

10G CWDM SFP+ 1470nm~1610nm 40km Industrial DOM Transceiver

CWDM-SFP10G-40-I



Application

- 10GBASE-ER/EW & 10G Ethernet
- 10G SONET/SDH, OTU2/2e

Features

- Up to 11.3Gbps Data Links
- Up to 40km transmission on SMF
- CWDM EML transmitter and PIN receiver
- Metal enclosure for lower EMI
- Duplex LC connector 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Commercial/Industrial case operating temperature range: 0°C to 70°C / -40°C to 85°C
- Without CDR or with CDR supported 9.95 to 11.3Gb/s reference-free
- Max power dissipation:
 - 1491 nm: 1.8W power dissipation without CDR for Industrial temperature
 - 1531 nm: 2W power dissipation with CDR for Industrial temperature

Description

FS’s serial SFP+ transceiver is designed for use in 10-Gigabit Ethernet links up to 40km over single mode fiber. The module consists of CWDM EML Laser, PIN and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF8472. The module data link up to 40km in 9/125um single mode fiber.

Product Specifications

I. General Specifications

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Module Form Factor	BR	9.95		11.3	Gb/s	1
Number of Lanes	BER			10 ⁻¹²		2
Maximum Aggregate Data Rate	L _{max}		40		KM	

Notes:

- 1. 10GBASE-ER, 10GBASE-EW, 1200-SM-LL-L 10GFC.
- 2. Tested with a PRBS 2³¹-1 test pattern.

CWDM Wavelength

18 Wavelengths from 1270nm to 1610nm, each step 20nm.

Band	Nomenclature	Wavelength(nm)		
		Min	Typ.	Max
O-band Original	A	1264	1270	1277.5
	B	1284	1290	1297.5
	C	1304	1310	1317.5
	D	1324	1330	1337.5
	E	1344	1350	1357.5
E-band Extended	F	1364	1370	1377.5
	G	1384	1390	1397.5
	H	1404	1410	1417.5
	I	1424	1430	1437.5
	J	1444	1450	1457.5
S-band Short Wavelength	K	1464	1470	1477.5
	L	1484	1490	1497.5
	M	1504	1510	1517.5
	N	1524	1530	1537.5
	O	1544	1550	1557.5
C-band Conventional	P	1564	1570	1577.5
L-band Long Wavelength	Q	1584	1590	1597.5
	R	1604	1610	1617.5

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	Ts	-40		85	°C
Relative Humidity	RH	5		95	%
Power Supply Voltage	VCC	-0.3		4	V
Signal Input Voltage		Vcc-0.3		Vcc+0.3	V

III. Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Notes
Supply Voltage	Vcc	3.14	3.3	3.46	V	
Supply Current (Note 1)	Icc			460 550 515 610	mA	1471NM 1491 nm 1511 nm 1531 nm

Transmitter

Input differential impedance	Rin		100		Ω	2
Single ended data input swing	Vin-pp	180		700	mV	
Transmit Disable Voltage	VDis	2.0		Vcc	V	3
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	

Receiver						
Differential data output swing	Vout-pp	400		800	mV	4
LOS output high level	V _{LOS-H}	2.0		V _{CCHOST}	V	5
LOS output low level	V _{LOS-L}	V _{ee}		V _{ee} +0.8	V	5

Notes:

- 1. Measured with receive Pin=Psen, Vcc=3.3V, operation temperature range, without air flow
- 2. Connected directly to TX data input pins. AC coupled .
- 3. Or open circuit.
- 4. Into 100 ohms differential termination.
- 5. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

