Gooch & Housego
ENABLING PHOTONIC TECHNOLOGIES

FUSED PUMP SIGNAL WDM 980 nm

Fused Fiber WDM

DATASHEET

The Gooch & Housego fused pump signal WDM, 980 nm multiplexes signal and pump power in 980 nm, 960 nm or 1060 nm-pumped erbium doped fiber amplifiers.

G&H proprietary manufacturing technology provides uniquely low excess loss and wavelength dependence, along with low polarization and temperature dependence for all ports. The ultra-low loss of these components promotes high efficiency of use of pump power and low noise figure.

These high performance parts are available in many wavelength configurations, housing, fiber and connector options. They can therefore be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds. Wavelength configurations allow for 960 nm, 980 nm or 1060 nm pumping and C, L or C+L signal bands.

Reliability is assured through qualification to Telcordia GR-1221, with a field proven FIT rate of <1.

For the sub-miniature version of this product please refer to the sub-miniature pump signal WDM data sheet.

Key Features

- Promotes low amplifier noise figure
- Promotes low pump power wastage
- Ultra-low typical <0.05 dB excess loss
- Wide range of regular parts available
- High power handling
- <1 FITs

Applications

- C, L or C+L band EDFA
- 960, 980 or 1060 nm pump rejection
- Fiber lasers

Compliance

- Telcordia GR-1221

Optical Specifications

Wavelength		Grade	housing Option[5]	Available Fiber Type[5]	Insertion Loss[1] (dB)	WDL[2] (dB)	PDL[3] (dB)	TDL[4] (dB)	Isolation (dB)
Pump	Signal				Max	Max	Max	Max	Min
980 nm 960 nm	C band	P	3,4,5,6,7,C	2	0.08	0.04	0.02	0.02	20
980 nm 960 nm 1060 nm[6]	C band L band	A	2,3,4,5,6,7,C	2	0.10	0.07	0.02	0.02	20
	C band L band	M	2,3,4,5,6,7,C	2	0.10	0.07	0.02	0.02	18
	C band L band	N	2,3,4,5,6,7,C	2	0.15	0.10	0.02	0.02	18
	C band L band	B	2,3,4,5,6,7,C	2,5	0.20	0.10	0.02	0.02	16
980 nm	C+L band	P	3,4,5,6,7,C	2	0.25	0.20	0.02	0.02	16
980 nm	C+L band	A	2,3,4,5,6,7,C	2,5	0.40	0.30	0.02	0.02	14
980 nm	C+L band	B	2,3,4,5,6,7,C	2,5	0.50	0.40	0.05	0.05	10

1 Insertion loss over operating wavelength range (not including PDL, TDL or connector losses).

2 Change in insertion loss over the operating wavelength range.

3 Change in insertion loss over all input polarization states in signal wavelength range.

4 Change in insertion loss from -5 – +75°C.

5 Cross reference to ordering information table for available options.

6 1060 nm components not available in housing option 2 (miniature).

Parameter		Specification
Operating wavelength range	C band	1528-1563 nm
	C + L band	1528-1605 nm
	L band	1570-1605 nm
	960 nm	955-970 nm
	980 nm	970-990 nm
	1060 nm	1050-1070 nm
Return loss/directivity[1]		55 dB
Pigtail tensile load		5 N
Optical power handling[3,4]		4 W
Operating temperature range[2]		-40 – +75°C
Storage temperature range		-40 – +85°C
Environmental qualification		Telcordia GR 1221

1 Measured reference port P3 input for signal wavelength, P2 input for pump wavelength and P1 input for signal and pump wavelengths.

2 For connectorized component, operating temperature range is -5 – +75°C.

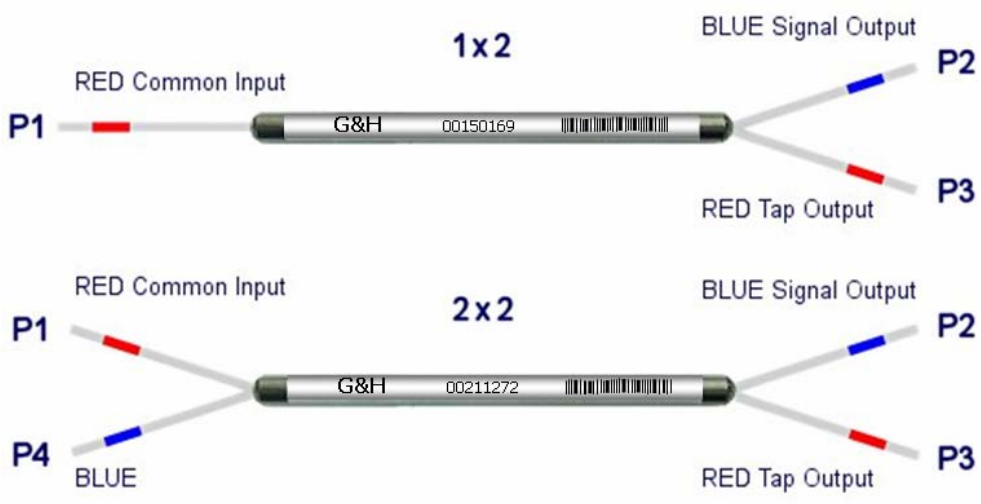
3 For operation at powers of greater than 4 W the component housing and fibre must be adequately heat-sunk (for additional information contact G&H sales). Components intended for high power operation are only available in the 2x2 configuration. Component performance and reliability under high power must be determined within the customer system.

