

FUSED COUPLER C OR L BAND

Fused Fiber Coupler

DATASHEET

The fused coupler, C or L band enables the accurate splitting and monitoring of optical signals in single-mode fiber.

Gooch & Housego proprietary manufacturing technology provides uniquely low excess loss and wavelength dependence, along with low polarization and temperature dependence for both signal and tap ports.

These high performance parts are available in a wide variety of tap ratios, wavelength ranges, housings and connector options. They can therefore be readily specified in a wide variety of applications. Enabling rapid design cycles and new project builds.

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



Key Features

- Ultra-low, typically <0.05 dB excess loss
- Low wavelength dependence
- Any coupling ratio available
- High power handling
- Proven reliability
- <1 FITs

Applications

- Signal monitoring in C or L band EDFA
- Also available at 1310 nm and 1480 nm
- Network monitoring
- Network expansion
- Fixed attenuation

Compliance

- Telcordia GR-1221



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Optical Specifications

Coupling Ratio	Grade	Signal Path				Tap Path					
		Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)	Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)
Example ⁷		Min	Max	Max	Max	Max	Min	Max	Max	Max	Max
1%	P		0.15	0.03	0.03	0.02	18.4	21.2	0.25	0.20	0.20
1%	A		0.18	0.05	0.05	0.02	17.6	22.4	0.35	0.25	0.20
2%	P		0.18	0.03	0.03	0.02	16.0	17.8	0.22	0.15	0.15
2%	A		0.20	0.05	0.05	0.02	15.2	18.2	0.30	0.20	0.15
3%	P		0.23	0.03	0.03	0.04	14.3	16.0	0.18	0.14	0.15
3%	A		0.28	0.05	0.05	0.04	13.8	17.0	0.26	0.20	0.15
5%	P		0.32	0.03	0.03	0.08	12.2	13.9	0.15	0.12	0.15
5%	A		0.40	0.05	0.05	0.08	11.9	14.4	0.20	0.20	0.15
10%	P		0.60	0.05	0.04	0.08	9.6	10.8	0.13	0.10	0.13
10%	A		0.70	0.06	0.06	0.08	9.2	11.2	0.18	0.15	0.13
50%	P	2.80	3.20 ⁶	0.10	0.08	0.10	2.8	3.2	0.10	0.08	0.10
50%	A	2.70	3.40	0.15	0.10	0.10	2.7	3.4	0.15	0.10	0.10

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

2 In 2x2 couplers insertion loss is not specified for launch through the second input port, P4 (coloured blue).

3 Change in insertion loss over the operating wavelength range.

4 Change in insertion loss over all input polarization states at band center wavelength.

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

6 Housing option 2 (miniature) insertion loss 2.8/3.30 dB.

7 Any coupling ratio available - contact G&H for specification of coupling ratios not listed.

Parameter	Specification	
Operating wavelength range ¹	C Band	1528-1563 nm
	L Band	1570-1605 nm
	1310 Band	1295-1325 nm
	1480 Band	1465-1495 nm
Return loss/directivity ²	55 dB	
Pigtail tensile load	5 N	
Optical power handling ^{4,5}	4 W	
Operating/storage temperature range ³	-40 - +75°C / -40 - +85°C	
Environmental qualification	Telcordia GR 1221	

- 1 For wavelengths within ± 5 nm of the specified range performance will be maintained for signal path insertion loss, PDL, TDL, directivity and return loss. The only parameters to increase will be tap insertion loss and WDL. Maximum values of increase for both parameters are 0.1 dB for 1% tap, 0.07 dB for 2-9%, 0.05 dB for 10-50%.
- 2 Return loss is the ratio of power launched to power reflected for port P1. Directivity for the 2x2 component is the ratio of power launched to P1 to the power reflected to P4.
- 3 For connectorized component, operating temperature range is -5 - +75°C.
- 4 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.
- 5 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 (Ø) x 45 (L)	Primary-coated fiber
3	Regular	3.0 (Ø) x 50 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (Ø) x 60 (L)	Ø 0.9 mm loose-tube
5	Semi-ruggedized	5.0 (Ø) x 75 (L)	Ø 0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	Ø 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 (Ø) x 50 (L)	Primary-coated fiber

Configuration



Order code

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

Sample: FFC-CK31PB110 (Fused fiber coupler, C band, 50% coupling ratio, regular housing, 1x2 port configuration, P grade, coming SMF-28, 1 m pigtail length, no connectors).

