

LIGHTTEL

*Pump Combiners and Other Optical Components
For High Power Fiber Lasers*

N×1 High Power Pump Combiners

Lightel's Multimode Pump Combiners can be used to combine several pump lasers. Our patented bundling technology significantly increases the combiner's reliability. Lightel's Combiners utilize air-clad technology with high numerical aperture fiber for robust pump delivery with no interaction of the pump light with the protective polymer coating.

Features:

- High Transfer Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification				
	3x1	4x1	7x1	19x1	37x1
Port Configuration	3x1	4x1	7x1	19x1	37x1
Pump Wavelength	800 nm ~ 1000 nm				
Pump Input Fiber	x/125 or 200/220		105/125 0.15NA/0.22NA or 200/220 0.22NA		105/125 0.15NA/0.22NA
Output Fiber	y/125 or 200/220		200/220 or y/250 or 20/400		y/400
Pump Efficiency	>95%		>90%	>90%	>93%
Total Power Handling	300W		350W	1800W	1800W
Pigtail	customized				
Operating Temperature	0~75°C				
Storage Temperature	-40~85°C				

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design

Ordering Information

P	C						
Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code		
3=3x1	18=MM-S105/125-15A	4= HI1060 NA:0.14	20=MM-S200/220-22A	1=D4.0xL60 SST	001-999		
7=7x1	19=MM-S105/125-22A	29=DCF-UN-10/125DC	47=Passive-25/250DC NA:0.07/0.46	3=75x12x8			
9=19x1	20=MM-S200/220-22A	30=10/125DC NA:0.08/0.46	49=LMA-GDF-20/400-M NA:0.06/0.46	8=105x15x8 Box			
		72=DCF-UN-8/105/125-14					

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

(N+1)×1 High Power Pump and Signal Combiners

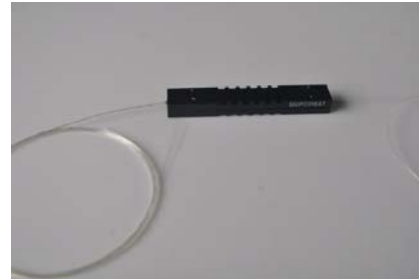
(N+1) ×1 Multimode Pump and Signal Combiners can be used for high power fiber lasers and fiber amplifiers. These devices can be used to combine several pump lasers and couple that power with a seed signal. Our combiners utilize air-clad technology with high numerical aperture fiber for robust pump delivery with no interaction of the pump light with the protective polymer coating. This series of products includes (6+1)×1\ (18+1)×1\ (36+1)×1 and other reasonable configurations are available.

Features:

- High Transfer Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification					
Port Configuration	(6+1)×1 (PM or Non-PM)			(18+1)×1	(36+1)×1	
Pump Wavelength	800 nm ~ 1000 nm					
Signal Wavelength	1030 nm ~1080 nm or 1450 nm ~ 1600 nm					
Signal Input Fiber	x/125		x/125 or x/250 or 20/400	x/125	x/125	
Pump Fiber	105/125 0.15NA/0.22NA		105/125 0.15NA/0.22NA or 200/220 0.22NA	105/125 0.15NA/0.22NA		
Output Fiber	y/125	y/250	20/400	y/250	20/400	y/400
Pump Efficiency	>90%	>93%	>95%	>93%	>95%	>93%
Signal Insertion Loss	<0.7 dB	<0.7 dB	<0.7 dB	<0.7 dB	<0.7 dB	
Total Power Handling	300W	600W	900W	2500W	2500W	
Polarization Extinction Ratio	≥18 dB			---		
Return Loss	>45 dB					
Pigtail	Customized					
Operating Temperature	0~75°C					
Storage Temperature	-40~85°C					

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design.

Ordering Information

P	C						
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code
6	(6+1)×1	18=MM-S105/125-15A	4= HI1060 NA:0.14	47=Passive-25/250DC NA:0.07/0.46	3=75x12x8	001-999	
C	(18+1)×1	19=MM-S105/125-22A	26=SCF10/125 NA:0.08	49=LMA-GDF-20/400-M NA:0.06/0.46	8=105x15x8 Box		
G	(36+1)×1	20=MM-S200/220-22A	29=DCF-UN-10/125DC	51=LMA-GDF-30/250-M NA:0.06/0.46	C=80x14x10		

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

(N+1)×1 High Power Reverse Pump Combiner

High power reverse pump combiners are specifically designed for especially high power fiber lasers. These combiners are usually mated with the forward optical path to form a bidirectional pump structure to get higher amplification efficiency and higher output power.

