

10G CWDM SFP+ 1350nm~1610nm 10km DOM Transceiver

CWDM-SFP10G-10M



Application

- 10GBASE-LR/LW Ethernet
- Sonet OC-192/SDH STM-64
- 10G Fibre Channel 1200-SM-LL-L

Features

- Supports 8.5 to 11.3Gb/s bit rates
- Hot-Pluggable
- Duplex LC connector
- CWDM DFB transmitter, PIN photo-detector
- SMF links up to 10km
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface
- Power Supply :+3.3V
- Power consumption<1.5W
- Temperature Range: 0~ 70° C
- RoHS compliant

Description

FS' CWDM-SFP10G-10M is a very compact 10Gb/s optical transceiver module for serial optical communication applications at 10Gb/s. The CWDM-SFP10G-10M converts a 10Gb/s serial electrical data stream to 10Gb/s optical output signal and a 10Gb/s optical input signal to 10Gb/s serial electrical data streams. The high speed 10Gb/s electrical interface is fully compliant with SFI specification.

The high performance CWDM DFB transmitter and high sensitivity PIN receiver provide superior performance for Ethernet applications at up to 10km links.

The SFP+ Module compliant with SFF-8431, SFF-8432 and IEEE 802.3ae 10GBASE-LR. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	T_s	-40		+85	° C
Case Operating Temperature	T_c	0		+70	° C
Supply Voltage	$V_{ccT, R}$	-0.5		4	V
Relative Humidity	RH	0		85	%

II. Electrical Characteristics ($T_{OP} = T_c$, $V_{CC} = 3.13$ to 3.47 Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Supply Voltage	V_{cc}	3.135		3.465	V	
Supply Current	I_{cc}			380	mA	
Power Consumption	P			1.5	W	
Transmitter Section:						
Input differential impedance	R_{in}		100		Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)	V	-0.3		4	V	

Differential input voltage swing	$V_{in,pp}$	180		700	mV	2
Transmit Disable Voltage	V_D	2		V_{CC}	V	3
Transmit Enable Voltage	V_{EN}	Vee		Vee+0.8	V	
Receiver Section:						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	V_o	300		850	mV	
Rx Output Rise and Fall Time	T_r/T_f	30			ps	4
LOS Fault	$V_{LOS\ fault}$	2		$V_{CC_{HOST}}$	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	5

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Per SFF-8431 Rev 3.0.
3. Into 100 ohms differential termination.
4. 20%~80% .
5. LOS is an open collector output. Should be pulled up with 4.7k – 10k Ω on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

III. Optical Characteristics (TOP = Tc, VCC = 3.13 to 3.47 Volts)

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Transmitter						
Date Rate		8.5	10.3125	11.3	Gb/s	
Optical Wavelength	λ	$\lambda-6.5$	λ	$\lambda+6.5$	nm	
Average Optical Power	P_o	-8.2		0.5	dBm	1
Optical Extinction Ratio	ER	3.5			dB	1
RMS spectral width	$\Delta\lambda$			1	nm	

Optical Modulation Amplitude	OMA	-5.2				dBm
Side Mode Suppression Ratio	SMSR	30				dB
Dispersion penalty				3.2		dB
Optical Eye Mask			IEEE802.3-2005 Compliant Compliant with ITU-T G.691 and GR-253-CORE			
Receiver						
Date Rate		8.5	10.3125	11.3		Gb/s
Optical Wavelength	λ	1350		1610		nm
Receiver Sensitivity	R			-14.4		dBm 2
Stressed Receiver Sensitivity	R1			-10.3		dBm 2
Maximum Input Power	P _{MAX}	0.5				dBm
LOS De-Assert	LOSD			-15		dBm
LOS Assert	LOSA	-25				dBm
LOS Hysteresis		0.5		4		dB
Receiver Reflectance	R _{rx}			-12		dB

Notes:

1. Measured at 10.3125b/s with PRBS $2^{31} - 1$ NRZ test pattern.
2. Under the ER worst case, measured at 10.3125 Gb/s with PRBS $2^{31} - 1$ NRZ test pattern for BER < 1×10^{-12} .

