

Portable Product Sheet - GBIC's



Last Updated: February 28, 2005

GBIC Summary

Product Number	Layer 1 Interface Type	Description
WS-G5482	Copper (1000BaseT, RJ-45)	First-generation solution, used in the 3500XL, 3550, and 2900MXL only . Superseded by the WS-G5483. Not supported in any other chassis due to power requirements.
WS-G5483	Copper (1000BaseT, RJ-45)	2nd-gen GE copper solution, solving power
GLC-T	Copper (1000BaseT, RJ-45)	SFP version of the 5483.
WS-X3500-XL	Copper (1000BaseT, Proprietary)	Gigastack GBIC, used in lower-end switches as a low-cost alternative to fiber and copper GBIC's. Can cascade switches in a chain using these GBIC's.
CAB-SFP-50CM	Copper (2Gbps full duplex, Proprietary)	50cm cable is an alternative to using SFP transceivers when interconnecting Catalyst 3560 switches through their SFP ports.
WS-G5484	Fiber, short wavelength (1000BaseSX, SC connector)	Class 1 LED of 850 nm for (short-range) applications.
WS-G5486	Fiber, long haul (1000BaseLX/LH, SC connector)	Class 1 laser of 1300 nm for (medium-range) applications.
WS-G5487	Fiber, extended distance (1000BaseZX, SC connector)	Class 1 laser of 1550 nm for (long-range) applications.
GLC-BX-U	1000BASE-BX10-U Small Form-factor Pluggable (SFP, LC connector)	1000BASE-BX10-U 1310 nm upstream bidirectional single fiber - need GLC-BX-D on downstream side
GLC-BX-D	1000BASE-BX10-D Small Form-factor Pluggable (SFP, LC connector)	1000BASE-BX10-D 1490 nm downstream bidirectional single fiber - need GLC-BX-U on upstream side
GLC-SX-MM	1000BaseSX Small Form-factor Pluggable (SFP, LC connector)	SFP version of the 5484.
GLC-LH-SM	1000BaseLX/LH Small Form-factor Pluggable (SFP, LC connector)	SFP version of the 5486.
GLC-ZX-SM	1000BaseZX Small Form-factor Pluggable (SFP, LC connector)	SFP version of the 5487.
GLC-GE-100FX	100BaseFX Small Form-factor Pluggable (SFP, LC Connector)	SFP for connecting some models of fixed-configuration switches with SFP slots to 100BaseFX networks.
CWDM-GBIC-xxxx	Fiber, CWDM, SC connector	Class 1 laser at varying lambdas for OADM applications.
CWDM-SFP-xxxx	Fiber, CWDM, LC connector	SFP version of the CWDM GBIC's.
DWDM-GBIC-xxxx	Fiber, DWDM, SC connector	Class 1 laser at varying lambdas for DWDM applications.
XENPAK-xxxx	Fiber, varying distances, SC or Infiniband	10GE modular optic of choice.

A note on Third-Party GBIC's

WDM, copper, and SFP GBIC's all include a GBIC EEPROM "code" that certifies the GBIC as coming from Cisco. New versions of IOS/CatOS check this code to verify the GBIC - if the code is not found, or is not valid, the software will disable the port in software and will not allow traffic to pass. Older GBIC's (5484/5486/5487) were manufactured before this feature was introduced, and do not contain this feature. Regardless, TAC will not troubleshoot a GBIC that was not purchased from Cisco, the same policy as Flash/DRAM memory.

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Cabling Specifications

GBIC	λ (nm)	Core Size (microns)	Modal λ	Maximum Cable Distance
Copper	N/A	N/A	N/A	328 ft (100 m)
SX	850	62.5	160	722 ft (220 m)
		62.5	200	902 ft (275 m)
		50	400	1640 ft (500 m)
		50	500	1804 ft (550 m)
LX/LH	1300	62.5	500	1804 ft (550 m)
		50	400	1804 ft (550 m)
		50	500	1804 ft (550 m)
		8, 9, or 10	N/A	6.2 miles (10 km)
ZX	1550	9 or 10	N/A	43.5 miles (70 km)
		8	N/A	62.1 miles (100 km)
CWDM	Various	8, 9, or 10	N/A	62.1 miles (100 km)

