



SANWA
TECHNOLOGIES

PASSIVE DEVICES

We Create, We Customize, We Connect





SANWA

TECHNOLOGIES

Providing engineering excellence, connecting you and beyond.

SANWA Technologies Co., Ltd. (formerly Sanwa Denki Kogyo Co., Ltd.) was established in 1947 and has since become a renowned manufacturer of communication and connectivity solutions, specializing in the global optical communications market. With over 75 years of innovation and engineering excellence, SANWA has developed and manufactured high-quality connectivity solutions and components to enhance the performance of optical networks both today and for the future.

Manufacturers designing products since 1947.

SANWA specializes in optical solutions that serve a broad range of international customers within the Telecom, Enterprise, Datacom, Premise wiring, CATV, OEM, Utility, Municipality, Security, and Aerospace/Military markets. With over 40 years of experience in fiber optic components and passive assembly manufacturing, we offer a variety of products and custom solutions tailored to your needs.

Our Vision

For over 75 years, SANWA has sought to establish relationships that are beyond transactional. Diligently collaborating on both custom and standard products with expeditious local support. Over time, we have transformed the traditional Japanese manufacturing philosophy, Monozukuri, exemplified in our everyday pursuit of manufacturing thoughtfulness, and equally focus on all aspects of product delivery: quality, time, and service.

ADVANCING TOGETHER, FORGING THE FUTURE

At SANWA Technologies, we take great pride in our world-class manufacturing facilities that empower us to deliver high-quality products to our valued customers.

With two state-of-the-art factories, strategically located in Tokyo, Japan, and Ayutthaya, Thailand, we strive for excellence through cutting-edge technology, precision engineering, and a dedicated focus on quality. Each facility serves a unique purpose, allowing us to meet the diverse needs of our global clientele.

Japan Hachioji Factory: Leading Innovation and Research

Our Hachioji factory, nestled in the western part of Tokyo, is the epitome of innovation and research. Equipped with the latest advancements in manufacturing technology, this facility drives our relentless pursuit of excellence. Our team of seasoned experts leads research and product development, ensuring that SANWA Technologies remains at the forefront of industry advancements. The factory also houses a robust QA, QC, and General Qualification Lab, where every product undergoes stringent testing to meet the highest quality standards. With a focus on low-volume and BCP production, as well as automated MT production and active device production, our Hachioji factory is a hub of progress and ingenuity.



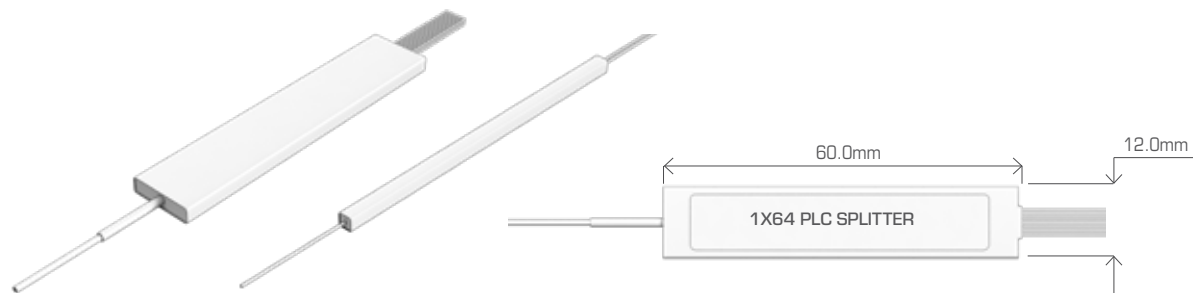
Thailand Ayutthaya Factory: Powering High-Volume Production

Nestled in Ayutthaya, Thailand, our second manufacturing facility is a powerhouse dedicated to high-volume production. With a sharp focus on efficiency and precision, this factory houses cutting-edge equipment for high-volume injection molding and precision assembly and testing. Quality is paramount, and our dedicated QA and QC Lab ensures that each product meets our stringent quality guidelines. We also prioritize tooling maintenance and repair, guaranteeing optimal performance and precision throughout the manufacturing process. For critical processes that demand a controlled environment, our Thailand factory boasts a semi-clean room, enabling us to deliver products with unparalleled purity and accuracy.





PLC SPLITTERS



1xN and 2xN Planar Light wave Circuit (PLC) Splitters are based on the Plasma Chemical Vapor Deposition (P-CVD) technology and its patented fabrication process for providing stable optical character.

PLC Splitter features guaranteed performance specifications and high reliability that surpass Telcordia requirements and is tailored for different applications and markets.

PARAMETERS		1X2	1X4	1X8	1X16	1X32	2X2	2X4	2X8	2X16	2X32	UNIT	
SPECIFICATIONS	Operating Wavelength	1260 ~ 1650											nm
	Insertion Loss	Typical	3.6	7.0	10.0	13.3	16.3	3.7	7.0	10.8	13.6	16.8	dB
		Max	4.0	7.4	10.7	13.7	16.9	4.2	7.8	11.5	14.5	17.7	dB
	Loss Uniformity	Typical	0.3	0.4	0.5	0.6	0.8	0.5	1.0	1.0	1.2	1.5	dB
		Max	0.4	0.6	0.8	1.2	1.5	0.6	1.2	1.5	1.8	2.0	dB
	Return Loss	55/50											dB
	PDL	Typical	0.1	0.1	0.15	0.15	0.15	0.1	0.1	0.2	0.3	0.3	dB
		Max	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.4	0.4	0.4	dB
	Directivity, (Min)	55											dB
	Wavelength Dep. Loss	Typical	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.5	0.5	dB
	Max	0.3	0.3	0.3	0.5	0.5	0.4	0.4	0.5	0.6	0.8	dB	
Package	Bare	40x4x4				50X7X4	50X4X4			60X7X4			mm
	Blockless	60x7x4			60x12x5	80X20X6	60X7X4		80X12X5	100X20X6			
Operating Temp.	-40 ~ +85											°C	

*Note: Specifications without fiber connectors. Value of parameters shows at room temperature. Custom specification is also available.

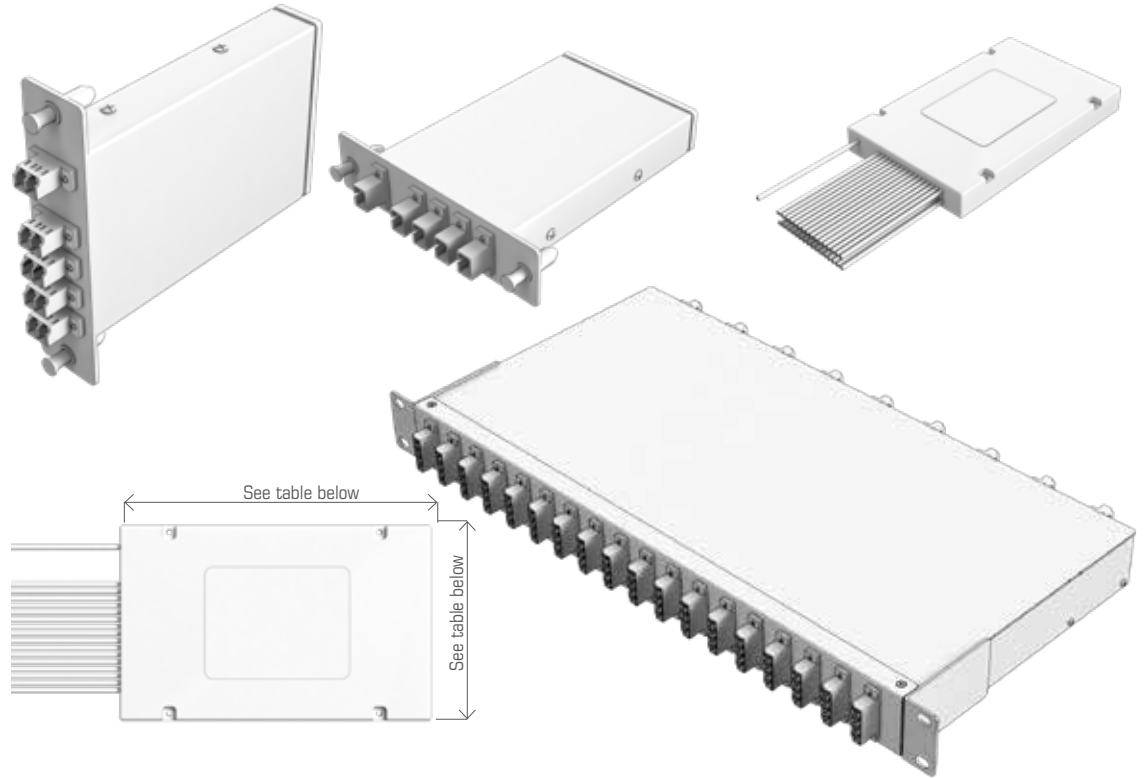
CODE	INPUT-OUTPUT		PACKAGE		INPUT FIBER		OUTPUT FIBER		CONNECTOR INPUT		CONNECTOR OUTPUT		FIBER LENGTH	
F4M-PLC	1X2	1 Input, 2 Outputs	BP	Bare Package	25	250µm Bare Fiber	25	250µm Bare Fiber	0	None	0	None	10	1.0 m
	1X4	1 Input, 4 Outputs	BL	Blockless	9L	900µm Loose Tube	9L	900µm Loose Tube	A	SC/UPC	A	SC/UPC	15	1.5m
	1X8	1 Input, 8 Outputs			9T	900µm Tight Buffer	BR	Bare Ribbon	B	SC/APC	B	SC/APC	S	Specify
	116	1 Input, 16 Outputs							C	FC/UPC	C	FC/UPC		
	132	1 Input, 32 Outputs							D	FC/APC	D	FC/APC		
	164	1 Input, 64 Outputs							E	LC/UPC	E	LC/UPC		
	2X2	2 Input, 2 Outputs							Q	LC/APC	Q	LC/APC		
	2X4	2 Input, 4 Outputs							S	Specify	S	Specify		
	2X8	2 Input, 8 Outputs												
	216	2 Input, 16 Outputs												
232	2 Input, 32 Outputs													
264	2 Input, 64 Outputs													