V. Pin Description

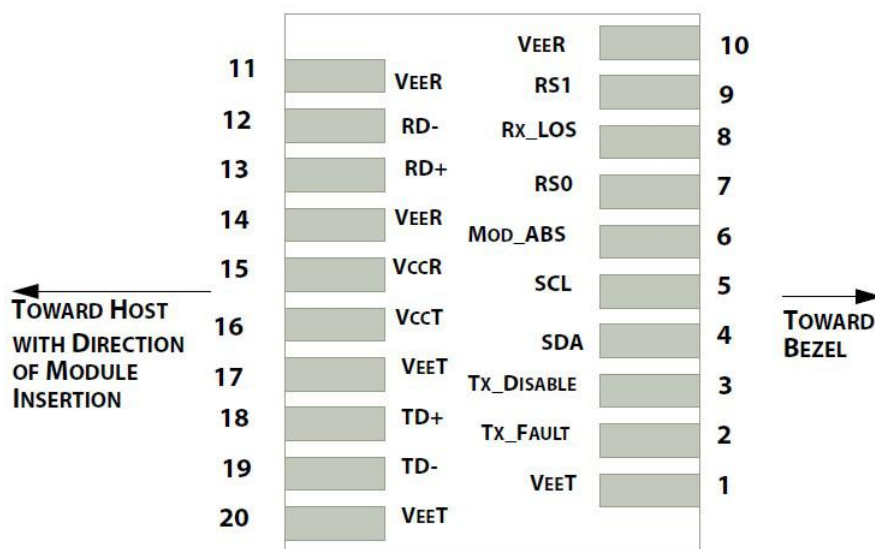


Figure 1 – Diagram of Host Board Connector Block Pin Numbers and Names

Pin	Name	Description	Notes
1	VeeT	Module transmitter ground	1
2	Tx Fault	Module transmitter fault	2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0,optionally control SFP+ receiver. When high, input data rate >4.5Gb/ s;when low, input data rate <=4.5Gb/s	
8	LOS	Receiver Loss of Signal Indication	4
9	RS1	Rate select0,optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s;when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	1
11	VeeR	Module receiver ground	1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	1

15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	1

Notes:

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

VI. SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information(A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

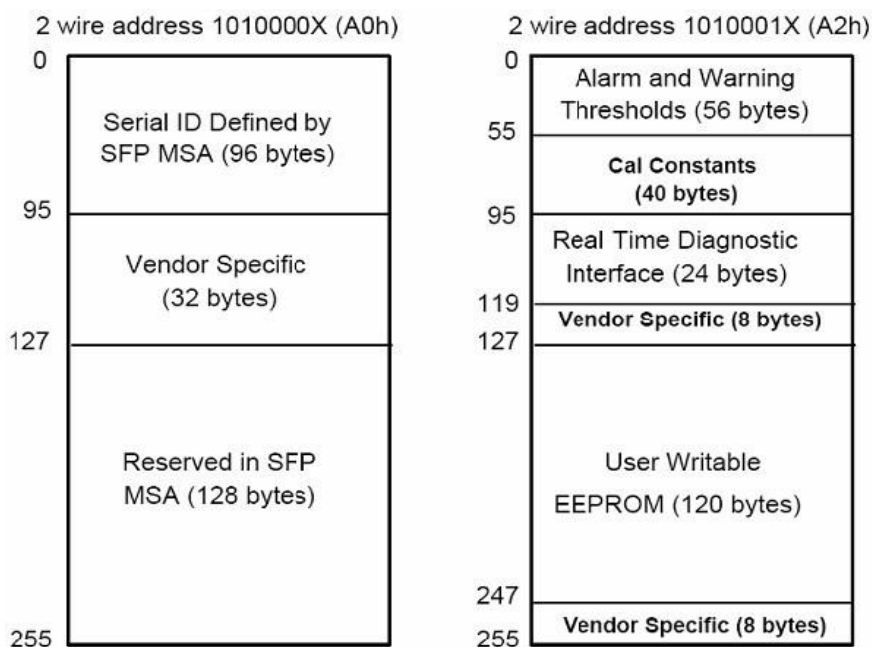
Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)