Physical Characteristics

Value	5483	5484	5486	5487	Gigastack
TX min. (dBm)	N/A	-9.5	-9.5	0	N/A
TX max. (dBm)		-4	-3	5	
RX min. (dBm)		-17	-20	-23	
RX max. (dBm)		0	-3	0	
Supply Current		200mA typical, 300mA max			
Supply Voltage		6V, max			
Surge Current		30mA			
Input Voltage		4.75-5.25V, 5V typical			
Dimensions	0.75 x 1.55 x 4.32 in. (1.78 x 3.94 x 11 cm)	0.39 x 1.18 x 2.28 in. (1 cm x 3 cm x 5.8 cm)		0.75 x 1.54 x 3.50 in. (1.90 x 3.91 x 8.89 cm)	
Temp (Storage)	-4 to 149° F (-20 to 65° C)	-40 to 185° F (-40 to 85° C)		-13 to 158° F (-25 to 70° C)	
Temp (Operating)	32 to 113° F (0 to 45° C)	32 to 122° F (0 to 50° C)		32 to 113° F (0 to 45° C)	
Relative Humidity	10-85% (non-condensing)				
Altitude	Up to 10,000 ft (3,000 m)				
Power Consumption	1.5W max	1.8W max		2W max	

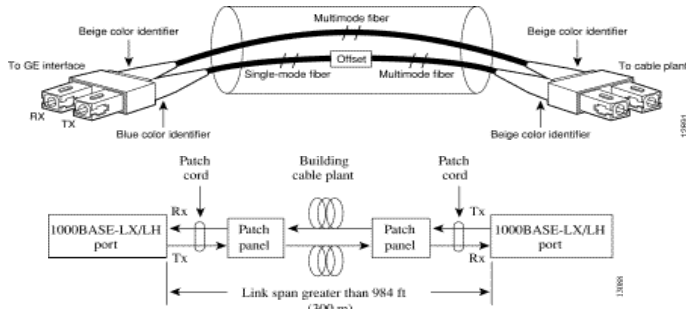
Notes: GBIC's

SFP GBIC's are roughly identical to 548x's with two exceptions - Input Voltage is only 3.3V typically, and measure 0.33 x 0.52 x 2.22 in. (0.85 cm x 1.34 cm x 5.65 cm). Their optical budget may be slightly less, as well, but the above numbers are valid approximations for the output of a SFP version.

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LX GBIC Mode Conditioning Cable (CAB-GELX-625=)



Used with LX/LH GBIC to attenuate signal to be appropriate for MMF
 Not needed with any other GBIC or when using LX/LH with SMF
 One needed per side of the link

GBIC Regulatory Restrictions

There used to be a 12 or 24 maximum GBIC restriction to comply with FCC emissions regulations. This no longer applies. Now, you may install as many ZX and CWDM GBIC's in a chassis as desired, so long as the cards are of a certain rev that uses metal rails (instead of plastic rails)... 6416 rev 2.0, 6516 rev 4.0, 6816 rev 1.2, and 4306 rev 2.2 all include this, as do all future linecards. CWDM are technically limited to 92 per chassis, but many deployments will never approach this limitation.

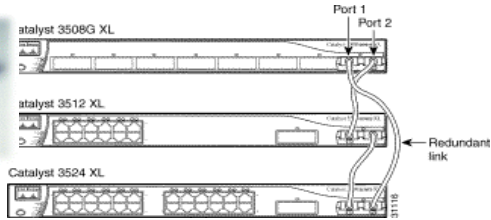
Gigastack GBIC (WS-X3500-XL=)

Part number WS-X3500-XL (one gigastack GBIC and one 50cm copper cable)
 Also can order CAB-GS-1M (one meter gigastack GBIC copper cable)
 Can daisy-chain top GBIC of a stack to the bottom for redundancy (only as of OS 12.0(5))
 Compatible only with 3500XL, 3550, 2950G, and 2900MXL switches

Gigastack GBIC Picture



Cascaded Configuration



CISCO CATALYST 3560 SFP INTERCONNECT CABLE - CAB-SFP-50CM=

The Cisco Catalyst 3560 SFP Interconnect Cable provides for a low-cost point-to-point Gigabit Ethernet connection between Catalyst 3560 switches. The 50cm cable is an alternative to using SFP transceivers when interconnecting Catalyst 3560 switches through their SFP ports over a short distance.