ORDER CODE EXAMPLE

F4M-PLC - 132 - BL - 25 - 9L - 0 - 0 - 10



PLC SPLITTER CASSETTE & MODULES



Whole series of 1xN and 2xN splitter modules that are tailored for specific applications. All products meet GR-1209-CORE-2001 and GR-1221-CORE-1999 requirements.

PARAMETERS	1X2~1X8	1X12~1X16	1X24~1X64	2X4 ~2X8	2X16	2X32~2X64	UNIT
L,W,H	100X80X10	120X80X18	140x114x18	100x80x10	120X80X18	140x114x18	mm
TYPE (Code)	TA	TB	TC	TA	TB	TC	-

Custom Solution is also available.

CODE	INPUT-OUTPUT	CASSETTE TYPE	FIBER CABLE	CONNECTOR/ ADAPTER INPUT	CONNECTOR/ ADAPTER OUTPUT	FIBER LENGTH
F4M-PLCM	1X2 1 Input, 2 Outputs	TA 100X80X10	9L 900µm Loose Tube	0 None	0 None	10 1.0 m
	1X4 1 Input, 4 Outputs	TB 120X80X18	2M 2mm Cable	A SC/UPC	A SC/UPC	15 1.5m
	1X8 1 Input, 8 Outputs	TC 140X114X18	3M 3mm Cable	B SC/APC	B SC/APC	S Specify
	116 1 Input, 16 Outputs	LG LGX Metal Box		C FC/UPC	C FC/UPC	
	132 1 Input, 32 Outputs	MM Mini Module		D FC/APC	D FC/APC	
	164 1 Input, 64 Outputs	RM Rack Mount		E LC/UPC	E LC/UPC	
	2X2 2 Input, 2 Outputs	S Specify		Q LC/APC	Q LC/APC	
	2X4 2 Input, 4 Outputs			S Specify	S Specify	
	2X8 2 Input, 8 Outputs					
	216 2 Input, 16 Outputs					
	232 2 Input, 32 Outputs					
	264 2 Input, 64 Outputs					

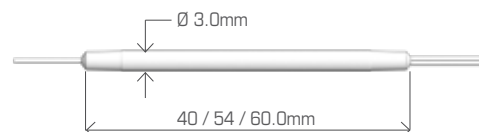
ORDER CODE EXAMPLE

F4M-PLCM -132 - TC - 2M - SS - SS - S





FUSED BICONIC WDM



FBWDM's are available in a wide variety of configurations, tap ratios, wavelength ranges, housing and connector options, and can therefore be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds.

These products are particularly well suited for harsh environments. These products also meet or exceed Telcordia GR-1209-CORE and GR-1221-CORE reliability requirements.

PARAMETERS	1060/1310		1310/1490		980/1550		980/1060		980/1310		1550/1620		1310/1490		1310/1550		1480/1550		UNIT
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	
Grade	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	-
Configuration	1×2 / 2×2																		-
Long Wavelength	1310±15		1490±10		1550/1585±20		1060±5		1310±10		1620±5		1490±10		1550±15		1550/1600±20		nm
Insertion Loss (Max)	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	dB
Isolation (Typ)	17.0	16.0	17.0	16.0	20.0	18.0	15.0	13.0	18.0	16.0	15.0	13.0	17.0	16.0	17.0	16.0	16.0	14.0	dB
PDL (Max)	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	dB
Short Wavelength	1060±15		1310±10		970±10		980±5		980±10		1550±5		1310±10		1310±15		1480±5		nm
Insertion Loss (Max)	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	0.30	0.40	dB
Isolation (Typ)	17.0	16.0	17.0	16.0	20.0	18.0	15.0	13.0	18.0	16.0	15.0	13.0	17.0	16.0	17.0	16.0	16.0	14.0	dB
PDL (Max)	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	0.10	0.15	dB
Return Loss (Min)	50 (Test at central wavelength only)																		dB
Operating Power	5.0																		W
Operating Temp.	-40 ~ +85																		°C
Storage Temp.	-40 ~ +85																		°C
Package Type	Ø3×40 for 250µm bare fiber - Ø3×60 for 900µm loose tube - 10×20×90 for 900µm loose tube or 3mm cable																		

SPECIFICATIONS

*Note: Specifications without fiber connectors. - Very high Isolation version over 32dB available in module version

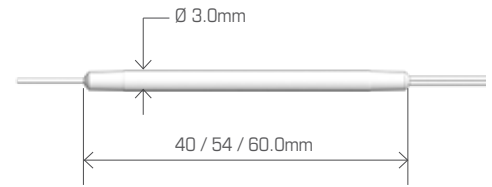
CODE	N° OF PORTS		WAVELENGTH		PACKAGE		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH	
F4M-FBWDM	12	1×2	63	1060/1310nm	1	3×54 mm	25	250µm Bare Fiber	0	None	10	1m (Std.)
	22	2×2	34	1310/1490nm	2	3×64 mm	9L	900µm Loose Tube	A	SC/UPC	15	1.5 Meter
			35	1310/1550nm	3	3×60 mm	9T	900µm Tight Buffer	B	SC/APC	S	Specify
			56	1550/1620nm	4	3×40 mm	2M	2.0mm Loose Tube	C	FC/UPC		
			45	1480/1550nm	5	3×45 mm	3M	3.0mm Loose Tube	D	FC/APC		
			86	980/1060nm	6	10×20×90 mm	S	Specify	E	LC/UPC		
			81	980/1310nm	7	80×100×10mm			Q	LC/APC		
			85	980/1550nm	S	Specify			S	Specify		
			S	Specify								

ORDER CODE EXAMPLE

F4M-FBWDM - 12 - 35 - 1 - 25 - 00 - 10



FUSED BICONIC COUPLERS



FBC's are available in a wide variety of configurations, tap ratios, wavelength ranges, housing and connector options, and can therefore be readily specified in a wide variety of applications, enabling

rapid design cycles and new project builds. These products are particularly well suited for harsh environments.

