SM CIRCULATOR

Single-Mode (SM) Fiber Optic Circulators

PRODUCT DATASHEET

G&H SM high power circulators offer low optical loss and high reliability across a wide range of wavelengths.

An optical circulator is a component that can be used to separate optical power that travels in opposite directions in one single fiber.

A fiber optic circulator is a three-port device that allows light to travel in only one direction from port 1 to port 2, then from port 2 to port 3. Fiber circulators are known for their reliability in increasing transmission capacity of existing networks.

Because of its high isolation and low insertion loss, optical circulators are widely used in advanced communication systems. With the development of advanced optical networks, applications of optical circulators are expanding rapidly from communication systems to medical and imaging fields such as OCT applications.

G&H offers a selection of highly reliable fiber optic SM circulators suitable for your applications. G&H's SM fiber optic circulators are offered at operating wavelengths 1310, 1480, 1550, 1580, 1625 and 1650 nm covering C+L and S+C+L-bands. G&H also offers a 3 port SM optical circulator that operates at 1064 nm.

Key Features

- Low optical Loss
- High Isolation
- Low polarization dependent loss

Applications

- Telecom
- Biomedical
- Oil and gas
- Laser applications
- Instrumentation
- Test and measurement

PRODUCT CODE: CIRC

Optical Specifications

3 Ports Circulator at 1064 nm

Parameter	Value
Operating wavelength	1064 nm
Bandpass	±10 nm
Isolation	≥20 dB (typically 25 dB)
Insertion loss	≤2.1 dB
PDL	≤0.2 dB
Return loss	≥50 dB
Cross talk	≥45 dB
Fiber type	HI 1060
Power handling	≤300 mW
Dimensions	34x8.4x8.4 mm
Operating temperature	0 - +70°C
Storage temperature	-40 - +85°C

1310 nm, up to 1650 nm

Parameter		3 port					4 port
Operating wavelength		1310 nm, 1480 nm, 1550 nm, 1580 nm (±30 nm)	1625 nm (±15 nm)	1650 nm (±15 nm)	C+L (1520-1620 nm)	S+C+L (1520-1620 nm)	1310 nm, 1550 nm (±30 nm)
Isolation at center wavelength at 23°C		≥40 dB	≥40 dB	≥40 dB	≥40 dB	≥35 dB	≥40 dB
Insertion loss at center wavelength at 23°C (all SOP)	Grade P	≤0.8 dB	≤0.9 dB	≤0.9 dB	≤1.1 dB	≤1.1 dB	≤1 dB
	Grade A	≤1 dB	≤1.1 dB	≤1.1 dB	≤1.2 dB	≤1.2 dB	≤1.2 dB
PDL		≤0.15 dB					≤20 dB
Return loss		≥50 dB					
PMD		≤0.1 ps					
Directivity		≥50 dB					
Power handling		≤300 mW					
Fiber type		SMF-28					
Operating temperature		0 - +70°C					
Storage temperature		-40 - +85°C					
Package dimensions	Bare/0.9 mm jacket	Ø5.5x50 mm					Ø5.5x68 mm
	2 mm or 3 mm jacket	90x20x9.5 mm (LxWxH)					

Order code

	①		②	③		④		⑤			⑥	⑦	⑧
CIRC	-		-			-		-		2 -			

①	**Port count**	3 ports				4 ports			
	Code	3				4			
②③	**Wavelength**	1064 ±10 nm	1310 nm	1480 nm	1550	1580	C+L-band	S+C+L-band	1625 nm	1650 nm
	Code	06	31	48	55	58	CL	SL	62	65
④	**Grade**	Single stage, or type B				Dual stage or type A			
	Code	S				D			
⑤	**Package**	250 µm bare fiber		900 µm jacket		2 mm cable		3 mm cable	
	Code	A		B		C		D	
⑥⑦	**Lead length**	1 m			1.5 m			etc	
	Code	10			15			etc	
⑧	**Connector Style**	None	ST	FC	SC	LC	FC/APC	SC/APC	LC/APC
	Code	0	2	3	4	5	6	7	A

Specifications are based on non-connectorized products. For connectorized specifications, please contact sales for details. Custom optical and mechanical configurations are available upon request.