IV. Optical Characteristics

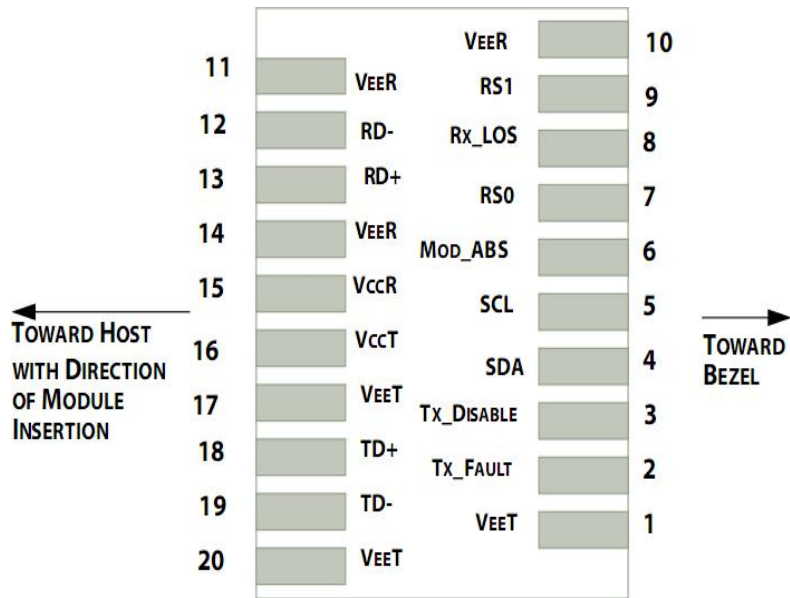
Parameter	Symbol	Min	Typ.	Max	Unit	Notes
Transmitter						
Average Launched Power	PO	-1		+4	dBm	1
Extinction Ratio	ER	6			dB	
Center Wavelength	λ _c	λ _c -6.5		λ _c +6.5	nm	2
Spectrum Band Width (-20dB)	σ			1.0	nm	
SMSR		30			dB	
Transmitter OFF Output Power	Poff			-30	dBm	
Output Eye Mask	Compliant with IEEE 802.3ae					

Receiver						
Input Optical Wavelength	λ	1270		1610	nm	
Receiver Sensitivity	P_{sen}			-16.0	dBm	3
Input Saturation Power (Overload)	P_{sat}	0			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD				dBm	
LOS Detect Hysteresis	P_{hys}	0.5			dB	

Notes:

- 1. Launched power (avg.) is power coupled into a single mode fiber with master connector.
- 2. λc refer to wavelength selection
- 3. Measured with conformance test signal for BER = 10^{-12} .@10.3125Gbps, PRBS= $2^{31}-1$,NRZ; Optical source with worst ER, Wavelength between 1471nm and 1611nm; back to back

V. Pin Description



Pin Num.	Symbol	Name/Description	Notes
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	2
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	no connection	
8	LOS	Loss of Signal indication.Logic 0 indicates normal operation.	5
9	RS1	Internally connect to circuit ground	

10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V_{EER}	Receiver Ground(Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground(Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground(Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an LVTTTL output.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power or the laser temperature exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on $T_{DIS}>2.0V$ or open, enabled on $T_{DIS}<0.8V$.
4. Should be pulled up with 4.7k Ω - 10k Ω on host board to a typical 3.3V voltage. MOD_ABS pulls low to indicate module is plugged in.
5. LOS is open collector output. It should be pulled up with 4.7k Ω – 10k Ω on host board to a typical 3.3V voltage. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

VI. Digital Diagnostic Functions

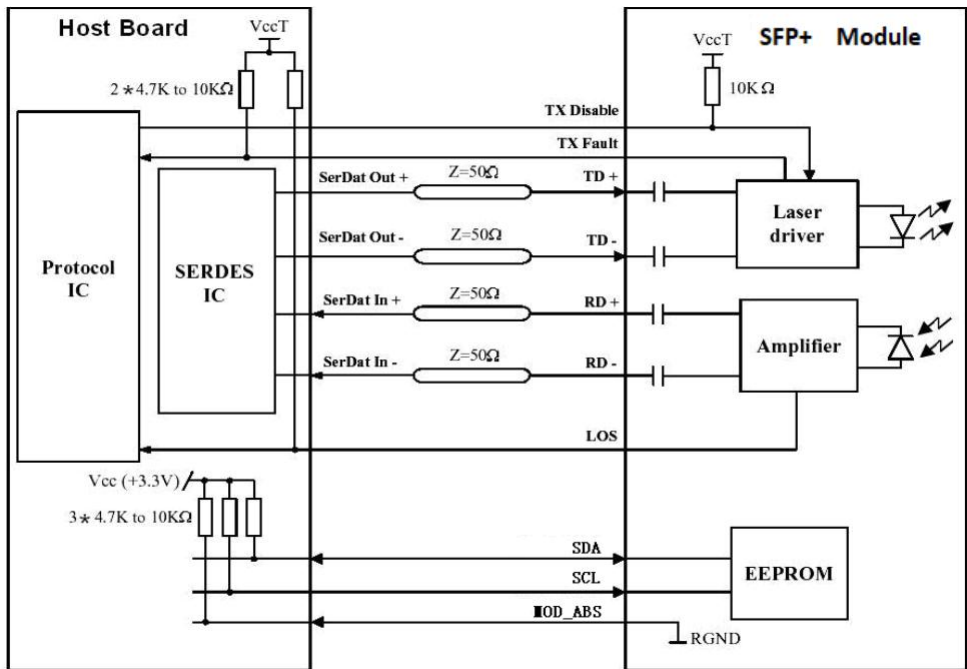
FS’s 1471NM/F/C/CF serial transceivers support the 2-wire serial communication protocol as defined in the SFP+MSA. The standard SFP serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer, and other information.