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CWDM GBIC's

CWDM GBIC's are configured to emit a laser at a particular wavelength (λ). These laser streams are then added/dropped off from a OADM (Optical Add-Drop Mux), which selectively drops channels off from a fiber. This allows multiple Gigabit Ethernet connections to be carried over a single pair of single-mode fiber for a much cheaper cost than conventional DWDM solutions. However, they cannot be optically amplified.

Parameter	Symbol	Min	Typical	Max	Units
Supply current	I_s		280	350	mA
Surge current	I_{Surge}			400	mA
Input voltage	V_{cc}	4.75	5	5.25	V
Transmitter center wavelength	λ	(x-4)	(x+1)	(x+6)	nm
Wavelength temperature			0.08		nm/ $^{\circ}$ C
Side mode suppression ratio	SMSR	30			dB
Transmitter optical output power	P_{out}	1	3	5	dBm
Receiver optical input power	P_{in}	-31	-33	-7	dBm
Optical input wavelength	λ_{in}	1450		1620	nm
Transmitter extinction ratio	OMI	9			dB
Transmitter eye opening	-	40%			
Dispersion penalty at 60 km				2	dB
Dispersion penalty at 100 km				3	dB

Product Number	Color
CWDM-GBIC-1470=	Gray
CWDM-GBIC-1490=	Violet
CWDM-GBIC-1510=	Blue
CWDM-GBIC-1530=	Green
CWDM-GBIC-1550=	Yellow
CWDM-GBIC-1570=	Orange
CWDM-GBIC-1590=	Red
CWDM-GBIC-1610=	Brown
CWDM-8GBIC-SET1=	2x Gray, Blue, Yellow,
CWDM-8GBIC-SET2=	2x Violet, Green,



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CWDM SFP GBIC's

CWDM SFP GBIC's are SFP-form factor versions of the CWDM GBIC's. They operate in the exact same manner, but have different operating characteristics, as shown in the

Parameter	Symbol	Min	Typical	Max	Units
Supply current	I_s		220	300	mA
Maximum voltage	V_{max}	3.1	3.3	3.6	V
Surge current	I_{Surge}			330	mA
Transmitter center wavelength	λ	(x-4)		(x+7)	nm
Side mode suppression ratio	SMSR	30			dB
TX optical output power	P_{out}	0		5	dBm
RX optical input power @1.25Gbps	P_{in}	-29		-7	dBm
RX optical input power	P_{in}	-28		-7	dBm
Optical input wavelength	λ_{in}	1450		1620	nm
Transmitter extinction ratio	OMI	9			dB
Dispersion penalty @100 km @1.25Gbps				2	dB
Dispersion penalty @100 km @2.12Gbps				3	dB

Product Number	Color
CWDM-SFP-1470=	Gray
CWDM-SFP-1490=	Violet
CWDM-SFP-1510=	Blue
CWDM-SFP-1530=	Green
CWDM-SFP-1550=	Yellow
CWDM-SFP-1570=	Orange
CWDM-SFP-1590=	Red
CWDM-SFP-1610=	Brown



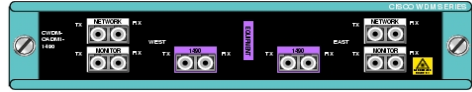
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CWDM GBIC OADM (Optical Add/Drop Multiplexors)

There are 3 different OADM's - 3 one-channel (one for each lambda), 1 four-channel, and 1 eight-channel. All are passive devices, requiring no power, and are unmanaged. They underwent a hardware "refresh" in late 2004 to newer models with less loss, a monitor port, LC connectors, and transparency to 1300nm lambdas, which means that existing GE signalling can be carried as well with minimal loss.

CWDM-OADM1-xxxx=



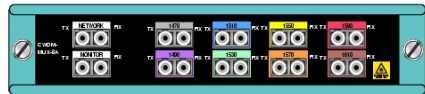
This single-channel OADM drops only one of the channels, and passes the rest. Its channels are divided into "east" and "west" sides of the network, and is the only OADM to physically denote the separation of east and west (the others assume a point-to-point topology or ring that is mostly pass-through). The older models went by part number CWDM-MUX-AD-xxxx and used SC connectors.