For further information

E: sales@gandh.com

gandh.com

SM CIRCULATOR

High Power Single-Mode (SM) Circulators

PRODUCT DATASHEET

G&H SM high power circulators offer low optical loss and high reliability across a wide range of wavelengths up to 5 W.

An optical circulator is a component that can be used to separate optical power that travels in opposite directions in one single fiber.

A fiber optic circulator is a three-port device that allows light to travel in only one direction from port 1 to port 2, then from port 2 to port 3. Fiber circulators are known for their reliability in increasing transmission capacity of existing networks. Because of its high isolation and low insertion loss, optical circulators are widely used in advanced communication systems.

With the development of advanced optical networks, applications of optical circulators are expanding rapidly from communication systems to medical and imaging fields such as OCT applications.

G&H offers a selection of highly reliable fiber optic SM circulators suitable for your applications. Our high quality fiber optic circulators (3 port) are offered at 1064, 1550 and 2000 nm operating wavelengths.

Key Features

- Low optical loss
- High isolation
- Low polarization dependent loss

Applications

- Telecom
- Sensors
- Laser applications
- Medical and imaging

PRODUCT CODE: HSCR

Optical Specifications

High Power 3-port Single-Mode Circulators at 1550±30 nm and 1570±50 nm

Parameter	Value	
Center wavelength	1550 nm	1570 (C+L band)
Bandwidth	±30 nm	±50 (C+L band)
Minimum isolation (all wavelengths, all SOP, 23°C)	40 dB	40 dB
Minimum isolation (all wavelengths, all SOP, 0–70°C)	35 dB	30 dB
Maximum insertion loss (all wavelengths, all SOP, 23°C)	1 dB	1 dB
Maximum insertion loss (all wavelengths, all SOP, 0–70°C)	1.2	1.2
Maximum PDL	0.15 dB	0.2 dB
Maximum PMD	0.1 ps	
Minimum crosstalk (directivity)	50 dB	
Minimum return loss	50 dB	
Maximum optical power	1 W, 2 W, 3 W, 5 W	
Fiber type	SMF-28	
Operating temperature	0 – +70°C	
Storage temperature	-40 – +85°C	
Dimensions	Ø5.5x50 mm	

High Power 3-port Single-Mode Circulator at 1064 and 2000 nm

Parameter	Value	
Center wavelength	1064 nm	2000 nm
Operating bandwidth	±5 nm	±30 nm
Minimum isolation at center wavelength at 23°C	22 dB	16 dB
Minimum insertion loss at 23°C	1.5 dB	
Maximum PDL	0.2 dB	
Minimum crosstalk	45 dB	40 dB
Return loss	45 dB	50 dB
Maximum average optical power	10 W	1, 2 or 5 W
Maximum peak power for ns pulse	10 kW	
Fiber type	HI-1060	SMF-28
Operating temperature	+10 – +50°C	-5 – +70°C
Storage temperature	0 – +60°C	-40 – +85°C
Package dimensions	41x62x130 mm	12x17x39 mm

Order code

	①		②	③		④	⑤		⑥			⑦	⑧	
HSCR	-		-			-			-		X	-			0

①	**Port count**	3 ports				
	Code	3				
②③	**Wavelength**	2000 nm	1550±30 nm	1570±50 nm	1064 nm	
	Code	00	55	57	06	
④	**Optical power**	1 W	2 W	5 W	10 W	etc
	Code	01	02	05	10	etc
⑤	**Package style**	250 µm bare fiber		900 µm jacket		
	Code	A		B		
⑥⑦	**Lead length**	1 m	1.5 m	etc		
	Code	10	15	etc		

Specifications are based on non-connectorized products. For connectorized specifications, please contact sales for details. Custom optical and mechanical configurations are available upon request.

For further information

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gandh.com

PM CIRCULATOR

Polarization-Maintaining (PM) Fiber Optic Circulators (Single and Dual Stage)

PRODUCT DATASHEET

G&H PM high power circulators offer low optical loss and high reliability across a wide range of wavelengths.