4 The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

Housing Option

Housing Code	Description	Dimensions (mm)	Pigtail
2	Miniature	3.0 (∅) x 45 (L)	Primary-coated fiber
3	Regular	3.0 (∅) x 55 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (∅) x 65 (L)	∅0.9 mm loose-tube
5	Semi-ruggedized	5.0 (∅) x 80 (L)	∅0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	∅3.0 mm fan-out sleeving
7	High power	5 (W) x 5 (H) x 85 (L max)	Primary-coated fiber
C	Regular high power	3.0 (∅) x 55 (L)	Primary-coated fiber

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFW) followed by code letters or numbers, which correspond to available options.

Sample: FFW-5C31A2210 (Fused Fiber WDM, 980 nm pump, C band signal, regular housing, 1x2 port configuration, A grade, Lucent BF05635-02 fiber, 1 m pigtail, no connector).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	W	-						2			

①	**Pump wavelength**	980 nm	1060 nm	960 nm
	Code	5	8	F

②	**Signal wavelength**	C+L band	C band	L band
	Code	1	C	L

③	**Housing** [4,5]	Miniature	Regular	Semi-ruggedized slim	Semi-ruggedized	Fully-ruggedized	High power	Regular high power
	Code	2	3	4	5	6	7	C

④	**Port configuration** [5]	1x2	2x2
	Code	1	2

⑤	**Grade**	Grade P	Grade A	Grade M	Grade N	Grade B
	Code	P	A	M	N	B

⑦	**Fiber type**	Lucent BF05635-02	Coming HI 1060 Flex
	Code	2	5

⑧	**Pigtail length** [2]	0.5 m	1 m
	Code	0	1

⑨	**Connector** [3,4]	None	FC/PC	FC/APC	SC/APC	FC/UPC	SC/UPC	LC[1]
	Code	0	1	3	5	9	A	B

1 Not available for housing option 6.

2 Minimum pigtail length. Further pigtail lengths available on request. Where connectorized, pigtail length is to connector end face.

3 Insertion loss in specification table does not include connector losses.

4 Connectors may be fitted to housing types 4, 5 and 6. For connectorization of other housing types please contact the sales office.

5 7 & C not available as 1x2 port configuration.

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FUSED PUMP SIGNAL WDM 1480 nm

Fused Fiber WDM

DATASHEET

The Gooch & Housego fused pump signal WDM, 1480 nm multiplexes signal and pump power in 1480 nm-pumped erbium doped fiber amplifiers.

G&H proprietary manufacturing technology provides uniquely low excess loss, along with low polarization and temperature dependence for all ports.

These high performance parts are available in many wavelength configurations, housing, fiber and connector options. They can therefore be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds. Wavelength configurations are 1480 nm-C band and 1480 nm-L band.

Key Features

- Ultra-low typical <0.05 dB excess loss
- Wide range of regular parts available
- High power handling

Applications

- C or L-band pump/signal multiplexing
- 1480 nm pump rejection
- Fiber lasers

Optical Specifications

Wavelength		Grade	Insertion Loss[1] (dB)	WDL[2] (dB)	PDL[3] (dB)	TDL[4] (dB)	Isolation (dB)
Pump	**Signal**		**Max**	**Max**	**Max**	**Max**	**Min**
1480nm	C band L band	P	0.30	0.20	0.10	0.10	14
1480nm	C band L band	A	0.50	0.30	0.15	0.10	12

1 Insertion loss over operating wavelength range (not including PDL, TDL or connector losses).

2 Change in insertion loss over the operating wavelength range.

3 Change in insertion loss over all input polarization states in signal wavelength range.

4 Change in insertion loss from -5 – 75°C.

Parameter		Specification
Operating wavelength range	1480nm band	1475-1485 nm
	C band	1545-1555 nm
	L band	1580-1590 nm
Return loss/directivity[1]		55 dB
Pigtail tensile load		5 N
Optical power handling[3,4]		4 W
Operating/storage temperature range[2]		-40 – +75°C/-40 – +85°C

1 Measured reference port P3 input for signal wavelength, P2 input for pump wavelength and P1 input for signal and pump wavelengths.