Features:

- High Transfer Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification		
	(2+1)x1	(6+1)x1	(9+1)x1
Port Configuration	(2+1)x1	(6+1)x1	(9+1)x1
Pump Wavelength	800 nm ~ 1000 nm		
Signal Wavelength	1030 nm ~ 1080 nm or 1450 nm ~ 1600nm		
Signal Input Fiber	x/125 or x/250 or x/400		x/250 or x/400
Pump Fiber	105/125 0.15NA/0.22NA or 200/220 0.22NA		105/125 0.15NA/0.22NA
Output Fiber	y/125 or y/250 or y/400		y/250 or y/400
Pump Efficiency	>90%		>93%
Signal Insertion Loss	<0.5 dB		<0.5dB
Total Power Handling	300W	1000W	1000W
Polarization Extinction Ratio	<150W	<100W	<150W
Return Loss	>45 dB		
Pigtail	Customized		
Operating Temperature	0~75°C		
Storage Temperature	-40~85°C		

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design.

Ordering Information

P	C							
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code	
2	(2+1)x1	18=MM-S105/125-15A	4= HI1060 NA:0.14	41=LMA-GDF-20/130-M NA:0.08/0.46	1=D4.0xL60 SST	001-999		
6	(6+1)x1	19=MM-S105/125-22A	29=DCF-UN-10/125DC	47=Passive-25/250DC NA:0.07/0.46	3=75x12x8			
H	(9+1)x1	20=MM-S200/220-22A	30=10/125DC NA:0.08/0.46	49=LMA-GDF-20/400-M NA:0.06/0.46	8=105x15x8 Box			
			72=DCF-UN-8/105/125-14	72=DCF-UN-8/105/125-14	G=100x28x12.6			

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

High Power Laser Combiners

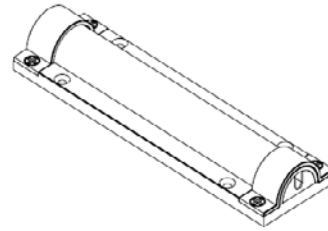
Lightel's laser beam combiner is used to combine several single-mode lasers into a multimode transmission fiber to achieve a laser power output in the range of several kilowatts to 10,000 watts. Visible light source can be added to the output delivery fiber for guidance in the machining process.

Features:

- High Transfer Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Industry Laser Processing



➔ Specifications

Parameter	Specification			
	4x1	6x1	(4+1)x1	(6+1)x1
Port Configuration	4x1	6x1	(4+1)x1	(6+1)x1
Laser Wavelength	1030nm ~ 1080 nm			
Laser Input Fiber	x/125 or 20/400			
Output Fiber	BD-S100/120/360-STN			
Transition Efficiency	>95%			
Total Power Handling	3,000W 5,000W 10,000W			
Pigtail	Customized			
Operating Temperature	0~75°C			
Storage Temperature	-40~85°C			

Note1: Values are referenced without connectors

Note2: Other package dimension and optical performance can meet customer design

➔ Ordering Information

P	C						
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code
		4=4x1	18=MM-S105/125-15A	4= HI1060 NA:0.14	41=LMA-GDF-20/130-M NA:0.08/0.46	1=D4.0xL60 SST	001-999
		6=(6+1)x1	19=MM-S105/125-22A	29=DCF-UN-10/125DC	47=Passive-25/250DC NA:0.07/0.46	3=75x12x8	
		B=(4+1)x1	20=MM-S200/220-22A	30=10/125DC NA:0.08/0.46	49=LMA-GDF-20/400-M NA:0.06/0.46	8=105x15x8 Box	
		E=6x1		72=DCF-UN-8/105/125-14	72=DCF-UN-8/105/125-14		

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

(1+1)×1 or (2+1) ×1 High Power Pump and Signal Combiners(PM or Non-PM)

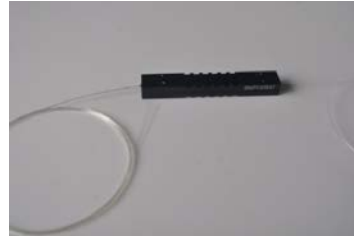
These Multimode Pump and Signal Combiners can be used for high power fiber laser and fiber amplifiers. These devices can be used to combine several pump lasers and couple that power with a seed signal. Our combiners utilize air-clad technology with high numerical aperture fiber for robust pump delivery with No interaction of pump light with the protective polymer coating.