An optical circulator is a component that can be used to separate optical power that travels in opposite directions in one single fiber

A fiber optic circulator is a three-port device that allows light to travel in only one direction from port 1 to port 2, then from port 2 to port 3. Fiber circulators are known for their reliability in increasing transmission capacity of existing networks.

Because of its high isolation and low insertion loss, optical circulators are widely used in advanced communication systems. With the development of advanced optical networks, applications of optical circulators are expanding rapidly from communication systems to medical and imaging fields such as OCT applications.

G&H offers a selection of highly reliable fiber optic PM circulators suitable for your applications. Our low wavelength fiber optic circulators are offered at 780, 810, 850, 980, 1030 and 1064 nm. G&H also offers a 3 port and 4 port PM optical circulator that operates at 1310 nm and 1550 nm with a band pass of ±20 nm.

Key Features

- Low insertion loss
- High optical return loss
- Stability
- High reliability

Applications

- Fiber optical instruments
- Fiber sensors
- Medical and imaging

PRODUCT CODE: PCIR

Optical Specifications

PM Circulators from 780 nm to 850 nm (Without Connectors)

Parameter	Single stage, type B	
	3 port	4 port
Operating wavelength	780, 808, 850 nm (or customized)	
Bandpass	±10 nm	
Insertion loss in bandpass at 23°C	≤1.5 dB	≤1.8 dB
Band of isolation	±5 nm	
Isolation in band at 23°C	≥25 dB	
Extinction ratio	≥20 dB	
Return loss	≥45 dB	
Fiber type	PM Panda	
Input maximum power handling	≤300 mW	
Dimensions	108x27x27 mm	
Operating temperature	-5 – +50°C	
Storage temperature	-20 – +70°C	

3-port PM Circulator from 1064 nm to 1550 nm (Without Connectors)

Parameter	Single stage	Dual stage	Single stage	Dual stage
Center wavelength	1064 nm		1310 nm or 1550 nm	
Operating bandwidth	±5 nm		±20 nm	
Insertion loss at 23°C	≤2.1 dB	≤3.5 dB	≤0.8 dB	≤0.9 dB
Extinction ratio	≥20 dB	≥22 dB	≥20 dB	≥22 dB
Isolation at 23°C	≥25 dB	≥35 dB	≥20 dB	≥40 dB
Return loss	≥50 dB			
Crosstalk	≥50 dB			
Fiber type	PM Panda			
Input maximum power handling	≤300 mW			
Dimensions	Ø5.5x35 mm			
Operating temperature	-5 – +50°C		-5 – +70°C	
Storage temperature	-40 – +85°C			

4-port PM Circulator 1064, 1310 and 1550 nm (Without Connectors)

Parameter	Dual stage type A	Single stage type B	Dual stage type A	Single stage type B
Center wavelength	1064 nm		1310 nm or 1550 nm	
Operating bandwidth	±5 nm		±20 nm	
Insertion loss at 23°C	≤4 dB	≤2.3 dB	≤1.1 dB	≤1 dB
Extinction ratio	≥20 dB		≥20 dB	
Isolation at 23°C	≥45 dB	≥25 dB	≥40 dB	≥22 dB
Return loss	≥50 dB			
Crosstalk	≥50 dB			
Fiber type	PM Panda			
Input maximum power handling	≤300 mW			
Dimensions	Ø5.5x35 mm			
Operating temperature	-5 – +50°C		-5 – +70°C	
Storage temperature	-40 – +85°C			

Order code

①		②	③		④		⑤		⑥	⑦	⑧
PCIR	-		-			-		-		X	-			

①	**Stage type**	Single stage			Dual stage		
	Code	S			D		
②③	**Wavelength**	780 nm	808 nm	850 nm	1064 nm	1310 nm	1550 nm
	Code	78	81	85	06	31	55
④	**Stage**	Single stage, or type B			Dual stage or type A		
	Code	S			D		
⑤	**Package style**	250 µm bare fiber			900 µm jacket		
	Code	A			B		
⑥⑦	**Lead length**	1 m		1.5 m		etc	
	Code	10		15		etc	
⑧	**Connector Style**	None		FC		FC/APC	
	Code	0		3		6	

Specifications are based on non-connectorized products. For connectorized specifications, please contact sales for details. Custom optical and mechanical configurations are available upon request.