Table 2 - EEPROM Serial ID Memory Contents (A0h)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	
11	1	Encoding	NRZ(03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: FS
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "CWDM-SFP10G-10M" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah=LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %

68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	FS's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)

Vendor Specific ID Fields

96-127	32	Readable	FS specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

VII. Digital Diagnostic Monitor Characteristics

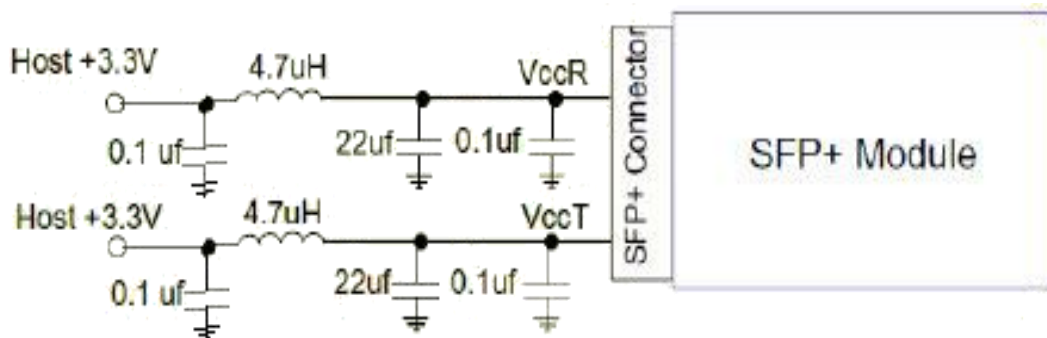
Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	± 3.0	° C
100-101	Laser Bias Current	± 10	%
100-101	Tx Output Power	± 3.0	dBm
100-101	Rx Input Power	± 3.0	dBm
100-101	VCC3 Internal Supply Voltage	± 5.0	%