FUSED SERIES

PARAMETERS		SINGLE WINDOW				DUAL / TRIPLE WINDOW				UNIT
Grade		P	A	P	A	P	A	P	A	-
Configuration		1×1(Attenuator), 1×2, 2×2								-
Fiber Type		SMF-28, MM fibers, PM fibers, others								-
Wavelength		808, 850, 980, 1060, 1310, 1480, 1550, 1620								nm
Bandwidth	B	Narrowband ±20		Broadband ±40		Broadband ±40		Ultra Broadband		nm
Insertion Loss	Max	3.4	3.6	3.4	3.7	3.6	3.9	3.7	4	dB
Excess Loss	Typ	0.06	0.1	0.1	0.15	0.06	0.1	0.1	0.15	dB
Uniformity	Max	0.5	0.8	0.6	0.9	0.8	1.1	1	1.4	dB
PDL	Max	0.05	0.1	0.1	0.15	0.15	0.2	0.15	0.2	dB
Return Loss	Min	50 (Test at central wavelength only)								dB
Operating Power	Max	5.0								W
Operating Temperature		-40 ~ +70								°C
Storage Temperature		-40 ~ +85								°C

*Note: Specifications without fiber connectors.

CODE	PORTS	WAVELENGTH		RATIO		PACKAGE		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH		
F4M-FBC	11	1×1 Attenuator	80	808nm	01	1/99	1	3×54 mm	25	250µm Bare Fiber	0	None	10	1m (Std.)
	12	1×2	85	850nm	02	2/98	2	3×64 mm	BR	250µm Ribbon	A	SC/UPC	15	1.5 Meter
	22	2×2	98	980nm	03	3/97	3	3×60 mm	9L	900µm Loose Tube	B	SC/APC	S	Specify
			31	1310nm	05	5/95	4	3×40 mm	9T	900µm Tight Buffer	C	FC/UPC		
			49	1490nm	10	10/90	5	3×45 mm	2M	2.0mm	D	FC/APC		
			55	1550nm	20	20/80	6	10×20×90 mm	3M	3.0mm	E	LC/UPC		
			34	1310&1490nm	25	25/75	7	80×100×10mm	S	Specify	Q	LC/APC		
			35	1310&1550nm	30	30/70	X	Custom			S	Specify		
			45	1490&1550nm	40	40/60								
			TW	1310&1490 & 1550nm	50	50/50								
		S	Specify		EQ									

ORDER CODE EXAMPLE

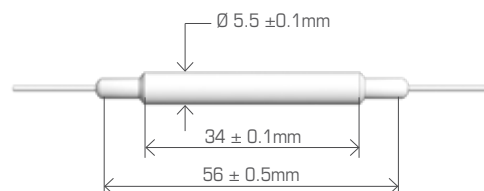
F4M-FBC -12 - 35 - 30 - 1- 25 - 00 - 10





COARSE WAVELENGTH DIVISION MULTIPLEXER

CWDM SERIES



The Coarse Wavelength Division Multiplexing (CWDM) devices utilize thin-film filter technology and are available in various wavelength combinations based on the entire wavelength spectrum (1270nm~1610nm in 20nm increments) defined by the ITU G.694.2

CWDM standard. Compact modules are also available with low insertion loss, low crosstalk, and wide passband with high isolation, which enables users to establish a low cost bi-directional optical communication system.

	PARAMETERS		VALUE		UNIT	
			MUX (ADD)	DEMUX (DROP)		
SPECIFICATIONS	Center Wavelength		1470,1490~1610 or 1471,1491~1611		nm	
	Channel Spacing		20		nm	
	Channel Passband		Min	+/-6.5	nm	
	Insertion Loss	Adjacent Channel	Max	0.6		dB
		Non-Adjacent Channel	Max	0.4		dB
	Isolation	Adjacent Channel	Min	30	30	dB
		Non-Adjacent Channel	Min	15	15	dB
	Ripple in Passband		Max	0.3		dB
	Polarization Dependent Loss		Max	0.1		dB
	Directivity		Min	55		dB
	Return Loss		Min	50		dB
	Polarization Mode Dispersion		Max	0.1		ps
	Power Handling		Max	500		mW
	Fiber Type		SMF-28e			
Operating Temperature Range		-40 ~ +70			°C	
Storage Temperature Range		-40~ +85			°C	

*Note: Specifications without fiber connectors, LGX Box / 19" Rack Packaging option is available upon request.

CODE	TYPE	WAVELENGTH		PACKAGE	FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH			
F4M-CWDM	1	ITU	27	1270nm	1	05.5xL34 mm	25	250µm Bare Fiber	O	None	10	1m (Std.)
	2	ITU+1	..	..	2	10x20x90mm Tube	9L	900µm Loose Tube	A	SC/UPC	15	1.5 Meter
			47	1470nm	S	Specify	2M	2.0mm Loose Tube	B	SC/APC	S	Specify
			49	1490nm			3M	3.0mm Loose Tube	C	FC/UPC		
			..	..			S	Specify	D	FC/APC		
			59	1590nm					E	LC/UPC		
			61	1610nm					Q	LC/APC		
			S	Specify					S	Specify		

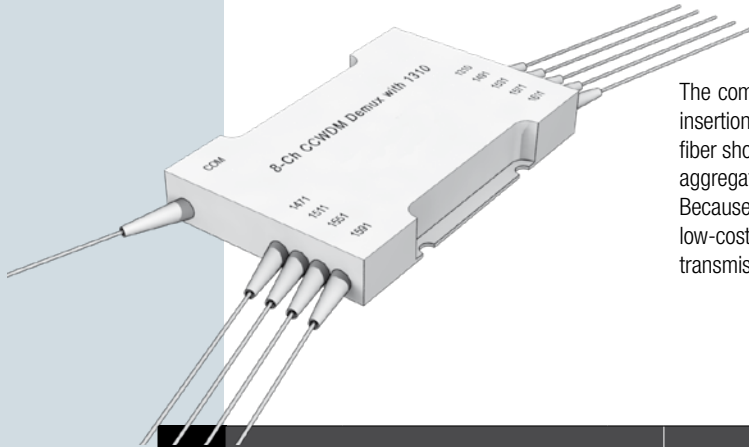
ORDER CODE EXAMPLE

F4M-CWDM - 1 - S - S - 25 - 00 - S



COMPACT CWDM MODULE- CCWDM

CWDM SERIES



The compact coarse wave divider (CCWDM) has a small package size and lower insertion loss compared to conventional CWDMs, and it also solves the problems of fiber shortage and multi-service transparent transmission, mainly in metro network aggregation and access layers, which can be built and operated in a short time. Because of low power consumption, small volume and many other advantages, is a low-cost, high-performance transmission solution, has been widely used in metro transmission.

PARAMETERS			VALUE			UNIT
			4CH	8CH	18CH	
Central Wavelength			1270,1290...1610 or 1271,1291...1611			nm
Channel Spacing			20			nm
Channel Passband		Min	+/-6.5	+/-6.5	+/-6.5	nm
Insertion Loss		Max	1.0	1.5	2.5	dB
Isolation	Adjacent Channel	Min	30			dB
	Non-Adjacent Channel	Min	40			dB
Passband Ripple		Max	0.4	0.5	0.6	dB
Polarization Dependent Loss		Max	0.1	0.15	0.2	dB
Directivity		Min	55			dB
Return Loss		Min	50			dB
Polarization Mode Dispersion		Max	0.1			ps
Fiber Type			SMF-28e			-
Operating Temperature			0 ~ +70			°C
Storage Temperature Range			-40~ +85			°C

*Note: Specifications without fiber connectors

CODE	TYPE		CHANNEL		WAVE-LENGTH		PACKAGE		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH	
	F4M-CCWDM	MU	Mux	02	2 Channels	27	1270nm	4C	44×25×6mm	9L	900µm Loose Tube	O	None	10	1m (Std.)
DE		Demux	04	4 Channels	..	..	8C	47×25×6mm	S	Specify	A	SC/UPC	15	1.5 Meter
			06	6 Channels	47	1470nm	18C	53×28×8mm			B	SC/APC	S	Specify
			08	8 Channels	49	1490nm	S	Specify			C	FC/UPC		
			S	Specify	..	..					D	FC/APC		
					59	1590nm					E	LC/UPC		
					61	1610nm					Q	LC/APC		
					S	Specify					S	Specify		

ORDER CODE EXAMPLE

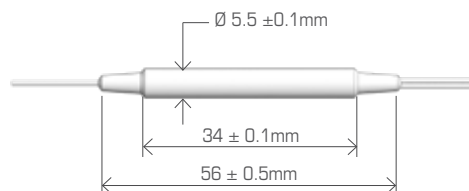
F4M-CCWDM MU - 04 - S - S - S - 00 - S





DENSE WAVELENGTH DIVISION MULTIPLEXER

DWDM SERIES



DWDM devices utilize thin-film filter technology. Individual components are available on ITU channel spacing of 200 and 100 GHz. These devices exceed the requirements of Telcordia GR-1221. DWDM devices demonstrate low loss, temperature insensitivity, and reliable

performance. Compact modules are also available with low insertion loss, low crosstalk, and wide passband with high isolation, which enables users to establish a low cost bi-directional optical communication system.