For further information

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PM CIRCULATOR

High Power Polarization-Maintaining (PM) Circulators

PRODUCT DATASHEET

G&H PM circulators offer low optical loss and high reliability across a wide range of wavelengths up to 5 W.

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A fiber optic circulator is a three-port device that allows light to travel in only one direction from port 1 to port 2, then from port 2 to port 3. Fiber circulators are known for their reliability in increasing transmission capacity of existing networks.

Because of its high isolation and low insertion loss, optical circulators are widely used in advanced communication systems. With the development of advanced optical networks, applications of optical circulators are expanding rapidly from communication systems to medical and imaging fields such as OCT applications.

G&H offers a selection of highly reliable fiber optic PM circulators suitable for your applications. Our low wavelength fiber optic circulators (3 port and 4 port) are offered at 780, 810, 850, 980, 1030 and 1064 nm with power levels ranging from 5 W and 10 W. G&H also offers a 3 port high power PM optical circulator that operates at 2000 nm with a band pass of ±30 nm.

Key Features

- Low optical loss
- High reliability

Applications

- Fiber optical instruments
- Fiber sensors
- Medical and imaging

PRODUCT CODE: HPCR

Optical Specifications

High Power 3 port and 4 port PM Circulator 780, 810, 850, 980, 1030 and 1064 nm

Parameter	3 port[1]	4 port[2]	3 port[1]	4 port[2]	3 port[1]	4 port[2]
Operating wavelength	780, 810 nm		850, 980, 1030 nm		1064 nm	
Bandpass	±10 nm					
Insertion loss in bandpass at 23°C	≤1.7 dB	≤2 dB	≤1.5 dB	≤1.8 dB	≤1.5 dB	≤1.8 dB
Band of isolation	±5 nm					
Isolation in band at 23°C	≥25 dB		≥28 dB		≥28 dB	
Extinction ratio	≥20 dB					
Return loss	≥45 dB					
Fiber type	PM Panda					
Input maximum power handling	5		10		10	
Dimensions	108x27x27 mm		110x34x34 mm		116x34x34 mm	
Operating temperature	-5 – +50°C					
Storage temperature	-20 – +70°C					

1 3 port type, input power of port 3 should <0.3 W (780–850 nm) or <0.5 W (980–1064 nm).
2 4 port type, the optical path is 1→2, 2→3, 3→4, 4→1.
3 The precondition of above specifications is extinction ratio of system ≥25 dB.

High power 3-port PM circulator at 2000 nm

Parameter	
Center wavelength	2000 nm
Operating bandwidth	±30 nm
Insertion loss at center wavelength at 23°C	1.5 dB
Minimum PER	18 dB
Isolation at 23°C	16 dB
Return loss	50 dB
Crosstalk	40 dB
Fiber type	PM1550 panda
Maximum average optical power	1, 2 or 5 W
Maximum peak power for ns pulse	10 kW
Maximum tensile load	5 N
Dimensions	12x17x39 mm
Operating temperature	-5 – +70°C
Storage temperature	-40 – +85°C

Order code

	①		②	③		④	⑤		⑥			⑦	⑧	
PCIR	-		-			-			-		X	-			0

①	**Port count**	3 ports	4 ports
	Code	S	D

②③	**Wavelength**	780 nm	810 nm	850 nm	980 nm	1030 nm	1064 nm	2000 nm
	Code	78	81	85	98	03	06	00

④	**Optical power**	1 W	2 W	5 W	10 W	etc
	Code	01	02	05	10	etc

⑤	**Package style**	250 µm bare fiber	900 µm jacket
	Code	A	B

⑥⑦	**Lead length**	1 m	1.5 m	etc
	Code	10	15	etc

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