2 For connectorized component, operating temperature range is -5 – +75°C.

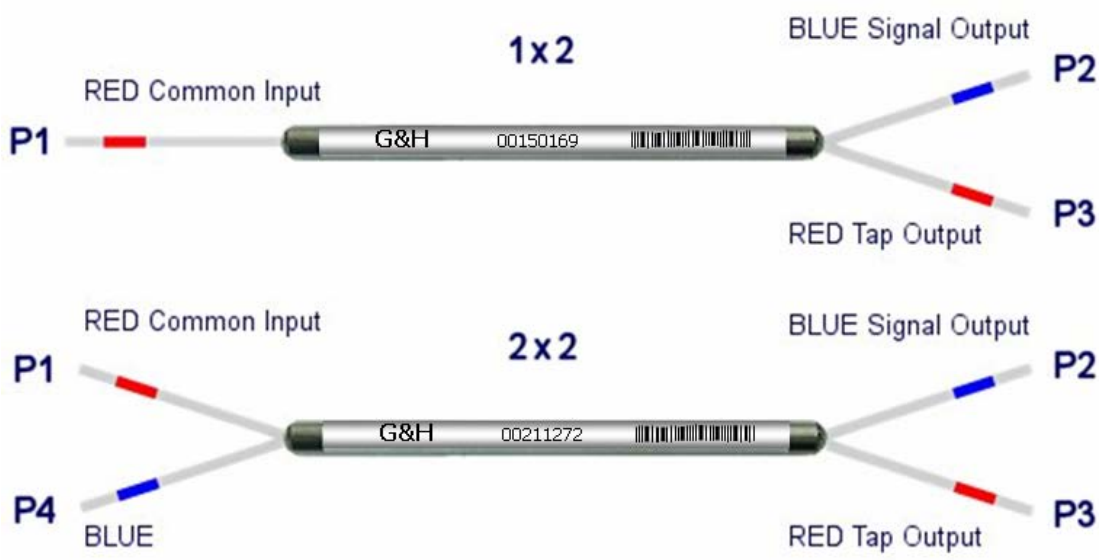
3 For operation at powers of greater than 4 W the component housing and fiber must be adequately heat-sunk (for additional information contact G&H sales). Components intended for high power operation are only available in the 2x2 configuration. Component performance and reliability under high power must be determined within the customer system.

4 The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

Housing Option

Housing Code	Description	Dimensions (mm)	Pigtail
3	Regular	3.0 (∅) x 55 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (∅) x 70 (L)	∅0.9 mm loose-tube
5	Semi-ruggedized	5.0 (∅) x 80 (L)	∅0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	∅3.0 mm fan-out sleeving
7	High power	5 (W) x 5 (H) x 85 (L max)	Primary-coated fiber
C	Regular high power	3.0 (∅) x 55(L)	Primary-coated fiber

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFW) followed by code letters or numbers, which correspond to available options.

Sample: FFW-3C31A2110 (Fused Fiber WDM, 1480 nm pump, C band signal, regular housing, 1x2, A grade, Coming SMF-28 fiber, 1 m pigtail length, no connector).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	W	-						2	1		

①	**Pump wavelength**	1480 nm					
	Code	3					
②	**Signal wavelength**	C band			L band		
	Code	C			L		
③	**Housing**[4,5]	Regular	Semi-ruggedized slim	Semi-ruggedized	Fully-ruggedized	High power	Regular high power
	Code	3	4	5	6	7	C
④	**Port configuration**[5]	1x2			2x2		
	Code	1			2		
⑤	**Grade**	Grade P			Grade A		
	Code	P			A		
⑦	**Fiber type**	Corning SMF-28					
	Code	1					
⑧	**Pigtail length**[2]	0.5 m			1 m		
	Code	0			1		

⑨	**Connector**[3,4]	None	FC/PC	FC/APC	SC/APC	FC/UPC	SC/UPC	LC[1]
	Code	0	1	3	5	9	A	B

1 Not available for housing option 6.

2 Minimum pigtail length. Further pigtail lengths available on request. Where connectorized, pigtail length is to connector end face.

3 Insertion loss in specification table does not include connector losses.

4 Connectors may be fitted to housing types 4, 5 and 6. For connectorization of other housing types please contact the sales office.

5 7 & C not available as 1x2 port configuration.

For further information

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SUBMINIATURE PUMP SIGNAL WDM

Fused Fiber Coupler

DATASHEET

The subminiature pump signal WDM provides low loss multiplexing of pump and signal in an ultra-short 32 mm length package.

Designed for space constrained optical amplifiers, the product is manufactured using ø80 µm cladding fiber. This enables low fiber bend radius without compromising mechanical integrity.