CWDM-OADM4-x=



These four-channel OADM's add/drop four of the channels (1470, 1490, 1510, 1530 for option 1, 1550, 1570, 1590, and 1610 for option 2), and passes the rest. Each channel is sent to one input/output port. The previous model (CWDM-MUX-4) only did four lambdas (1470, 1510, 1550, and

CWDM-MUX8A=



This eight-channel OADM add/drops all eight of the channels, and does not pass any. Each channel is sent to one input/output port. The older model was part number CWDM-MUX-8 and used SC.

All eleven OADM's have physical dimensions of 8.3" x 1.17" x 10.4" (W x H x D). Two OADM's fit in the OADM chassis (CWDM-CHASSIS-2=), which takes up 1 RU and is standard 19" rackmount.

All new MUX chassis and SFP's use LC fiber connectors. GBIC versions use SC fiber connectors.

Insertion Losses (New)

MUX	max insertion loss(dB)	
	Add/Drop	Pass
OADM1-xxxx	1.5	1.5
OADM4-x	1.8	2.1
MUX8A	2.2	N/A

Insertion Losses (Old)

MUX	Max Insertion Loss(dB)		
	Add	Drop	Pass
MUX-AD-xxxx=	1.9	2.3	2
MUX-4=	4	5	2.6
MUX-8=	4	5	N/A

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DWDM GBIC's

DWDM GBIC's are configured to emit a laser at a particular wavelength (λ), compatible with DWDM systems operating in the ITU ranges listed below. Since they all operate within a discrete, well-known spectrum, they can be optically amplified.

Parameter	Symbol	Min	Typical	Max	Units
Supply current	I_s		250	350	mA
Surge current	I_{Surge}			+0	mA
Input voltage	V_{cc}	4.75	5	5.25	V
Spectral Width	λ_{20}			0.3	nm
Transmitter center wavelength	λ	(x-100)	x	(x+100)	pm
Side mode suppression ratio	SMSR	30			dB
Transmitter optical output power	P_{out}	0		3	dBm
Receiver optical input power	P_{in}	-28		-7	dBm
Optical input wavelength	λ_{in}	1450		1620	nm
Transmitter extinction ratio	OMI	9			dB



Product Number	Description	ITU Chan.
DWDM-GBIC-60.61	1000BASE-DWDM 1560.61 Nm GBIC (100 GHz ITU)	21
DWDM-GBIC-59.79	1000BASE-DWDM 1559.79 Nm GBIC (100 GHz ITU)	22
DWDM-GBIC-58.98	1000BASE-DWDM 1558.98 Nm GBIC (100 GHz ITU)	23
DWDM-GBIC-58.17	1000BASE-DWDM 1558.17 Nm GBIC (100 GHz ITU)	24
DWDM-GBIC-56.55	1000BASE-DWDM 1556.55 Nm GBIC (100 GHz ITU)	26
DWDM-GBIC-55.75	1000BASE-DWDM 1555.75 Nm GBIC (100 GHz ITU)	27
DWDM-GBIC-54.94	1000BASE-DWDM 1554.94 Nm GBIC (100 GHz ITU)	28
DWDM-GBIC-54.13	1000BASE-DWDM 1554.13 Nm GBIC (100 GHz ITU)	29
DWDM-GBIC-52.52	1000BASE-DWDM 1552.52 Nm GBIC (100 GHz ITU)	31
DWDM-GBIC-51.72	1000BASE-DWDM 1551.72 Nm GBIC (100 GHz ITU)	32
DWDM-GBIC-50.92	1000BASE-DWDM 1550.92 Nm GBIC (100 GHz ITU)	33
DWDM-GBIC-50.12	1000BASE-DWDM 1550.12 Nm GBIC (100 GHz ITU)	34
DWDM-GBIC-48.51	1000BASE-DWDM 1548.51 Nm GBIC (100 GHz ITU)	36
DWDM-GBIC-47.72	1000BASE-DWDM 1547.72 Nm GBIC (100 GHz ITU)	37
DWDM-GBIC-46.92	1000BASE-DWDM 1546.92 Nm GBIC (100 GHz ITU)	38
DWDM-GBIC-46.12	1000BASE-DWDM 1546.12 Nm GBIC (100 GHz ITU)	39
DWDM-GBIC-44.53	1000BASE-DWDM 1544.53 Nm GBIC (100 GHz ITU)	41
DWDM-GBIC-43.73	1000BASE-DWDM 1543.73 Nm GBIC (100 GHz ITU)	42
DWDM-GBIC-42.94	1000BASE-DWDM 1542.94 Nm GBIC (100 GHz ITU)	43
DWDM-GBIC-42.14	1000BASE-DWDM 1542.14 Nm GBIC (100 GHz ITU)	44
DWDM-GBIC-40.56	1000BASE-DWDM 1540.56 Nm GBIC (100 GHz ITU)	46
DWDM-GBIC-39.77	1000BASE-DWDM 1539.77 Nm GBIC (100 GHz ITU)	47
DWDM-GBIC-38.98	1000BASE-DWDM 1538.98 Nm GBIC (100 GHz ITU)	48
DWDM-GBIC-38.19	1000BASE-DWDM 1538.19 Nm GBIC (100 GHz ITU)	49
DWDM-GBIC-36.61	1000BASE-DWDM 1536.61 Nm GBIC (100 GHz ITU)	51
DWDM-GBIC-35.82	1000BASE-DWDM 1535.82 Nm GBIC (100 GHz ITU)	52
DWDM-GBIC-35.04	1000BASE-DWDM 1535.04 Nm GBIC (100 GHz ITU)	53
DWDM-GBIC-34.25	1000BASE-DWDM 1534.25 Nm GBIC (100 GHz ITU)	54
DWDM-GBIC-32.68	1000BASE-DWDM 1532.68 Nm GBIC (100 GHz ITU)	56
DWDM-GBIC-31.90	1000BASE-DWDM 1531.90 Nm GBIC (100 GHz ITU)	57
DWDM-GBIC-31.12	1000BASE-DWDM 1531.12 Nm GBIC (100 GHz ITU)	58
DWDM-GBIC-30.33	1000BASE-DWDM 1530.33 Nm GBIC (100 GHz ITU)	59