Order code	①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-			B			
① Passband	C band		L band		1310 nm band		1480 nm band		
Code	C		L		4		3		
② Coupling ratio⁴	1%	2%	3%	5%	10%	50%			
Code	1	2	3	5	A	K			
③ Housing^{5,6}	Miniature	Regular	Semi-ruggedized slim	Semi-ruggedized	Fully-ruggedized	High power	Regular high power		
Code	2	3	4	5	6	7	C		
④ Port configuration⁶	1x2				2x2				
Code	1				2				
⑤ Grade	Grade A					Premium			
Code	A					P			
⑦ Fiber type	Corning SMF-28								
Code	1								
⑧ Pigtail length²	0.5 m				1 m				
Code	0				1				
⑨ Connector^{3,5}	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 Any coupling ratio available - contact G&H for specification and ordering codes of coupling ratios not listed.

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

6 7 & C not available as 1x2 port configuration.

For further information

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FUSED COUPLER C OR L BAND



FUSED COUPLER C+L OR S BAND

Fused Fiber Coupler

DATASHEET

The fused couplers, C+L or S band enables the accurate splitting and monitoring of optical signals in single mode fiber.

Gooch & Housego proprietary manufacturing technology provides uniquely low excess loss and wavelength dependence, along with low polarization and temperature dependence for both signal and tap ports.

These high performance components are available in a wide variety of tap ratios, wavelength ranges, housings and connector options. Devices can be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds.

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 datasheet sub-miniature tap couplers.



Key Features

- Ultra-low typical <0.05 dB excess loss
- Low wavelength dependence
- Any coupling ratio available
- High power handling
- Proven reliability
- < 1 FITs

Applications

- Signal monitoring in C+L band EDFA or RAMAN amplifier.
- Network monitoring
- Network expansion
- Fixed attenuation

Compliance

- Telcordia GR-1221



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Optical Specifications

Coupling Ratio	Grade	Signal Path				Tap Path					
		Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)	Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)
Example ⁷		Min	Max	Max	Max	Max	Min	Max	Max	Max	Max
1%	P		0.15	0.04	0.03	0.02	18.2	23.0	0.90	0.20	0.20
1%	A		0.18	0.06	0.05	0.02	17.4	23.0	1.20	0.25	0.20
2%	P		0.18	0.05	0.03	0.02	16.0	18.6	0.60	0.15	0.15
2%	A		0.20	0.07	0.05	0.02	15.2	20.0	1.00	0.20	0.15
3%	P		0.23	0.05	0.03	0.04	14.2	16.5	0.50	0.14	0.15
3%	A		0.28	0.07	0.05	0.04	13.7	17.4	0.90	0.20	0.15
5%	P		0.32	0.06	0.03	0.08	12.1	14.3	0.45	0.12	0.15
5%	A		0.40	0.08	0.05	0.08	11.8	14.8	0.80	0.20	0.15
10%	P		0.60	0.07	0.04	0.08	9.4	11.1	0.40	0.10	0.13
10%	A		0.70	0.09	0.06	0.08	9.0	11.4	0.60	0.15	0.13
50%	P	2.65	3.35 ⁶	0.25	0.08	0.10	2.7	3.3	0.25	0.08	0.10
50%	A	2.60	3.50	0.40	0.10	0.10	2.6	3.5	0.40	0.10	0.10

- 1 Insertion loss over operating wavelength range (not including PDL, TDL or connector losses).
- 2 In 2x2 couplers insertion loss is not specified for launch through second input port P4 (coloured blue).
- 3 Change in insertion loss over the operating wavelength range.
- 4 Change in insertion loss over all input polarization states at band center wavelength.
- 5 Change in insertion loss from -5 - +75°C.
- 6 Housing option 2 (miniature) insertion loss 2.65/3.40 dB.
- 7 Any coupling ratio available - contact G&H for specification of coupling ratios not listed.