PARAMETERS		VALUE		UNIT	
SPECIFICATIONS	Center Wavelength	C/L band, ITU-T grid		nm	
	Channel Spacing	0.8 (100GHz)	1.6 (200GHz)	nm	
	Channel Passband	Min	ITU±0.11	ITU±0.25	nm
	Transmission Insertion Loss	Max	1.2 (Typ 0.8)	1.0 (Typ 0.7)	dB
	Reflection Insertion Loss	Max	0.6 (Typ 0.4)		dB
	Passband Ripple	Max	0.5		dB
	Transmission Isolation	Min	28	30	dB
	Reflection Isolation	Min	12		dB
	Return Loss	Min	45		dB
	Directivity	Min	50		dB
	Polarization Dependent Loss	Max	0.15	0.1	dB
	Polarization Mode Dispersion	Max	0.1		ps
	Insertion Loss Temperature Sensitivity	Max	0.005		dB/°C
	Power Handling	Max	500		mW
	Operating Temperature Range		-40 ~ +70		°C
Storage Temperature Range		-40~ +85		°C	

*Note: Specifications without fiber connectors, LGX Box / 19' Rack Packaging option is available upon request.

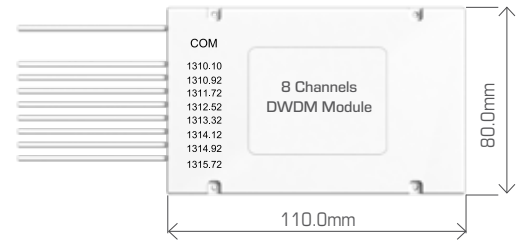
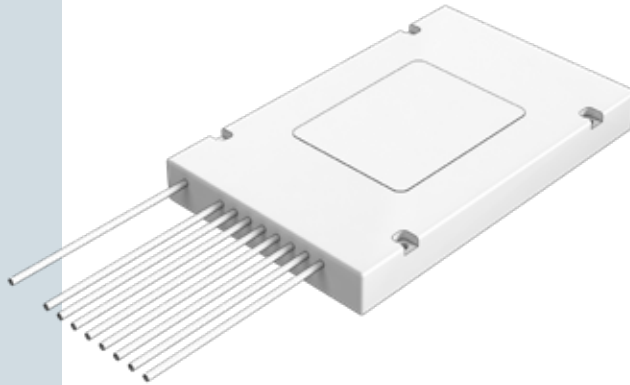
CODE	TYPE	WAVELENGTH ITU GRID	PACKAGE	FIBER JACKET	Connector Type	FIBER LENGTH						
F4M-DWDM	1	100G	S	Specify	1	Ø5.5×L34 mm	25	250µm Bare Fiber	0	None	10	1m
	2	200G	S	Specify	2	10×20×90mm	9L	900µm Loose Tube	A	SC/UPC	S	Specify
	3	50G			2M	2.0mm Loose Tube	B	SC/APC				
					3M	3.0mm Loose Tube	C	FC/UPC				
					S	Specify	D	FC/APC				
							E	LC/UPC				
							Q	LC/APC				
							S	Specify				

ORDER CODE EXAMPLE

F4M-DWDM - 3 - S - S - 25- 00 - S



DWDM - MODULE



DWDM module is compact and has the properties of low insertion loss, low crosstalk, and wide passband with high Isolation, which enables users to establish a low cost bi-directional optical communication system.

	PARAMETERS		VALUE		UNIT		
			4CH	8CH			
SPECIFICATIONS	Center Wavelength		C/L band, ITU-T grid		nm		
	Channel Spacing		200		GHz		
	Channel Passband		Min	+/-0.25		nm	
	Insertion Loss		Max	1.8	3.0	dB	
	Isolation	Adjacent Channel		Min		25	dB
		Non-Adjacent Channel		Min		35	dB
	Passband Ripple		Max	0.5		dB	
	Polarization Dependent Loss		Max	0.2		dB	
	Directivity		Min	50		dB	
	Return Loss		Min	50		dB	
	Polarization Mode Dispersion		Max	0.1		ps	
	Fiber Type		SMF-28e				
	Power Handling		Max	500		mW	
	Operating Temperature		-40 ~ +70			°C	
Storage Temperature Range		-40~ +85			°C		

*Notes: Specifications without fiber connectors

CODE	TYPE		TYPE		CHANNEL		ITU GRID		PACKAGE		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH									
	MU	DE	1	2	04	08	S	Specify	3	4	5	6	7	S	O	A	B	C	D	E	Q	S		
F4M-DWDM	Mux	Demux	100G	200G	4 Channels	8 Channels			10×80×100mm	18×115×141mm	18×80×120mm	19 inch Rack	LGX Box	Specify	90µm Loose Tube	2.0mm Loose Tube	3.0mm Loose Tube	Specify	FC/UPC	FC/APC	LC/UPC	LC/APC	Specify	
			50G		16 Channels																			
					20 Channels																			

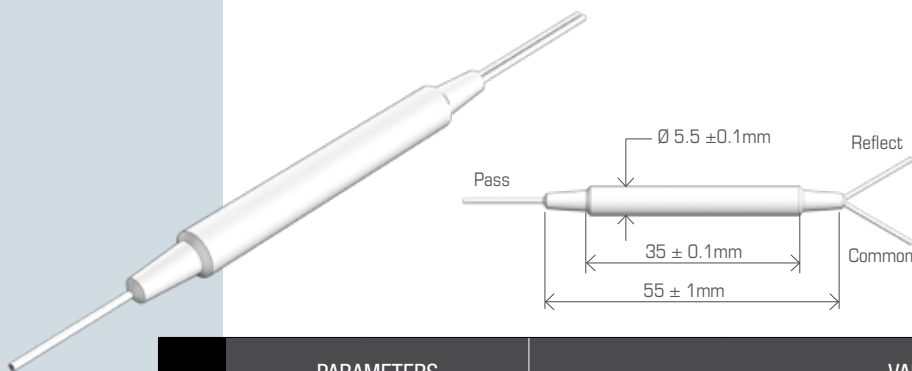
ORDER CODE EXAMPLE

F4M-DWDM- MU - 1 - 04 - S - S - S - 00 - S





FWDM 980/1060 - 980/1550 - 1310/1550, 1480/1550, 1510/1550 WDM



The Filter Wavelength Division Multiplexer series is based on environmentally stable thin film filter technology. The devices combine or separate light at different wavelength in a wide wavelength range. They offer very low insertion loss, low polarization dependence, high Isolation and excellent environmental stability. High power handling capability can be achieved through unique pigtail processing and high quality AR coating. These components have been extensively used in EDFAs, Raman amplifiers, WDM networks and fiber optical instruments.