VIII. Digital Diagnostic Monitor Characteristics

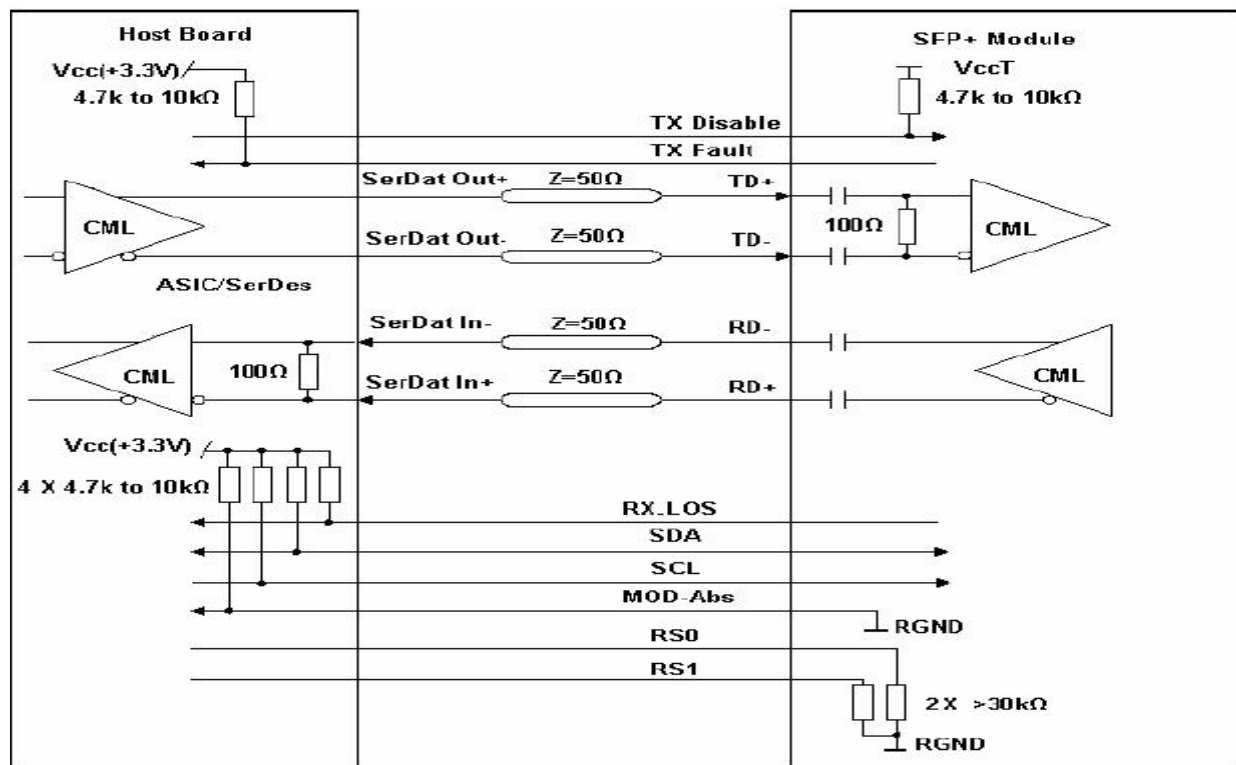
The CWDM-SFP10G-10 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product