Parameter	Specification	
Operating wavelength range ¹	C+L band	1528-1605 nm
	S band	1425-1500 nm
Return loss/directivity ²	55 dB	
Pigtail tensile load	5 N	
Optical power handling ^{4,5}	4 W	
Operating/storage temperature range ³	-40 to +75°C / -40 to +85°C	
Environmental qualification	Telcordia GR 1221	

- 1 For wavelengths within ± 5 nm of the specified range performance will be maintained for signal path insertion loss, PDL, TDL, directivity and return loss. The only parameters to increase will be tap insertion loss and WDL. Maximum values of increase for both parameters are 0.15 dB for 1% tap, 0.10 dB for 2-9%, 0.08 dB for 10-50%.
- 2 Return loss is the ratio of power launched to power reflected for port P1. Directivity for the 2x2 component is the ratio of power launched to P1 to the power reflected to P4.
- 3 For connectorized component, operating temperature range is -5 - +75°C.
- 4 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.
- 5 The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

FUSED FIBER C+L OR S BAND

Housing Option

Housing Code	Description	Dimensions (mm)	Pigtail
2	Miniature	3.0 (Ø) x 45 (L)	Primary-coated fiber
3	Regular	3.0 (Ø) x 50 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (Ø) x 60 (L)	Ø0.9 mm loose-tube
5	Semi-ruggedized	5.0 (Ø) x 75 (L)	Ø0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	Ø3.0 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 (Ø) x 50 (L)	Primary-coated fiber

Configuration



Order code

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

Sample: FFC-1231PB110 (C+L Band, 2% tap, regular housing, 1x2 port configuration, premium grade, SMF-28 fiber, 1 m pigtail, no connector).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-						B			
①	Passband			C+L band				S band				
	Code			1				S				
②	Coupling ratio⁴			1%	2%	3%	5%	10%	50%			
	Code			1	2	3	5	A	K			
③	Housing^{5,6}			Miniature	Regular	Semi-ruggedized slim	Semi-ruggedized	Fully-ruggedized	High power	Regular high power		
	Code			2	3	4	5	6	7	C		
④	Port configuration⁶			1x2				2x2				
	Code			1				2				
⑤	Grade			Grade A				Premium				
	Code			A				P				
⑦	Fiber type			Corning SMF-28								
	Code			1								
⑧	Pigtail length²			0.5 m				1 m				
	Code			0				1				
⑨	Connector^{3,5}			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 Any coupling ratio available - contact G&H for specification and ordering codes of coupling ratios not listed.

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

6 7 & C not available as 1x2 port configuration.

For further information

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FUSED FIBER C+L OR S BAND

SUB-MINIATURE TAP COUPLER

Fused Fiber Coupler

DATASHEET

The sub-miniature tap coupler provides low loss splitting and monitoring in an ultra-short 32 mm length package.

Designed for space constrained applications, the product is manufactured using $\varnothing 80 \mu\text{m}$ cladding fiber. This enables low fiber bend radius within modules, without compromising mechanical integrity.

Standard wavelengths of operation are the C, L, C+L or S bands for fiber amplifier applications. Many other wavelengths are available for 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
- $\varnothing 80 \mu\text{m}$ cladding fiber
- 1/99 - 50/50 coupling ratio
- Ultra-low (typical $< 0.5 \text{ dB}$) excess loss
- High power handling
- Proven reliability

Applications

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

Compliance

- Telcordia GR-1221

Optical Specifications

C or L band

Coupling Ratio	Grade	Signal Path					Tap Path				
		Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)	Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)
Example ⁶		Min	Max	Max	Max	Max	Min	Max	Max	Max	Max
1%	A		0.18	0.05	0.05	0.02	17.6	22.4	0.35	0.25	0.20
2%	A		0.20	0.05	0.05	0.02	15.8	18.2	0.30	0.20	0.15
3%	A		0.28	0.05	0.05	0.04	13.8	17.0	0.26	0.20	0.15
5%	A		0.40	0.05	0.05	0.08	11.9	14.4	0.20	0.20	0.15
10%	A		0.70	0.06	0.06	0.08	9.2	11.2	0.18	0.15	0.13
50%	A	2.70	3.40	0.15	0.10	0.10	2.7	3.4	0.15	0.10	0.10