PARAMETERS		VALUE					UNIT	
SPECIFICATIONS	Pass Band	Wavelength Range	970-990 (1020-1100)	950-1010(1500-1600)	1270-1350	1450-1490	1500- 1520	nm
		Typ. Insertion Loss	0.6	0.5	0.4	0.4	0.5	nm
		Max. Insertion Loss	0.8	0.7	0.6	0.6	0.7	dB
		Typ. Isolation	30	35	35	30	35	dB
		Min. Isolation	25	30	30	25	30	dB
	Reflection Band	Wavelength Range	1020-1000 (970-990)	1500-1600 (950 -1010)	1530-1600 (1270-1350)	11530-1580 (1450-1490)	1530-1570 (1500 - 1520)	nm
		Typ. Insertion Loss	0.3					dB
		Max. Insertion Loss	0.5					dB
		Typ. Isolation	15					dB
		Min. Isolation	12					dB
		Min. Return Loss	50					dB
		Max. Polarization Dependent Loss	0.1					dB
		Typ. Polarization Dependent Loss	0.05					dB
		Thermal Stability	0.005					dB/°C
		Max. Optical Power	300					mW
	Max. Tensile Load	5					N	
	Operating Temperature Range	-40 ~ +70					°C	
	Storage Temperature Range	-40 to +85					°C	

*Note: IL is 0.3 dB higher and RL is 5 dB lower for each connector added

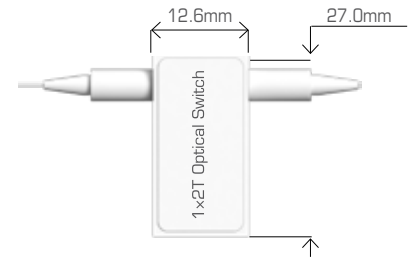
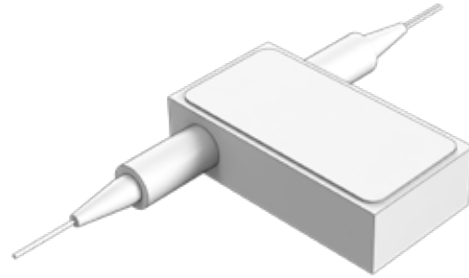
CODE	WAVELENGTH	CONNECTOR TYPE	FIBER JACKET	FIBER LENGTH	
F4M - FWDM	9806	980 Pass/1060 Reflect	O None	25 250µm Bare Fiber	10 1m (Std.)
	0698	1060 Pass/980 Reflect	A SC/UPC	9L 900µm Loose Tube	S Specify
	9855	980 Pass/1550 Reflect	B SC/APC	S Specify	
	5598	1550 Pass /980 Reflect	C FC/UPC		
	3155	1310 Pass/1550 Reflect	D FC/APC		
	5531	1310 Reflect/1550 Pass	E LC/UPC		
	4855	1480 Pass/1550 Reflect	Q LC/APC		
	5548	1480 Reflect/1550 Pass	S Specify		
	5155	1510 Pass/1550 Reflect			
	5551	1510 Reflect/1550 Pass			
	S	Specify			

ORDER CODE EXAMPLE

F4M-FWDM - S - 00 - 25 - S



1x2 OPTICAL SWITCH



1x2T/1x2 Optical Switch, which is famous for its high performance, low insertion loss and compact. It is an ideal component for OADM OXC system monitoring and protection. With compact package, it can be easy to integrate into a high density optical communication system.

	PARAMETERS	VALUE	UNIT
SPECIFICATIONS	Wavelength Range	1260 ~ 1650	nm
	Test Wavelength	1310 / 1550	nm
	Insertion Loss ^{1,2}	≤0.8dB	dB
	Return Loss ^{1,2}	≥55(SM) ≥30(MM)	dB
	Crosstalk ¹	≥ 55 dB	dB
	PDL	≤0.05	dB
	WDL	≤0.25	dB
	Repeatability	≤±0.02	dB
	Operating Voltage	3.0 or 5.0	V
	Durability	≥ 10 Million	Cycles
	Switching Time	≤8	ms
	Optical Power	≤500	mW
	Operating Temperature	-20 ~ +70	°C
	Storage Temperature	-40 ~ +85	°C
	Relative Humidity	5 ~ 95	%
Dimension	(L)27.0×(W)12.6×(H)8.0 ±0.2 or (L)22.5×(W)12×(H)10.5±0.2		mm

*Note: 1) Within operating temperature and SOP. 2) Excluding Connectors.

CODE	FIBER TYPE		OPERATING VOLTAGE		SWITCH TYPE		TEST WAVELENGTH		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH	
F4M-OSW	SM	3 ports	3	3V	L	Latching	85	850nm	25	250μm	0	None	05	0.5 m ±5cm
	M5	Specify	5	5V	N	Non-latching	31	1310nm	9L	900μm	A	SC/UPC	10	1m ±5cm
	M6	3 ports					55	1550nm	S	Specify	B	SC/APC	S	Specify
							35	1310/1550nm			C	FC/UPC		
	S	Specify					S	Specify			D	FC/APC		
										E	LC/UPC			
										Q	LC/APC			
										S	Specify			

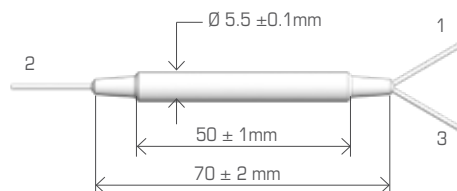
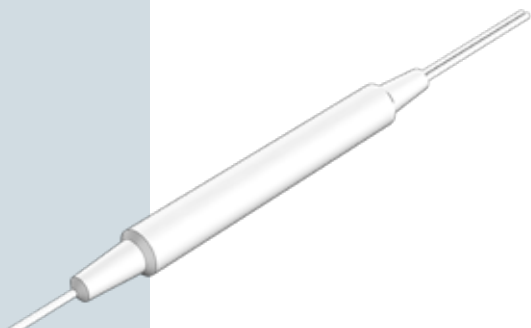
ORDER CODE EXAMPLE

F4M-OSW - SM - 3 - L - S - S - S - S





OPTICAL CIRCULATOR



The Fiber Optic Circulators are non-reciprocal advanced passive devices that direct light sequentially from port 1 to port 2, port 2 to port 3 and so on in only one direction. Unlike Fiber Optic Isolators, Fiber Optic Circulators do not disregard backward propagating light from

the input fiber, but rather route it to another port. Circulators are used in Bi-Directional and High-Speed Communication Systems, DWDM Networks, Fiber Amplifiers, Fiber Sensors, OTDR Measurements.

	PARAMETERS	VALUE	UNIT
SPECIFICATIONS	Center Wavelength (λ_c)	1310, 1550 or 1064	nm
	Operating Wavelength range	± 30	nm
	Insertion Loss*	≤ 0.8 UPC ; ≤ 1.0 APC	dB
	Isolation	≥ 40	dB
	Isolation [Channel Peak]	≥ 50	dB
	Polarization Dependent Loss	≤ 0.15	dB
	Return Loss *	≥ 50	dB
	Channel Cross Talk [Port1 to Port3]	≥ 50	dB
	Polarization Mode Dispersion	≤ 0.05	ps
	Power Handling**	500	mW
	Operating Temperature	-40 to +85	$^{\circ}\text{C}$
	Storage Temperature	-40 to +85	$^{\circ}\text{C}$
	Package size	$\varnothing 5.5 \times 50$	mm

*Note: IL and RL tested with Connectors. ** High Power handling available.

CODE	N° OF PORTS		WAVELENGTH		FIBER TYPE		CONNECTOR TYPE		FIBER LENGTH	
F4M-CIR	13	3 ports	31	1310nm	25	250 μm Bare Fiber	0	None	05	0.5 m
	S	Specify	55	1550nm	9L	900 μm Loose Tube	A	SC/UPC	10	1m
			64	1064nm	S	Specify	B	SC/APC	S	Specify
			S	Specify			C	FC/UPC		
							D	FC/APC		
							E	LC/UPC		
							Q	LC/APC		
						S	Specify			

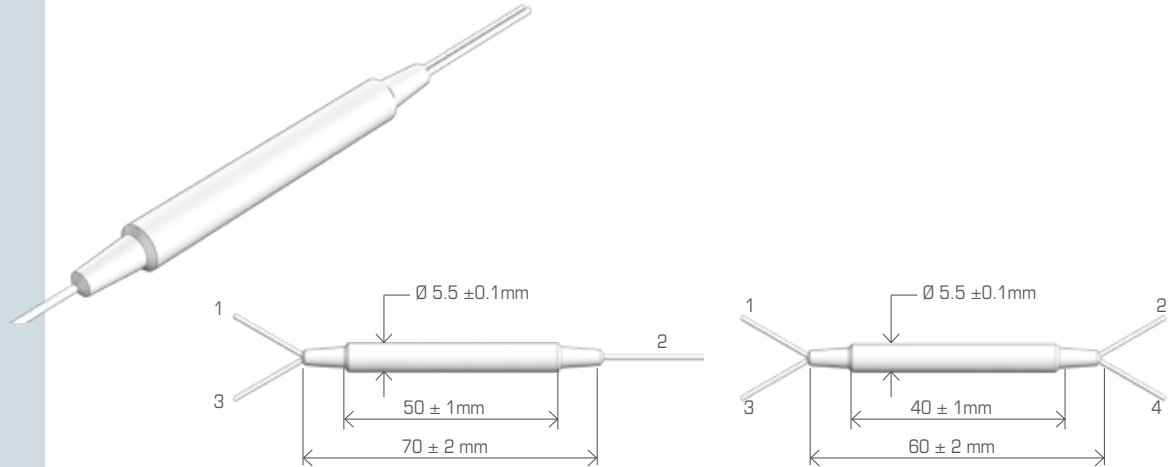
ORDER CODE EXAMPLE

F4M-CIR - 13 - 31 - 25 - QQ - 10



POLARIZATION INSENSITIVE MINI OPTICAL CIRCULATOR

CIR SERIES



The Optical Circulator is a compact, high performance lightwave component that routes incoming signals from Port 1 to Port 2, and incoming Port 2 signals to Port 3 and so on in only one direction. The component provides high Isolation, low insertion loss, low PDL, low PMD and excellent environmental stability.