Features:

- High Transfer Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Fiber Amplifier



➔ Specifications

Parameter	Specification		
Port Configuration	(1+1)×1 or (2+1)×1		
Operating Wavelength	800~1000nm		
Signal Wavelength	1030~1080nm or 1450~1600nm		
Signal Input Fiber	X/125	X/250	20/400
Pump Fiber	105/125 0.15NA/0.22NA or 200/220 0.22NA		
Output Fiber	Y/125 or Y/250	Y/250	20/400
Pump Efficiency	>90%	>93%	>95%
Signal Insertion Loss	<0.5 dB	<0.45 dB	<0.4 dB
Total Power Handling	50W	100W	200W
Polarization Extinction Ratio	≥18 dB		
Return Loss	>45 dB		
Operating Temperature	0~75°C		
Storage Temperature	-40~85°C		

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design.

➔ Ordering Information

P	C						
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code
1	1	1=(1+1)×1	18=MM-S105/125-15A	4= HI1060 NA:0.14	41=LMA-GDF-20/130-M NA:0.08/0.46	1=D4.0xL60 SST	001-999
2	1	2=(2+1)×1	19=MM-S105/125-22A	29=DCF-UN-10/125DC	49=LMA-GDF-20/400-M NA:0.06/0.46	3=75x12x8	
			20=MM-S200/220-22A	72=DCF-UN-8/105/125-14	72=DCF-UN-8/105/125-14	8=105x15x8 Box	

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

2000nm High Power Pump and Signal Combiners (PM or Non-PM)

These pump and signal combiners can be used for high power fiber lasers and fibers amplifier specially designed for use at the 2000nm wavelength. They can be used to combine several pump lasers and couple that power with a seed signal.

Features:

- High Power
- Low Excess Loss
- High Directivity
- Stable and Reliable

Application:

- Laser Positioning
- High Power Fiber Laser



Specifications

Parameter	Specification	
Port Configuration	(1+1)x1 or (2+1)x1	(6+1)x1
Pump Wavelength	800 nm ~ 1000 nm	
Signal Wavelength	1900 nm ~ 2100 nm	
Signal Input Fiber	x/125 or x/250	x/125 or x/250
Pump Fiber	105/125 0.15NA/0.22NA or 200/220 0.22NA	
Output Fiber	y/125 or y/250	y/250
Pump Efficiency	>90%	>93%
Signal Insertion Loss	<0.5 dB	<0.7 dB
Total Power Handling	200W	600W
Polarization Extinction Ratio	≥16 dB	
Return Loss	>45 dB	
Pigtail	Customized	
Operating Temperature	0~75°C	
Storage Temperature	-40~85°C	

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design.

Ordering Information

P	C						
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code
1	=(1+1)x1	18=MM-S105/125-15A	29= DCF-UN-10/125DC	41=LMA-GDF-20/130-M NA:0.08/0.46	1=D4.0xL60 SST	001-999	
2	=(2+1)x1	19=MM-S105/125-22A	30=10/125DC NA:0.08/0.46	47=Passive-25/250DC NA:0.07/0.46	3=75x12x8		
6	=(6+1)x1	20=MM-S200/220-22A	72=DCF-UN-8/105/125-14	49=LMA-GDF-20/400-M NA:0.06/0.46	8=105x15x8 Box		
				72=DCF-UN-8/105/125-14			

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

Active (2+1) X1 Combiner

Features:

- High Optical-Optical Conversion Efficiency
- Air-Clad Technology for Robust Power Delivery
- Stable and Reliable
- Custom Configurations Available

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification	
Port Configuration	(1+1)×1 or (2+1)×1	
Operating Wavelength	800~1000nm	
Signal Wavelength	1030~1080nm or 1550~1600nm	
Signal Input Fiber	DCF-EY-10/128	LMA-YDF-10/130 M
Pump Fiber	105/125 0.15NA/0.22NA	
Output Fiber	DCF-EY-10/128	LMA-YDF-10/130 M
Pump Efficiency	>90%	>90%
Signal Insertion Loss	<0.3 dB	<0.3 dB
Optical-optical Conversion Efficiency	>26%	>56%
Total Power Handling	30W	50W
Return Loss	>45 dB	
Package Dimension	75 mm x 12mm x 8mm or Φ4 x 60 mm	
Operating Temperature	0~75° C	
Storage Temperature	-40~85° C	