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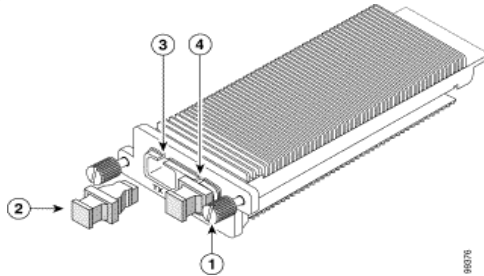


XENPAK and X2 10GE Optics

Xenpak optics are modular interfaces used to select the layer 1 connectivity option for 10GE transmission. They are used on all 10GE interfaces, save the original 1-port 10GE linecard for the 6500/7600 series switches and routers. X2 optics are essentially identical, but a slightly smaller form factor.

Feature	LX4	CX4	SR	LR	ER
TX min. (dBm)	n/a	N/A	-7.3	-8.2	-4.7
TX max. (dBm)	-0.5 per lane		n/a	0.5	4
RX min. (dBm)	-14.4 per lane		-9.9	-14.4	-15.8
RX max. (dBm)	-0.5 per lane		-1	0.5	-1
Tx/Rx Wavelength (nm)	lanes, 1269 - 1355		840-860	1260-1355	1530-1565
Dimensions	4.76 in (121mm) D x 1.42 in (36mm) W x 0.47 in (18mm) H				
Weight	0.29 lb (0.13 kg)				
Temp (Storage)	-40° F to 167° F (-40° C to 75° C)				
Temp (Operating)	0° C and 40° C (32° F to 104° F)				
Cable Type	MMF	Copper	MMF	SMF	SMF
Max Tx Distance (typ)	300m	15m	35m	10km	40km
Power Usage (Max)	8W				

Xenpak Picture



1	Captive installation screw	3	Transmit optical bore
2	Optical bore dust plug	4	Receive optical bore

Portable Product Sheet - GBIC's



100BaseFX Transceiver

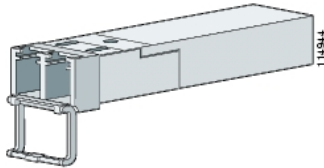
This SFP is intended to provide a 100BaseFX connection to other switches, facilitating transitions to

Optical Characteristics						
Wavelength (nanometers)			Fiber Type	Core Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
Minimum: 1270	Typical: 1300	Max: 1380	MMF	50/125 62.5/125	500	6,562 feet (2 km)

Environmental Ranges	
Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	-40 to 176°F (-40 to 80°C)
Relative humidity	10 to 85% (noncondensing)
Operating altitude	Up to 10,000 ft (3049 m)
Storage altitude	Up to 15,000 ft (4573 m)