PARAMETERS	VALUE		UNIT
	3 PORT	4 PORT	
Center Wavelength (λ_c)	1310, 1550 or 1064		nm
Operating Wavelength Range	$\lambda_c \pm 20$		nm
Typ. Insertion Loss	0.7		dB
Max Insertion Loss	0.8	0.9	dB
Min. Isolation (@ 23 °C)	38	45	dB
Min. Crosstalk	50		dB
Min. Return Loss	55	50	dB
Max. Polarization Dependent Loss, 23°C	0.1	0.2	dB
Max. Polarization Mode Dispersion	0.1		ps
Max. Tensile Load	5		N
Fiber Type	SMF-28e		
Max. Optical Power (Continuous Wave)	300		mW
Operating Temperature Range	-5 to +70		°C
Storage Temperature Range	-40 to +85		°C

*Note: IL is 0.3 dB higher and RL is 5 dB lower for each connector added.

CODE	N° OF PORTS	WAVELENGTH	FIBER TYPE	CONNECTOR TYPE	FIBER LENGTH	
F4M-CIRI	13	3 ports	31 1310nm	25 250µm Bare Fiber	0 None	05 0.5 m
	14	4 ports	55 1550nm	9L 900µm Loose Tube	A SC/UPC	10 1m
	S	Specify	64 1064nm	S Specify	B SC/APC	S Specify
			S Specify		C FC/UPC	
					D FC/APC	
					E LC/UPC	
					Q LC/APC	
				S Specify		

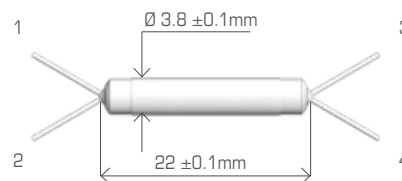
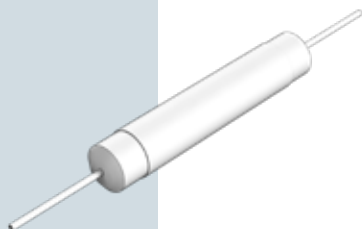
ORDER CODE EXAMPLE

F4M-CIRI-13 - 55 - 25 - BB - S





POLARIZATION INSENSITIVE MINI 2 IN 1 ISOLATOR



The Twin Isolator integrates two independent isolators into one standard isolator package and is excellently suited for EDFAs or instrumentation designs where two or more isolators are used. The Twin

Isolator offers excellent temperature stability, low insertion loss, high isolation, low temperature dependence and great space saving.

	PARAMETERS	DUAL STAGE		UNIT
		GRADE P	GRADE A	
SPECIFICATIONS	Center Wavelength (λ_c)	1550		nm
	Typ. Peak Isolation(Port 4 to Port 1, Port 3 to Port 2)	52	50	dB
	Min. Isolation (Port 4 to Port 1, Port 3 to Port 2), $\lambda_c \pm 15$ nm, 23°C, all polarization	40	38	dB
	Typ. Insertion Loss (Port 1 to Port 4, Port 2 to Port 3), λ_c , 23°C, all polarization	0.6	0.75	dB
	Max. Insertion Loss, (Port 1 to Port 4, Port 2 to Port 3), $\lambda_c \pm 20$ nm, all polarization	0.9	1.0	dB
	Min. Return Loss (Input/Output)	55/55	55/55	dB
	Directivity (Port 1 to Port 2, Port 3 to Port 4), λ_c , 23°C	55	55	dB
	Min. Crosstalk (Port 1 to Port 3, Port 2 to Port 4), λ_c , 23°C	50	50	dB
	Max. Polarization Dependent Loss, λ_c , 23°C	0.1	0.2	dB
	Max. Polarization Mode Dispersion	0.07	0.1	ps
	Max. Optical Power (Continuous Wave)	300		mW
	Operating Temperature	-5 to +70		°C
	Storage Temperature	-40 to +85		°C

*Note: *IL is 0.5 dB higher and RL is 5 dB lower for each connector added.

CODE	STAGE	GRADE	WAVELENGTH	FIBER TYPE	CONNECTOR TYPE	FIBER LENGTH	
F4M-TMISO	2	Dual Stage	P Premium	55 1550 nm	25 250 μ m Bare Fiber	O None	05 0.5 m
			A A grade	S Specify	9L 900 μ m Loose Tube	A SC/UPC	10 1m
				S Specify	B SC/APC	S Specify	
					C FC/UPC		
					D FC/APC		
					E LC/UPC		
					Q LC/APC		
					S Specify		

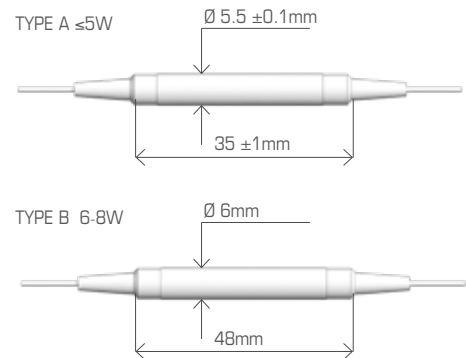
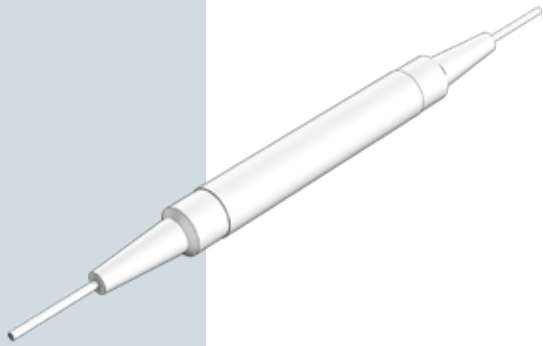
ORDER CODE EXAMPLE

F4M-TMISO - 2 - P - 55 - 25 - 00 - 10



POLARIZATION INSENSITIVE HIGH POWER ISOLATOR

ISO SERIES



The Polarization Insensitive Isolator is designed and manufactured according to Telcordia standard. The unique manufacturing process and optical path epoxy-free design enhance the device high power handling capability. The device is characterized with high perfor-

mance, high reliability and low cost. It has been widely used in EDFAs, fiber lasers, transmitters and other fiber optics communication equipments to suppress back reflection and back scattering.

PARAMETERS	SINGLE STAGE		DUAL STAGE		UNIT
	GRADE P	GRADE A	GRADE P	GRADE A	
Center Wavelength (λ_c)	1310, 1480 or 1550				nm
Typ. Peak Isolation	42	40	58	55	dB
Min. Isolation, $l_c \pm 10$ nm, 23°C, all polarization states	30	29	46	45	dB
Typ. Insertion Loss, $l_c \pm 10$ nm, 23°C, all polarization states	0.35	0.5	0.4	0.6	dB
Max. Insertion Loss, $l_c \pm 20$ nm, all temperature, all polarization	0.5	0.7	0.6	0.9	dB
Min. Return Loss (Input/Output)	60/55	60/55	60/55	60/55	dB
Max. Polarization Dependent Loss, 23°C	0.10	0.15	0.10	0.15	dB
Max. Polarization Mode Dispersion	0.20	0.25	0.05	0.07	ps
Max. Optical Power (Continuous Wave)	10				W
Max. Tensile Load	5				
Fiber Type	SMF-28e				-
Operating Temperature	-5 to +70				°C
Storage Temperature	-40 to +85				°C

SPECIFICATIONS

*Note: IL is 0.3 dB higher, RL is 5 dB lower for each connector added. Optical Power will be 1W only with connector added.