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design

Ordering Information

P	C							
		Port Configuration	Pump Fiber	Signal Fiber	Output fiber	Package Size	Special Code	
1	(1+1)×1	18=MM-S105/125-15A	4= HI1060 NA:0.14	41=LMA-GDF-20/130-M NA:0.08/0.46	1=D4.0xL60 SST	001-999		
2	(2+1)×1	19=MM-S105/125-22A	30=10/125DC NA:0.08/0.46	49=LMA-GDF-20/400-M NA:0.06/0.46	3=75x12x8			
		20=MM-S200/220-22A	72=DCF-UN-8/105/125-14	72=DCF-UN-8/105/125-14	8=105x15x8 Box			

Note: These are our most popular configurations. Contact Lightel Sales for custom port counts or alternative fibers.

Mode Field Adapter (PM or Non-PM)

Mode Field Adapters (MFA) can be used for high power fiber lasers and fiber amplifiers. These devices can be used to connect two different fibers with different core diameter and NA. Lightel's MFAs utilize mode field optimization technology to get high transfer efficiency and low beam degradation.

Features:

- High Power
- High Transfer Efficiency
- Custom Configurations Available
- Stable and Reliable

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification					
Port Configuration	1x1					
Operating Wavelength	1030~1080nm or 1450~1600nm					
SMA Fiber	6/125	10/125	10/125	6/125	20/250	62.5/125
LMA Fiber	10/125	20/125	25/250	20/400	30/250	105/125
Signal IL for Forward use	0.3 dB	0.4 dB	0.5 dB	0.5 dB	0.2 dB	-
Signal IL for Reverse use	0.3 dB	0.5 dB	0.7 dB	0.7 dB	0.2 dB	2 dB
Total Power Handling	10W			50W		10W
Polarization Extinction Ratio	≥18dB for PM Fiber					
Return Loss	>45dB					
Operating Temperature	0~75 °C					
Storage Temperature	-40~85 °C					

Note1: Values are referenced without connectors.

Note2: Other package dimension and optical performance can meet customer design.

Ordering Information

M	F	A	-	-	-	-	-	-	-
			↓				↓		
			Direction				Input		
			F=Forward				04=HI1060 NA:0.14		
			R=Reverse				29=DCF-UN-10/125-080		
							30=Passive-10/125DC NA:0.08/0.46		
							72=DCF-UN-8/105/125-14		
							Output		
							41=LMA-GDF-20/130-M NA:0.08/0.46		
							47=Passive-25/250DC NA:0.07/0.46		
							49=LMA-GDF-20/400-M NA:0.06/0.46		
							72=DCF-UN-8/105/125-14		
							Package Size		
							1=D4.0xL60 SST		
							2=50x5x5		
							3=75x12x8		
							Special Code		
							001-999		

Cladding Power Stripper

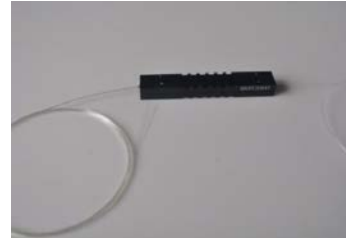
Cladding Power Strippers (CPS) can be used for high power fiber lasers and fiber amplifiers. Lightel's CPS is used to clean the cladding power from unwanted pump or signal power.

Features:

- High Stripping Efficiency
- Low Signal Loss and Beam Quality Degradation
- High Extinction Ratio (for PM Fiber)
- Stable and Reliable

Application:

- High Power Fiber Laser
- Fiber Amplifier



Specifications

Parameter	Specification		
Port Configuration	1x1		
Signal Wavelength	800 nm ~ 2000 nm		
Pump Wavelength	800 nm~ 1000 nm		
Signal Fiber	x/125	x/250	x/400
Cladding Attenuation	>20 dB	>18 dB	>18 dB
Signal IL	<0.13 dB		
Power Handling	20W	100W	1000W
Polarization ER	>17 dB (Input PER >25 dB)		
Return Loss	>45 dB		
Pigtail	Customized		
Operating Temperature	0~75°C		
Storage Temperature	-40~85°C		

Note1: Values are referenced without connectors.

Note2: Bottom side of these devices must be mounted on heat sink with good heat conduction.

