test the reflectance from the central office.
- Check optical continuity of a subscriber when being added, or when troubleshooting

Parameter

	Parameters	Min.	Typ.	Max.	Unit
	Optical Parameters				
1	Pass band wavelength range		1260~1625		nm
2	Reflect band wavelength range		1644.5~1655.5		nm
3.1	IL(1260nm~1360nm)			1.0	dB
3.2	IL(1460nm~1600nm)			1.0	dB
3.3	IL(1600nm~1625nm)			2.0	dB
3.4	IL(REFLECT BAND)	21			dB
4.1	RL(1260nm~1360nm)	35			dB
4.2	RL(1460nm~1580nm)	35			dB
4.3	RL(1580nm~1620nm)	30			dB
4.4	RL(1610nm~1620nm)	30			dB
4.5	RL(1620nm~1625nm)	20			dB
4.6	RL(REFLECT BAND) (Note 3)	0		1.0	dB
5	PDL(1260nm~1600nm)			0.4	dB
6	Ripple (REFLECT BAND)			0.6	dB
7	TDL(1260nm~1600nm)			0.5	dB
8	Max Optical Power Handling	27			dBm
9	Plug Times	500			
10	Connector		SC/APC Male & SC/APC Female		
	Temperature Range				
	Storage Temperature	-40		85	℃
	Operating Temperature	-25		65	℃
	Storage Relative Humidity	5		95	%
	Operating Relative Humidity	5		95	%

notes: 1. ORL(dB) = -10 $\log_{10}$(Reflected Power/ Input Power) [dB]
2. IL(dB) = -10 $\log_{10}$(Output Power/ Input Power) [dB]
3. To measure the Return Loss of reflect band, the light of 1650nm should be injected from the female side of reflector

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