CODE	STAGE	HANDLING POWER	GRADE	WAVELENGTH	FIBER JACKET	POWER TYPE	FIBER LENGTH
F4M-HPISO	1	Single Stage	05 5 W	P Premium	31 1310 nm	25 250µm Bare Fiber	P Pulse Application 05 0.5 m
	2	Dual Stage	10 10W	A A grade	48 1480 nm	9L 900µm Loose Tube	C Continuous Wave 10 1m
			S Specify		55 1550 nm	S Specify	S Specify
					S Specify		

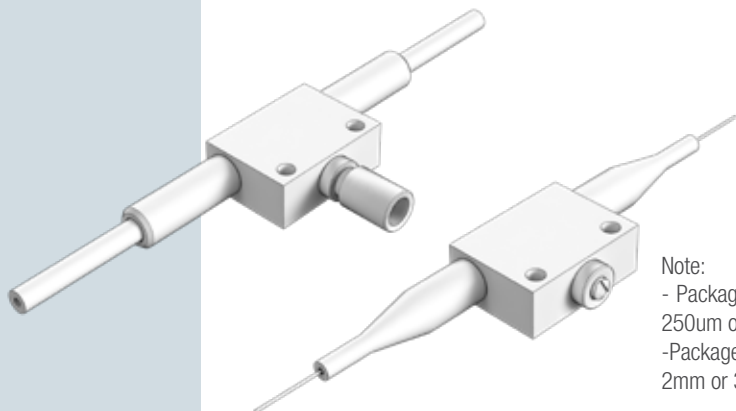
ORDER CODE EXAMPLE

F4M-HPISO - 1 - S - P - S - S - P - S

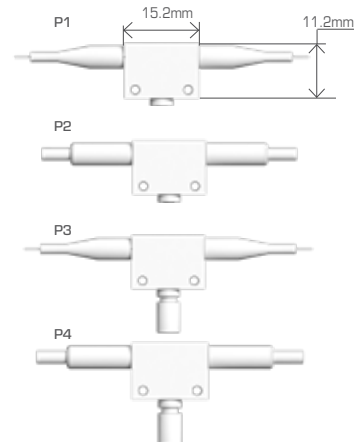




MINI MANUAL VARIABLE ATTENUATOR



Note:
 - Package type P1&P3 is designed for 250um or 900um fiber jacket
 - Package type P2&P4 is designed for 2mm or 3mm fiber jacket.



Mini Type Manual variable Attenuator (MVOA) operates by manually moving a shading element into optical beam. The shading element can be integrating adjusted to get any attenuation value in a range.

MVOA features low insertion loss, good resolution, high stability and good reliability. It is applied for pre-emphasis attenuation, transmitter power control, in-line power equalization, and amplifier power control.

	PARAMETERS	VALUE		UNIT
SPECIFICATIONS	Center Wavelength (λ_c)	780 or 850	980 or 1064	nm
	Operating Wavelength Range	± 10	± 20	nm
	Max. Excess Loss	1.0	0.6	dB
	Max. WDL, 23C°, minimum attenuation	0.3		dB
	Min. Attenuation Range	30		dB
	Resolution within 10dB Attenuation Range	0.1		dB
	Min. Extinction Ratio (for PM fiber type)	20		dB
	Max. PDL (for SM fiber type), 23C°, c, minimum attenuation	0.05		dB
	Max. TDL at attenuation range, c**	0.01		dB/°C
	Min. Return Loss (for SM or PM fiber)	50		dB
	Min. Return Loss (for MM fiber)	25		dB
	Max. Optical Power (Continuous Wave)	300		mW
	Storage Temperature	0 ~ +70		°C
	Operating Temperature	-40 ~ + 85		°C

*Note: *IL is 0.5 dB higher, RL is 5 dB lower, and ER is 2 dB lower for each connector added. TDL is exempted when attenuation value over 30dB.

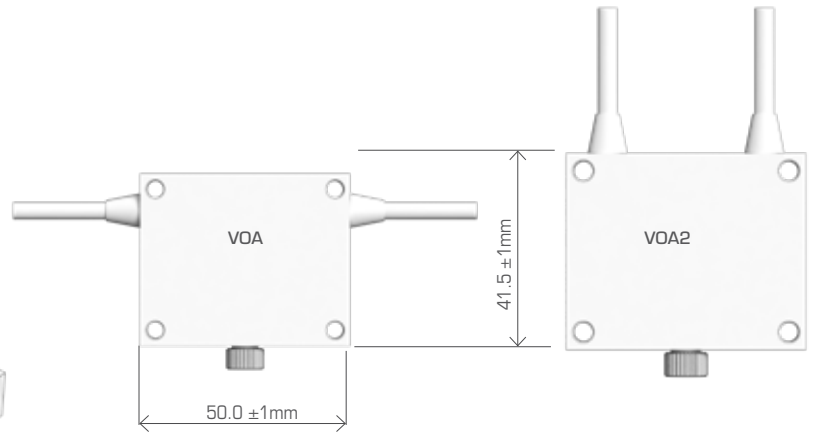
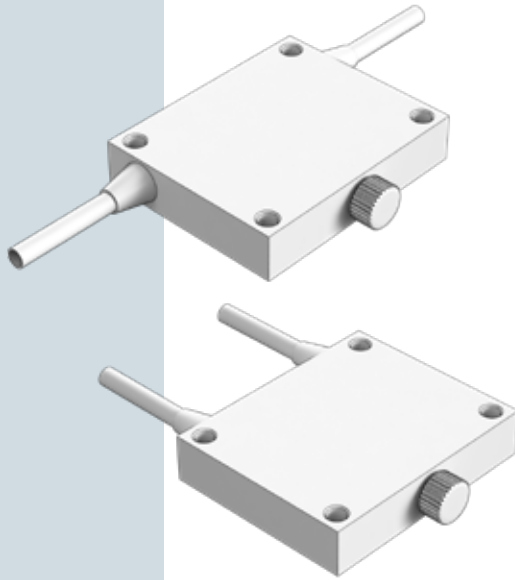
CODE	WAVELENGTH		FIBER TYPE		FIBER JACKET		CONNECTOR TYPE		FIBER LENGTH		PACKAGE TYPE	
F4M-MVOA	78	780 \pm 10 nm	HI	HI fiber	25	250 μ m Bare Fiber	O	None	05	0.5 m	P1	Set-Screw
	85	850 \pm 10 nm	PF	Panda fiber	9L	900 μ m Loose Tube	A	SC/UPC	10	1m	P2	Set-Screw
	98	980 \pm 20 nm	M1	105/125 N.A.	2M	2mm	B	SC/APC	S	Specify	P3	Knob
	64	1064 \pm 20 nm	M5	50/125	3M	3mm	C	FC/UPC			P4	Knob
	S	Specify	M6	62.5/125	S	Specify	D	FC/APC				
			S	Specify			E	LC/UPC				
							Q	LC/APC				
							S	Specify				

ORDER CODE EXAMPLE

F4M-MVOA - S - S - 2M - 00 - 10 - P1



VARIABLE ATTENUATOR



Used in In-line Power Control in Multi-channel Optically Amplified System, Transmitter Power Equalization and Laboratory R&D, It features high resolution and convenient manual adjustment. It has low insertion loss, low wavelength dependent loss, and low polarization dependent loss.

It is designed for pre-emphasis attenuation, detector saturation control, in-line power equalization and amplifier power control. Customized designs to meet specialized feature applications is also available.