Ordering Information

C P S

Package Size
3=75x12x8
8=105x15x8 Box
G=100x28x12.6mm

Fiber Type
28=DCF-UN-8/125 NA:0.14/0.46
48=25/250 DCF NA:0.08/0.46
67=DCF-UN-50/400-12

Special Code
001-999

Fiber End Cap (PM or Non-PM)

High Power Fiber End-Caps (FEC) can be used for high power fiber laser and fiber amplifier. These devices can be used to reduce the power density at the output fiber facet. A mode stripper is used in all Lightel FECs to clean the cladding from unwanted back-reflected light.

Features:

- High Power Application
- Low Signal Loss and Beam Quality Degradation
- High Extinction Ratio (For PM Fiber)
- Mode Stripper is Used
- Stable and Reliable

Application:

- High Power Fiber Laser
- Scientific Research
- Sensor



Specifications

Parameter	Specification				
Port Configuration	Fiber In, Free-space out				
Signal Wavelength	800 nm ~ 2000 nm				
Input Fiber	x/125	x/250	x/400	200/220	400/440
Signal IL	<0.1 dB				
Output Beam Ellipticity	>95% (for Single Mode Input)			-	
Polarization ER	>20 dB (Input PER>23 dB for PM Type)			-	
Power Handling	200W 500W				
Return Loss	>45 dB				
Package Size	Φ17mm x 80 mm (Customized)				
Pigtail	2m Armor Cable, 2.5m PVC, 3m Fiber (Customized)				
Operating Temperature	0~75°C				
Storage Temperature	-40~85°C				

Note1: Other package dimension and optical performance can meet customer design.

Note2: These devices must be mounted on heat sink with good heat conduction.

Ordering Information

F E C

-

Fiber Type

20=MM-S200/220-22A
 22=MM-S400/440-22A
 47=Passive-25/250DC NA:0.07/0.46
 50=Passive-20/400DC NA:0.07/0.46

Special Code

001-999

High Power Cable-Laser Output Caput (QBH)

Features:

High Stripping Efficiency
Low Signal Loss and Beam Quality
Degradation
Mode Stripper is Used
Stable and Reliable

Application:

High Power Fiber Laser



➔ Specifications

Parameter	Specification
Port Configuration	Fiber In, Free-space out
Signal Wavelength	915nm, 1060nm, 1080nm
Input Fiber	20/400 0.06NA/0.46NA
Signal IL	<0.13 dB
Output Beam Ellipticity	>95% (for Single Mode Input.)
Power Handling	500W, 1000W, 2000W
Return Loss	>45 dB
Tensile Load	25 kg
Armored Length (B)	8m, 12m, 15m, 20m (Customized)
Fiber Length	2.2m
Operating Temperature	0~75°C
Storage Temperature	-40~85°C
Cooling Mode	Water Cooling

➔ Ordering Information

Q B H

Fiber Type

49=LMA-GDF-20/400-M NA:0.06/0.46
50=Passive-20/400DC NA:0.07/0.46

Special Code

001-999

FBT WDM

Wavelength Division Multiplexer 630/1060 nm





Specifications

Parameter	Specification	
Center Wavelength	630 nm & 1060 nm	
Band Width	± 10 nm	
Insertion Loss	≤ 0.8 dB	
Isolation	≥ 20 dB	
Return Loss	≥ 55 dB	
PDL	≤ 0.1 dB	
Operating & Storage Temperature	- 40° C ~ + 85° C	
Package Dimensions	Light Duty (B)	3.0mm (Φ) x 60.0mm (L)
	Medium Duty (L)	3.0mm (Φ) x 65.0mm (L)
	Heavy Duty (K, R)	100.0mm x 12.0mm x 8.0mm

Note1: All values specified are without connectors.

Note2: Higher performance specifications available upon request.

Ordering Information

W D M 7	-		-	P	-		-		-	
		Port Number 12: 1 x 2 22: 2 x 2		Grade P: Premium		Fiber Length 1: 1 meter 2: 2 meter S: Special		Pigtail Style (=Package style) B: bare fiber L: 900 μm loose tube K: 2mm cable R: 3mm cable		Connector 0: None 7: LC/UPC 1: FC/PC 8: LC/SPC 2: FC/APC 9: Special 3: SC/PC A: FC/UPC 4: SC/APC B: SC/UPC 5: FC/SPC C: ST 6: SC/SPC