Power Requirements	
Supply voltage	3.32 to 3.47 V
Supply current	405 to 450 mA
Power dissipation	1.5 W

Physical Dimensions	
Weight	0.6 oz. (17 g)
Dimensions (H x D x W)	0.39 x 2.23 x 0.54 in. (9.80 x 56.70 x 13.8 mm)



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GBIC Compatibility Chart

Green = Supported (check IOS/CatOS Release Notes for version compatibility) Red = Not Supported

Device	GBIC					Gigastack X3500-XL	CWDM	DWDM
	5484	5486	5487	5482	5483			
Switches								
2912MF-XL	Green	Green	Red	Green	Green	Green	Green	Red
2924M-XL	Green	Green	Red	Green	Green	Green	Green	Red
2948G	Green	Green	Red	Green	Green	Green	Green	Red
2948G-L3	Green	Green	Red	Green	Green	Green	Green	Red
2950G-xx-EI	Green	Green	Red	Green	Green	Green	Green	Red
2980G (-A)	Green	Green	Red	Green	Green	Green	Green	Red
3500XL Series	Green	Green	Red	Green	Green	Green	Green	Red
3550 Series	Green	Green	Red	Green	Green	Green	Green	Red
4908G-L3	Green	Green	Red	Green	Green	Green	Green	Red
4912	Green	Green	Red	Green	Green	Green	Green	Red
4000 (CatOS)	Green	Green	Red	Green	Green	Green	Green	Red
4000 (Native)	Green	Green	Red	Green	Green	Green	Green	Red
5000	Green	Green	Red	Green	Green	Green	Green	Red
6000 (CatOS)	Green	Green	Red	Green	Green	Green	Green	Red
6000 (Native)	Green	Green	Red	Green	Green	Green	Green	Red
Routers								
26/36/3700	Green	Green	Red	Green	Green	Green	Green	Red
7200	Green	Green	Red	Green	Green	Green	Green	Red
7300	Green	Green	Red	Green	Green	Green	Green	Red
7600	Green	Green	Red	Green	Green	Green	Green	Red
10000	Green	Green	Red	Green	Green	Green	Green	Red
12000	Green	Green	Red	Green	Green	Green	Green	Red

Notes - GBIC/SFP Compatibility

Other products generally accept only the SX and LX/LH versions of the GBIC/SFP's. Note that the 6500 series switch and the 7600 series router are essentially the same box and support the same GBIC/SFP/XENPAK's. Just because an area is green does not mean that every combination works. What it means is that at least one type of card or interface works with the GBIC/SFP on at least one CatOS/IOS combination. Check the release notes to ensure your combination works.

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SFP/Xenpak Compatibility Chart

Green = Supported (check IOS/CatOS Release Notes for version compatibility) Red = Not Supported

Device	SFP							Xenpak 10GE	X2
	GLC-SX	GLC-LX	GLC-ZX	GLC-T	100FX	CWDM	GLC-BX		
Switches									
2940	Green	Green	Red	Green	Red	Red	Red	Red	Red
2948G-GE-TX	Green	Green	Green	Green	Red	Green	Red	Red	Red
2970G-24TS	Green	Green	Green	Green	Red	Green	Red	Red	Red
3560 Series	Green	Green	Green	Green	Red	Green	Red	Red	Red
3750 Series	Green	Green	Green	Green	Red	Green	Red	Green	Red
4000 (CatOS)	Green	Green	Green	Green	Red	Green	Red	Red	Red
4000 (Native)	Green	Green	Green	Green	Red	Green	Red	Green	Red
4948	Green	Green	Green	Green	Red	Green	Red	Red	Red
6000 (CatOS)	Green	Green	Green	Green	Red	Green	Red	Green	Red
6000 (Native)	Green	Green	Green	Green	Red	Green	Red	Green	Red
Routers									
28xx	Green	Green	Green	Green	Red	Green	Red	Red	Red
38xx	Green	Green	Green	Green	Red	Green	Red	Red	Red
12000	Green	Green	Green	Red	Red	Red	Red	Red	Red

Notes - GBIC/SFP Compatibility

Other products generally accept only the SX and LX/LH versions of the GBIC/SFP's. Just because an area is green does not mean that every combination works - for instance, though the 12000 series router can accept a ZX SFP in the 4-port GE card, the 10-port GE card does not. Always check the release notes to ensure your combination works.