C+L or S band

Coupling Ratio ⁶	Grade	Signal Path					Tap Path				
		Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)	Insertion Loss ^{1,2} (dB)		WDL ³ (dB)	PDL ⁴ (dB)	TDL ⁵ (dB)
Example ⁶		Min	Max	Max	Max	Max	Min	Max	Max	Max	Max
1%	A		0.18	0.06	0.05	0.02	17.4	23.0	1.20	0.25	0.20
2%	A		0.20	0.07	0.05	0.02	15.2	20.0	1.00	0.20	0.15
3%	A		0.28	0.07	0.05	0.04	13.7	17.4	0.90	0.20	0.15
5%	A		0.40	0.08	0.05	0.08	11.8	14.8	0.80	0.20	0.15
10%	A		0.70	0.09	0.06	0.08	9.0	11.4	0.60	0.15	0.13
50%	A	2.60	3.50	0.40	0.10	0.10	2.6	3.5	0.40	0.10	0.10

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

2 In 2x2 couplers insertion loss is not specified for launch through second input port P4 (coloured blue).

3 Change in insertion loss over the operating wavelength range.

4 Change in insertion loss over all input polarization states at band center wavelength.

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

6 Any coupling ratio available – contact G&H for specification of coupling ratios not listed.

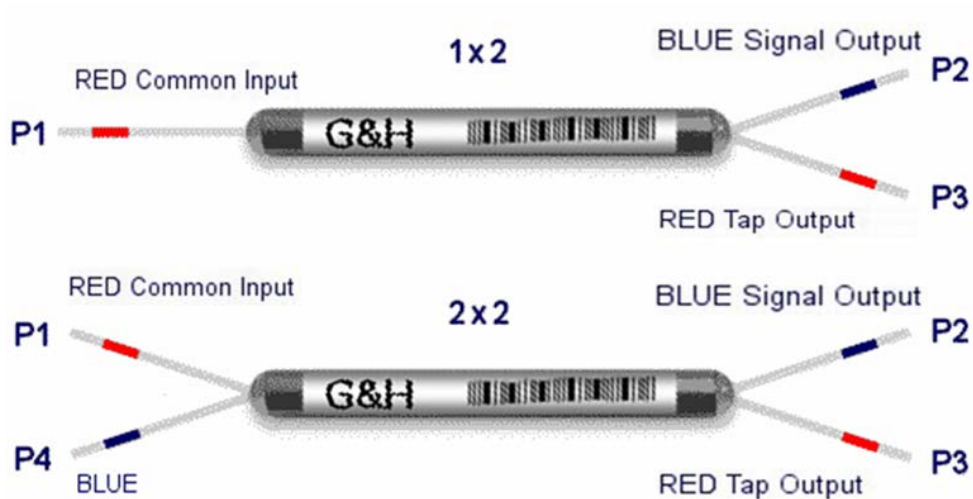
Parameter	Specification	
Operating wavelength range	C	1528-1563 nm
	L	1570-1605 nm
	C+L Band	1528-1605 nm
	S Band	1425-1500 nm
Return loss/directivity ¹	55 dB	
Pigtail tensile load	5 N	
Optical power handling	4 W	
Operating/storage temperature range	-40 to +75 °C / -40 to +85 °C	
Environmental qualification	Telcordia GR 1221	

¹ Return loss is the ratio of power launched to power reflected for port P1. Directivity for the 2x2 component is the ratio of power launched to P1 to the power reflected to P4.

Housing Option

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

Configuration



Order code

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

Sample: FFC-C211AB310 (C Band, 2% tap, sub-miniature housing, 1x2 port configuration, A grade, Ø 80 µm cladding fiber, 1 m pigtails, no connector).