	PARAMETERS	VALUE	UNIT	
SPECIFICATIONS	Attenuation Variable Range	30dB (@ 1310nm,1550nm)	dB	
	Return Loss	UPC	55	dB
		APC	65	dB
	Resolution	0.5	dB	
	Operation Temperature	-15 ~ 60	°C	
	Storage Temperature	-40 ~ 70	°C	

CODE	TYPE		MODE		GRADE		CONNECTOR SIDE 1&2		CABLE TYPE		CABLE COLOR		FIBER LENGTH	
F4M VOA / VOA2	SJ	Sx Jumper	08	SM 08µm	P	Premium	A	SC/UPC	2MR	2mm	B	Blue	05	0.5 m
			62	MM 62.5µm	S	Standard	B	SC/APC	3MR	3mm	O	Orange	10	1m
			50	MM 50µm			C	FC/UPC	9TB	900µm tight buffer	A	Aqua	S	Specify
			10	MM 50µm 10g			D	FC/APC			Y	Yellow		
			BX	SM Bend Ins.			E	LC UPC Kit			W	White		
			S	Specify			H	ST			R	Red		
							Q	LC/APC			G	Gray		
							S	Specify			L	Black		
								X	No-Jacket					

ORDER CODE EXAMPLE

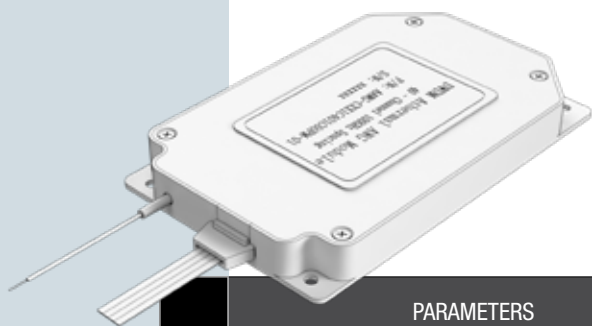
F4M-VOA - SJ - 08 - S - SS - 3MR - Y - 05





40-CH. 100GHZ ATHERMAL AWG MUX/DEMUX MODULE

AWG SERIES



Dense Wavelength Division Mux/Demultiplexer Modules are part of a series of high performance products based on silica-on-silicon planar technology and a unique athermal packaging design requiring no electrical power, software or temperature control for a completely passive DWDM solution. This product range offers a combination of very low loss and high channel isolation along with long term reliability and low cost per channel for 1x40 channel, 100GHz solutions.

	PARAMETERS	MIN	TYP.	MAX	UNIT
SPECIFICATIONS	Number of Channels		1x40		-
	Number Channel Spacing		100		GHz
	Cha. Center Wavelength		C-band		nm
	Clear Channel Passband		±0.1		nm
	Wavelength Stability		±0.05		nm
	-1 dB Channel Bandwidth	0.24	-	-	nm
	-3 dB Channel Bandwidth	0.43			nm
	Optical Insertion Loss at ITU grid	-	3.5	4.5	dB
	Adjacent Channel Isolation	25	-	-	dB
	Non-Adjacent, Channel Isolation	29	-	-	dB
	Total Channel Isolation	22	-	-	dB
	Insertion Loss Uniformity	-	0.8	1.5	dB
	Insertion Loss Ripple			1.5	dB
	Optical Return loss	40	-	-	dB
	PDL Polarization Dependent Loss in Clear Channel Band		0.3	0.5	dB
	Polarization Mode Dispersion	-	-	0.5	ps
	Maximum Optical Power	-	-	23	dBm
	MuxDemux input output Monitoring range	-35	-	+23	dBm
	Operating Temperature	-5	-	65	°C
	Operating Humidity	5		95	%RH
Storage Temperature	-40	-	+85	°C	

1. IL Represents the worst case over a +-0.1nm window around the ITU wavelength.

2. PDL was measured on average polarization over a +- 0.1nm window around the ITU wavelength.

3. Bandwidth measured from the peak of IL average.

CODE	TYPE	CHANNEL COUNT	CHANNEL SPACING	CONNECTOR TYPE	FIBER LENGTH	
F4M-AWG	GA	Gauss, Athermal	16 | 16 channels	05 | 50GHz	0 | None	05 | 0.5 m
			24 | 24 channels	10 | 100GHz	A | SC/UPC	10 | 1m
			32 | 32 channels	S | Specify	B | SC/APC	S | Specify
			40 | 40 channels		C | FC/UPC	
			44 | 44 channels		D | FC/APC	
			48 | 48 channels		E | LC/UPC	
			S | Specify		Q | LC/APC	
					S | Specify	

Different input and output fibers, such as SM fibers, MM fibers and PM fiber can be selected to meet different applications.

ORDER CODE EXAMPLE

F4M-AWG-GA - 40 - S - 0 - 05



40-CH. 100GHZ THERMAL AWG MUX/DEMUX MODULE

AWG SERIES



This component is designed for use within the C-band release of DWDM system. To decrease the power dissipation of the devices in different environmental conditions, the AWG package is special designed with selection of reliable thermal plastic with low thermal conduction, and the AWG operating temperature is controlled by using foil resist heater with thermistor temperature sensor.

	PARAMETERS	MIN	TYP.	MAX	UNIT
SPECIFICATIONS	Number of Channels		40		-
	Number Channel Spacing		100		GHz
	Cha. Center Wavelength		C-band		nm
	Clear Channel Passband		±0.1		nm
	Wavelength Stability		±0.05		nm
	-1 dB Channel Bandwidth	0.40			nm
	-3 dB Channel Bandwidth	0.60			nm
	Optical Insertion Loss at ITU grid	-	5.0	6.0	dB
	Adjacent Channel Isolation	22	25	-	dB
	Non-Adjacent, Channel Isolation	30	35	-	dB
	Total Channel Isolation	20	22		dB
	Insertion Loss Uniformity	-	-	1.0	dB
	Insertion Loss Ripple	-	0.5	1.0	dB
	Optical Return loss	40	-	-	dB
	Polarization Dependent Loss in Clear Channel Band	-	0.3	0.5	dB
	Polarization Mode Dispersion	-	-	0.5	ps
	Optical Power Handling	-	-	23	dBm
	Set-Point temperature of component	65	-	85	°C
	Set-Point temperature stability	-	-	±0.2	°C
Heater Drive Voltage	-	+5		V	
Heater Drive Current	-	-	2.5	A	

1. IL Represents the worst case over a ±0.1nm window around the ITU wavelength.
2. PDL was measured on average polarization over a ±0.1nm window around the ITU wavelength.
3. Bandwidth measured from the peak of IL average.

CODE	TYPE		CHANNEL COUNT		CHANNEL SPACING		CONNECTOR TYPE		FIBER LENGTH	
	F4M-AWG	FT	Flat top, Thermal	16	16 channels	05	50GHz	0	None	05	0.5 m
			24	24 channels	10	100GHz	A	SC/UPC	10	1m
			32	32 channels	S	Specify	B	SC/APC	S	Specify
			40	40 channels			C	FC/UPC		
			44	44 channels			D	FC/APC		
			48	48 channels			E	LC/UPC		
			S	Specify			Q	LC/APC		
							S	Specify		

Different input and output fibers, such as SM fibers, MM fibers and PM fiber can be selected to meet different applications.

ORDER CODE EXAMPLE

F4M-AWG- FT - S - 10 - 00 - S



Enhancing Optical Performance

These passive devices, from splitters that efficiently distribute optical signals to multiple paths, couplers that adeptly combine or segregate signals from various fibers to the advanced Wavelength Division Multiplexers (WDMs) that can amplify the data capacity of a single fiber by accommodating multiple wavelengths simultaneously, form the backbone of contemporary optical networks. Notably, the Arrayed Waveguide Gratings (AWG) further elevates the performance by acting as a multi-channel optical multiplexer, significantly enhancing data throughput. In essence, these components are instrumental in the design and operation of our modern optical infrastructures, ensuring not just high-speed data transmission but also optimizing the use of every single optical fiber strand to its maximum potential. SANWA Technologies remains committed to delivering the utmost quality in all of these essential components.

Applications:

- Telecommunications
- Broadband Internet Access
- Data Centers
- Cable Television (CATV) Distribution
- Optical Signal Monitoring
- Sensing
- Medical Imaging & Diagnostics
- Research & Development

OVER THE WORLD

SANWA product selection offers a wide range of high-quality and reliable solutions for various applications. Fiber optic technology is known for its ability to transmit data at incredibly fast speeds over long distances, making it ideal for telecommunications, networking, and data center environments.



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