Gooch & Housego proprietary manufacturing technology provides uniquely low insertion loss for signal and pump paths. This promotes low noise figure and the efficient use of pump power in optical amplifiers.

Standard wavelengths of operation are based on 980 nm pumping and C, L or C+L signal bands. However many other wavelength combinations are available for diverse requirements such as sensing, fiber lasers and fiber Gyros. Do not hesitate to contact us with your specific requirements.

Reliability is assured through qualification to Telcordia GR-1221.

Key Features

- 32 mm package length
- ø80 µm cladding fiber
- C, L or C+L signal bands
- Ultra-low typical <0.05dB excess loss
- High power handling
- Proven reliability

Applications

- Miniature optical amplifiers
- Miniature modules
- Fiber Gyros
- Fiber lasers
- Sensors

Compliance

- Telcordia GR-1221

Optical Specifications

Wavelength		Grade	Available Fiber Type Option[5]	Insertion Loss (dB)[1]	WDL (dB)[2]	PDL (dB)[3]	TDL (dB)[4]	Isolation (dB)
Pump	Signal			Max	Max	Max	Max	Min
980nm	C band L band	M	4	0.10	0.07	0.02	0.02	18
		N	4	0.15	0.10	0.02	0.02	18
		B	4,9	0.20	0.10	0.02	0.02	16
980nm	C+L band	B	4,9	0.50	0.40	0.02	0.02	10

1 Insertion loss over operating wavelength range (not including PDL and TDL).

2 Change in insertion loss over the operating wavelength range.

3 Change in insertion loss over all input polarization states in signal wavelength range.

4 Change in insertion loss from -5 – 75°C.

5 Cross reference to ordering information table for available options.

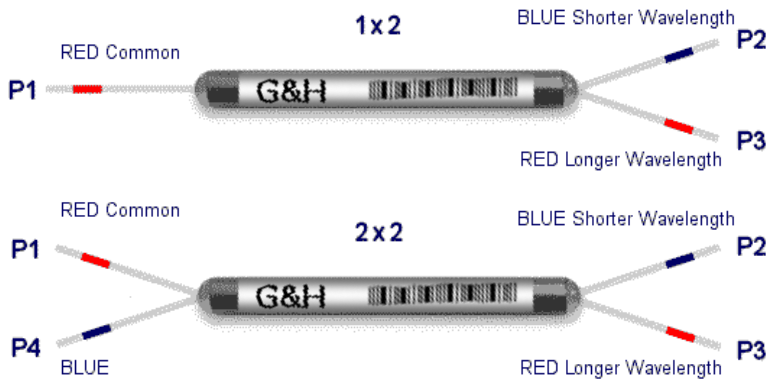
Parameter		Specification
Operating wavelength range[1]	C band	1528-1563 nm
	C + L band	1528-1605 nm
	L band	1570-1605 nm
	980 nm	970-990 nm
Return loss/directivity[1]		55 dB
Pigtail tensile load		5 N
Optical power handling		4 W
Operating/storage temperature range		-40 – +75°C/-40 – +85°C
Environmental qualification		Telcordia GR 1221

1 Measured reference port P3 input for signal wavelength, P2 input for pump wavelength and P1 input for signal and pump wavelengths.

Housing Option

Housing Code	Description	1x2, 2x2 Dimensions (mm)	Pigtail
1	Subminiature	3.0 (∅) x 32 (L)	Primary-coated fiber, 80 µm cladding

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFW) followed by code letters or numbers, which correspond to available options.

Sample: FFW-5C11M2410 (Fused Fiber WDM, 980 nm pump, C band signal, subminiature housing, 1x2, M grade, ø80 µm cladding fiber (980 nm), 1 m pigtail, no connector).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	W	-	5		1			2			0

①	**Pump wavelength**	980 nm		
	Code	5		
②	**Signal wavelength**	C+L band	C band	L band
	Code	1	C	L
③	**Housing**	Subminiature		
	Code	1		
④	**Port configuration**	1x2	2x2	
	Code	1	2	
⑤	**Grade**	Grade M	Grade N	Grade B
	Code	M	N	B
⑦	**Fiber type**	ø80 µm cladding fiber (980 nm)	ø80 µm cladding high NA fiber (980 nm)	
	Code	4	9	
⑧	**Pigtail length**[1]	0.5 m	1 m	
	Code	0	1	
⑨	**Connector**	None		
	Code	0		

1 Minimum pigtail length. Further pigtail lengths available on request.

Other products which may be of interest

- HI REL couplers
- High power multimode combiners
- Combiners with all types of signal feedthrough fiber
- Ultra-low ratio tap couplers
- WDMs for combining signals with red pointer lasers
- OCT wideband couplers