Order code	①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-		1	A	B		0
① Passband	C band		L band		C+L band		S band		
Code	C		L		1		S		
② Coupling ratio²	1%	2%	3%	5%	10%	50%			
Code	1	2	3	5	A	K			
③ Housing	Subminiature								
Code	1								
④ Port configuration	1x2				2x2				
Code	1				2				
⑤ Grade	Grade A								
Code	A								
⑦ Fiber type	Ø 80 µm cladding fiber				Ø 80 µm cladding high NA fiber				
Code	3				8				
⑧ Pigtail length¹	0.5 m				1 m				
Code	0				1				
⑨ Connector	None								
Code	0								

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

² Any coupling ratio available - contact G&H for specification and ordering codes of coupling ratios not listed.



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SUB-MINIATURE TAP COUPLER



DUAL WINDOW COUPLER

Fused Fiber Coupler

DATASHEET

Gooch & Housego's dual window coupler provides new levels of performance and reliability for two-window couplers.

The coupler enables coupling and splitting simultaneously over the 1310 nm and 1550 nm windows.

Within optical networks the ultra-low insertion loss of the wideband coupler makes it easier to meet stringent optical power budgets. Furthermore the component is designed for high reliability and low FIT rates, through robust fusion and advanced component packaging.

Components are available in a variety of package styles to suit a wide range of applications, including optical networking. Wavelengths other than 1310/1550 nm are also available as a custom product. Please contact us to discuss your specific requirements.



Key Features

- 1310 nm and 1550 nm operation
- High performance
- ± 20 nm bandwidth in each window
- Consistently reliable
- Low loss

Applications

- Optical networking
- Passive optical networks
- CATV
- Undersea systems



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Optical Specifications

Coupling Ratio	Grade	Signal Path			Tap Path		
		Insertion Loss ^{1,2} (dB)		PDL ³ (dB)	Insertion Loss ^{1,2} (dB)		PDL ³ (dB)
Example ⁴		Min	Max	Max	Min	Max	Max
5%	P	-	0.4	0.10	11.9	14.7	0.35
5%	A	-	0.5	0.10	11.6	15.3	0.35
10%	P	-	0.7	0.10	9.1	11.2	0.30
10%	A	-	0.8	0.10	8.9	11.5	0.30
33%	P	-	2.1	0.15	4.4	5.5	0.20
33%	A	-	2.2	0.15	4.3	5.7	0.20
50%	P	2.6	3.5	0.15	2.7	3.4	0.15
50%	A	2.6	3.6	0.20	2.6	3.6	0.20

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

² In 2x2 couplers insertion loss is not specified for launch through second input port P4 (coloured blue).

³ Change in insertion loss over all input polarisation states at band centre wavelength.

⁴ Any coupling ratio available - contact G&H for specification of coupling ratios not listed.

Parameter	Specification
Operating wavelength range	1310/1550 nm 1310±20 nm and 1550±20 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

¹ Return loss is the ratio of power launched to power reflected for port P1. Directivity for the 2x2 component is the ratio of power launched to P1 to the power reflected to P4.

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 (Ø) x 50 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (Ø) x 60 (L)	Ø0.9 mm loose-tube
5	Semi-ruggedized	5.0 (Ø) x 75 (L)	Ø0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	Ø3.0 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 (Ø) x 50 (L)	Primary-coated fiber

Configuration



Order code

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

Sample: FFC-AE41A113 (Fused fibre dual band coupler, 33% tap coupling ratio, semi-ruggedized slim housing, 1x2 port configuration, A grade, corning SMF-28, 1 m pigtail lengths, FC/APC connectors).

Order code	①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-					B	
① Passband	A								
Code	1310/1550 nm								
② Coupling ratio⁵	5%		10%		33%		50%		
Code	5		A		E		K		
③ Housing^{4,6}	Regular	Semi-ruggedized slim	Semi-ruggedized	Fully-ruggedized	High power	Regular high power			
Code	3	4	5	6	7	C			
④ Port configuration⁶	1x2				2x2				
Code	1				2				
⑤ Grade	Grade A				Grade B				
Code	A				B				
⑦ Fiber type	Corning SMF-28								
Code	1								
⑧ Pigtail length²	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. To request connectors fitted to other housings please contact the sales office.