IX. Recommended Circuit

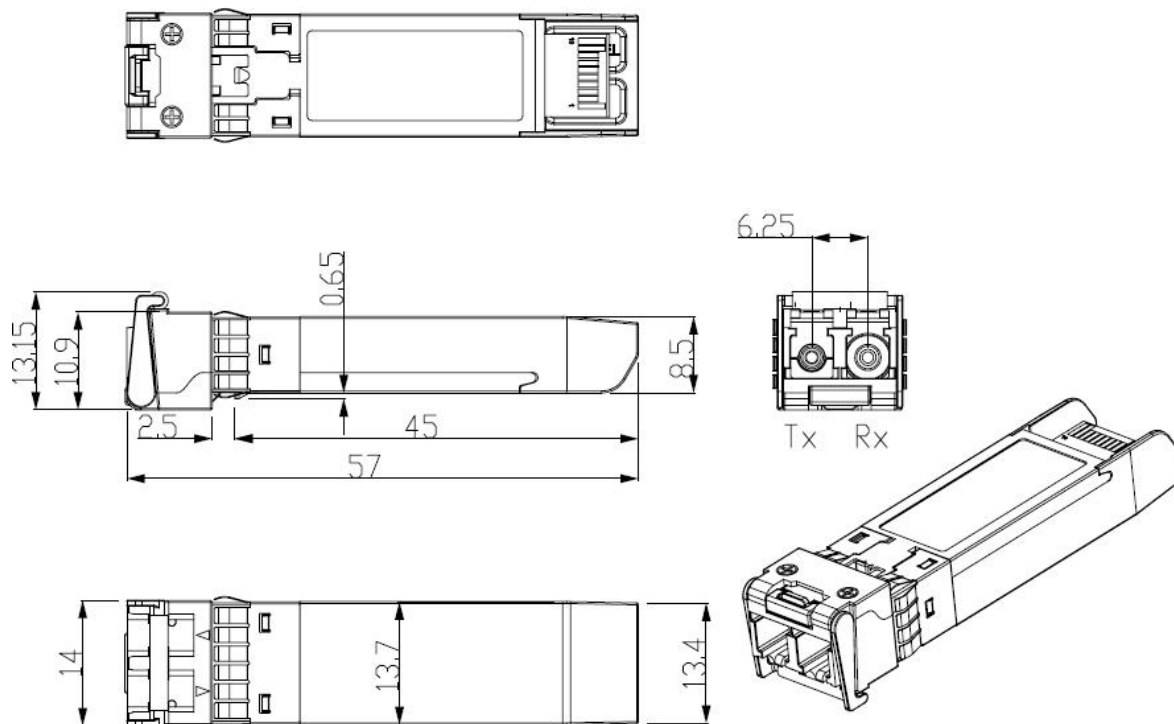


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

X. Mechanical Dimensions



Test Center

FS.COM transceivers are tested to ensure connectivity and compatibility in our test center before shipped out. FS.COM test center is supported by a variety of mainstream original brand switches and groups of professional staff, helping our customers make the most efficient use of our products in their systems, network designs and deployments.

The original switches could be found nowhere but at FS.COM test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX & Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, Avaya VSP 7000 MDA 2, etc.



Cisco ASR 9000 Series(A9K-MPA-1X40GE)



ARISTA 7050S-64(DCS-7050S-64)



Juniper MX960



Brocade ICX 7750-26Q



Extreme Networks X670V VIM-40G4X



Mellanox M3601Q



Dell N4032F



HP 5406R ZL2 V3(J9996A)



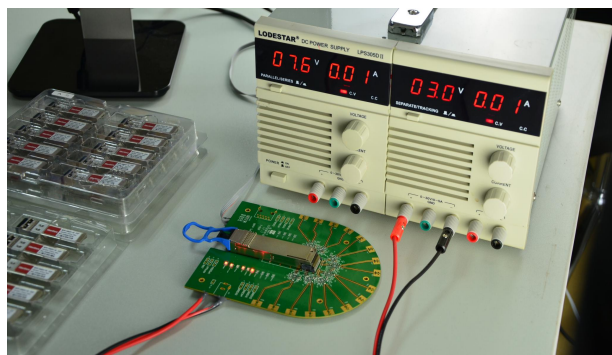
AVAYA 7024XLS(7002QQ-MDA)

Test Assured Program

FS.COM truly understands the value of compatibility and interoperability to each optics. Every module FS.COM provides must run through programming and an extensive series of platform diagnostic tests to prove its performance and compatibility. In our test center, we care of every detail from staff to facilities—professionally trained staff, advanced test facilities and comprehensive original-brand switches, to ensure our customers to receive the optics with superior quality.



Our smart data system allows effective product management and quality control according to the unique serial number, properly tracing the order, shipment and every part.



Our in-house coding facility programs all of our parts to standard OEM specs for compatibility on all major vendors and systems such as Cisco, Juniper, Brocade, HP, Dell, Arista and so on.



With a comprehensive line of original-brand switches, we can recreate an environment and test each optics in practical application to ensure quality and distance.



The last test assured step to ensure our products to be shipped with perfect package.

Order Information

Part Number	Description
CWDM-SFP10G-10SP	10GBASE CWDM SFP+ 1270-1330NM 10KM DOM TRANSCEIVER
CWDM-SFP10G-10M	10GBASE CWDM SFP+ 1350-1610NM 10KM DOM TRANSCEIVER
CWDM-SFP10G-20SP	10GBASE CWDM SFP+ 1270-1330NM 20KM DOM TRANSCEIVER
CWDM-SFP10G-20L	10GBASE CWDM SFP+ 1350-1610NM 20KM DOM TRANSCEIVER
CWDM-SFP10G-40S	10GBASE CWDM SFP+ 1270-1450NM 40KM DOM TRANSCEIVER
CWDM-SFP10G-40L	10GBASE CWDM SFP+ 1470-1610NM 40KM DOM TRANSCEIVER
CWDM-SFP10G-80L	10GBASE CWDM SFP+ 1470-1610NM 80KM DOM TRANSCEIVER



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