5 Any coupling ratio available - contact G&H for specification and ordering codes of coupling ratios not listed.

6 7 & C not available in 1x2 port configuration.

For further information

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DUAL BAND COUPLER

FUSED COUPLER 980 nm

Fused Fiber Coupler

DATASHEET

The Gooch & Housego fused coupler, 980 nm enables the accurate splitting and monitoring of pump power in 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 a wide variety of tap ratios, housing and connector options and can therefore be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds. Standard variants for 960 nm and 1060 nm may also be selected.

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 contact the sales office.



Key Features

- Ultra-low pump loss
- Minimum wastage of pump power
- High EDFA output power
- 960 nm and 1060 nm also available
- < 1 FITs

Applications

- EDFA pump redundancy and sharing
- EDFA pump monitoring
- Sensors

Compliance

- Telcordia GR-1221

Optical Specifications

Coupling Ratio	Grade	Signal Path			Tap Path		
		Insertion Loss ^{1,2} (dB)		TDL ³ (dB)	Insertion Loss ^{1,2} (dB)		TDL ³ (dB)
Example ⁴		Min	Max	Max	Min	Max	Max
1%	P		0.15	0.02	18.4	21.5	0.20
1%	A		0.20	0.02	15.0	22.0	0.20
5%	P		0.40	0.08	11.3	14.8	0.15
5%	A		0.50	0.08	11.0	15.2	0.15
10%	P		0.65	0.08	9.0	11.5	0.13
10%	A		0.75	0.08	8.5	11.8	0.13
20%	P		1.40	0.10	5.6	8.4	0.10
20%	A		1.50	0.10	5.4	8.6	0.10
30%	P		2.00	0.10	4.1	6.4	0.10
30%	A		2.20	0.10	4.0	6.5	0.10
40%	P		2.60	0.10	3.2	4.7	0.10
40%	A		2.80	0.10	3.1	4.8	0.10
50%	P	2.60	3.40	0.10	2.6	3.4	0.10
50%	A	2.50	3.60	0.10	2.5	3.6	0.10

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

² In 2x2 couplers, insertion loss is not specified for launch through second input port P4 (coloured blue).

³ Change in insertion loss from -5 - +75°C.

⁴ Any coupling ratio available - contact G&H for specification of coupling ratios not listed.

Parameter	Specification	
Operating wavelength range	960 nm	955-965 nm
	980 nm	975-985 nm
	1060 nm	1055-1065 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	
Environmental qualification	Telcordia GR 1221	

¹ Return loss is the ratio of power launched to power reflected for port P1. Directivity for the 2x2 component is the ratio of power launched to P1 to the power reflected to P4.

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 (Ø) x 45 (L)	Primary-coated fiber
3	Regular	3.0 (Ø) x 50 (L)	Primary-coated fiber
4	Semi-ruggedized slim	3.0 (Ø) x 60 (L)	Ø 0.9 mm loose-tube
5	Semi-ruggedized	5.0 (Ø) x 75 (L)	Ø 0.9 mm loose-tube
6	Fully-ruggedized	80 (L) x 10 (W) x 8 (H)	Ø 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 (Ø) x 50 (L)	Primary-coated fiber

Configurations



Order code

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

Sample: FFC-5541P513 (Fused fiber coupler, 980 nm wavelength, 5% tap coupling ratio, semi-ruggedized slim housing, 1x2 port configuration, P grade, Coming HI 1060 Flex, 1 m pigtail length, FC/APC connectors).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-						N			
①	Passband			980 nm			1060 nm			960 nm		
	Code			5			8			F		
②	Coupling ratio			1%	5%	10%	20%	30%	40%	50%		
	Code			1	5	A	C	E	H	K		
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 configuration⁵			1x2				2x2				
	Code			1				2				
⑤	Grade			Grade A					Premium			
	Code			A					P			
⑦	Fiber type			Lucent BF05635-02					Corning HI 1060 Flex			
	Code			2					5			
⑧	Pigtail length²			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 values in specification table do not include connector loss.

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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FUSED COUPLER 980 nm

SINGLE FUSE COUPLER 1X3, 3X3, 1X4, 4X4

Fused Fiber Coupler

DATASHEET

The single fuse coupler provides optical splitting and combining for > 2 ports.

A single low loss fusion takes place to produce 1x3, 3x3, 1x4 and 4x4 couplers in a single cylindrical package.

Standard versions of these components are available optimized for 980, 1310, 1480, 1550 or 1585 nm wavelengths. These may be used in a wide variety of applications including optical network expansion.

Single fuse couplers, by virtue of their phase properties, are also ideal for use in fiber Gyros. Versions are available with ultra-compact housings and $\varnothing 80 \mu\text{m}$ cladding fiber pigtails, directly compatible with Gyro sensing loops. Low loss ensures optimal Gyro sensitivity.

These Gyro-optimized single fuse couplers are available on a custom basis. Please contact us for a specification tailored to your requirements.



Key Features

- Single low loss fusion
- 1x3, 3x3, 1x4, 4x4
- Standard product for network expansion
- $\varnothing 80 \mu\text{m}$ cladding fiber capability
- Custom designs for Gyro applications

Applications

- Optical network expansion
- Fiber Gyros
- Sensors
- Research

Optical Specifications¹

Parameter	Specification							
Operating wavelength	980, 1310, 1480, 1550 or 1585 nm							
Port configuration	1x3		3x3		1x4		4x4	
Coupling ratio	33/33/33%		33/33/33%		25/25/25/25%		25/25/25/25%	
Grade	A	B	A	B	A	B	A	B
Maximum insertion loss ²	5.7 dB	6.2 dB	6.2 dB	6.5 dB	7.0 dB	7.8 dB	8.0 dB	8.6 dB
Return loss/directivity	50 dB							
Pigtail tensile load	5 N							
Optical power handling	4 W							
Operating temperature ³	-40 - +75°C							
Storage temperature	-40 - +85°C							
Fiber type	Corning SMF-28 ⁴ or 980 nm fiber ⁵							

¹ All specifications are preliminary.

² Insertion loss (not including PDL, TDL or any connector losses).

³ For connectorized component, operating temperature range is -5 - +75°C.

⁴ Custom designs using Ø80 µm fiber for Gyro applications are available. Please contact the sales office for further information.

⁵ For 980 nm component.

Housing Option

Housing Code	Description	Dimensions (mm)		Pigtail
3	Regular	1x3, 3x3	3.0 (Ø) x 55 (L)	Primary-coated fiber
		1x4, 4x4	3.0 (Ø) x 71 (L)	

Order code

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

Sample: FFC-CF35AN110 (1550 nm, 33%, regular housing, 3x3 port configuration, A grade, Corning SMF-28 fiber, 1 m pigtail lengths, no connectors).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-						N			
①	Passband			1550 nm	1585 nm		1310 nm		1480 nm			
	Code			C	L		4		3			
②	Coupling ratio	25% (Nx4)				33% (Nx3)						
	Code	D				F						
③	Housing	Regular										
	Code	3										
④	Port configuration	1x3		3x3		1x4		4x4				
	Code	3		5		6		9				
⑤	Grade	Grade A				Grade B						
	Code	A				B						
⑦	Fiber type³	Corning SMF-28				980 nm fiber ⁴						
	Code	1				2						
⑧	Pigtail length¹	0.5 m				1 m						
	Code	0				1						
⑨	Connector²	None										
	Code	0										

¹ Minimum pigtail length. Further pigtail lengths available on request. Where connectorized, pigtail length is to connector end face.

² For connectorization of this component please contact the sales office.

³ Custom designs using Ø80 nm fiber for Gyro applications are available. Please contact the sales office for further information.

⁴ For 980 nm components only.



For further information

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SINGLE FUSE COUPLER 1X3, 3X3, 1X4, 4X4

FUSED COUPLER FOR 2 μm OPERATION

Fused Fiber Coupler

DATASHEET

Gooch & Housego's fused coupler range has been expanded to include the 2 μm operating window.

The G&H fused coupler enables the accurate splitting and monitoring of optical signals in single mode fiber. G&H proprietary manufacturing technology provides uniquely low excess loss and wavelength dependence, along with low polarization and temperature dependence for both signal and tap ports.

The all fiber construction offers excellent reliability and high power handling characteristics.

These high performance parts are available in a wide variety of tap ratios, wavelengths, housings and connector options. Components can be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds.



Key Features

- Any coupling ratio available
- Low Loss
- Low PDL (by design)
- High power handling
- Custom product key

Applications

- Telecoms
- Instrumentation
- IR Imaging
- Biomedical
- Industrial
- Defence
- IR Counter measures



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Typical Optical Specifications⁴

Coupling Ratio (%) ³	Available Wavelength (nm) ⁵	Coupling Ratio Tolerance (%) ^{1,2}	Excess Loss (dB) ^{1,2,6}
1	1900 - 2199	±0.5	0.20
5	1900 - 2199	±1.5	0.20
10	1900 - 2199	±3.0	0.20
20	1900 - 2199	±4.0	0.25
30	1900 - 2199	±4.0	0.25
40	1900 - 2199	±5.0	0.30
50	1900 - 2199	±5.0	0.30

1. In 2x2 couplers performance through second input port P4 (coloured blue) not measured.
2. Maximum limit at center wavelength. Not including TDL, PDL or connector losses.
3. Any coupling ratio available. Please contact us for specifications of coupling ratios not listed.
4. Custom specifications, including 1700 nm and 1800 nm windows and wavelength flattened available on request.
5. Performance specified for center wavelength, selected from within the available range.
6. Based on 1 m pigtails at 1900 nm, fiber IR absorption leads to higher losses for longer wavelengths and fiber pigtail lengths. Example: Additional fiber loss ranges from 0.0075 dB/m at 1901 nm to 0.20 dB/m at 2199 nm.

Parameter	Specification
Operating wavelength	Specified wavelength within the range 1900 - 2199 nm
Operating/storage temperature range ¹	-40 - +75°C/-40 - + 85°C
Optical power handling ^{2,3}	4 W
Pigtail tensile load	5 N
Fiber type	Speciality single mode fiber

- 1 For connectorized component, operating temperature range is -5 - +75°C.
- 2 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.
- 3 The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

Housing Options

Housing Code	Description	1x2, 2x2 Dimensions (mm)	Pigtail
3	Regular	3.0 (Ø) x 60 (L max)	Primary-coated fiber
7	High power	5 (W) x 5 (H) x 85 (L max)	Primary-coated fiber
C	Regular high power	3.0 (Ø) x 60 (L max)	Primary-coated fiber

Configuration



Order code

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

Sample: FFC-ZK3150200 (Fused fiber coupler, 2050 nm center wavelength, 50/50 coupling ratio, regular housing, 1x2 port configuration, SM1950 fiber, 0.5 m pigtail length, no connectors).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	C	-									
①	Passband			17XX nm	18XX nm	19XX nm	20XX nm	21XX nm				
	Code			V	W	Y	Z	T				
②	Coupling ratio³			1%	2%	3%	5%	10%	50%			
	Code			1	2	3	5	A	K			
③	Housing^{4,5}			Regular		High power		Regular high power				
	Code			3		7		C				
④	Port configuration⁶			1x2			2x2					
	Code			1			2					
⑤	Last two digits of center wavelength			e.g. XX20 nm		e.g. XX50 nm		e.g. XX70 nm		e.g. XX80 nm		
⑥	Code			20		50		70		80		
⑦	Fiber type⁶			SM2000		SM1950		10/125 0.15NA				
	Code			1		2		3				
⑧	Pigtail length¹			0.5 m			1 m					
	Code			0			1					
⑨	Connector^{2,4}			None		FC/PC		FC/APC				
	Code			0		1		3				

¹ Minimum pigtail length. Further pigtail lengths available on request. Where connectorized, pigtail length is to connector end face.

² Specification table does not include connector losses.

³ Any coupling ratio available - contact G&H for specification and ordering codes of coupling ratios not listed.

⁴ Connectors may be fitted to housing type 3. For connectorization of other housing types please contact the sales office.

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

⁶ Other fiber types available on request.

For further information

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FUSED COUPLER FOR 2 μm OPERATION