Additionally, FS SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

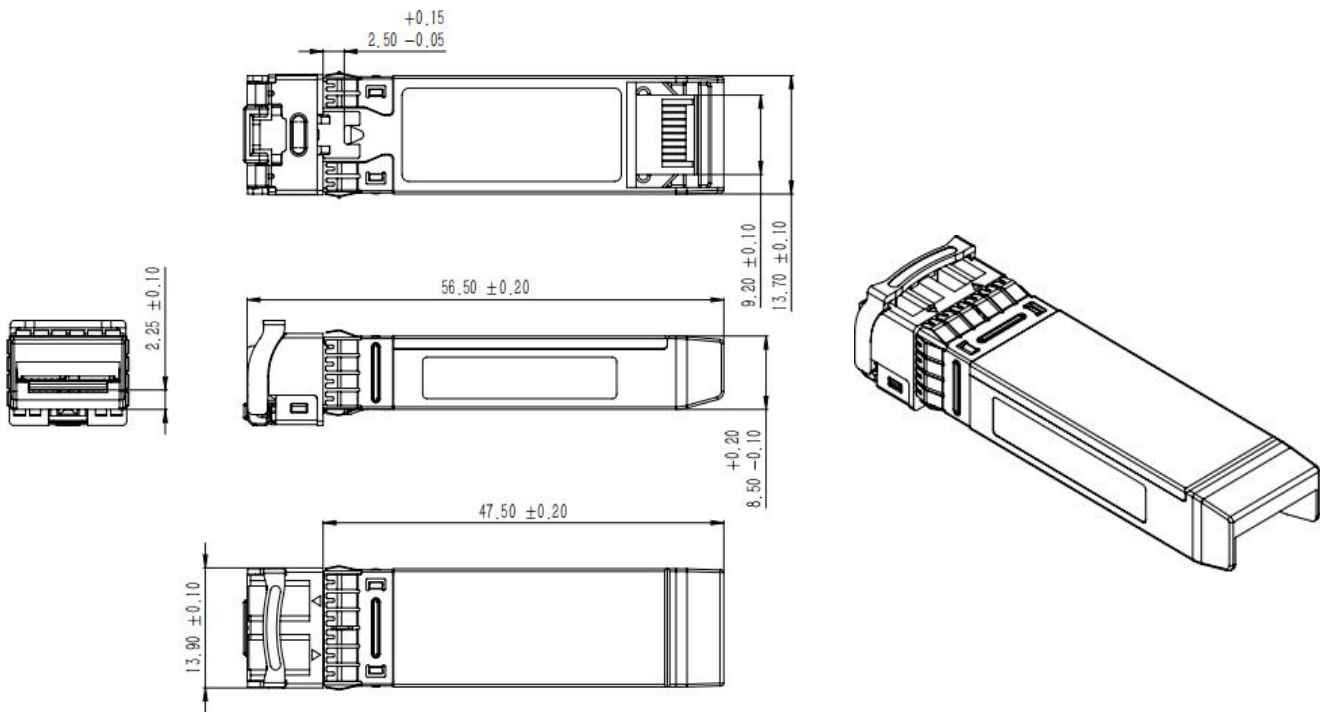
The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h).The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

VII. Recommended Interface Circuit



VIII. Outline 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



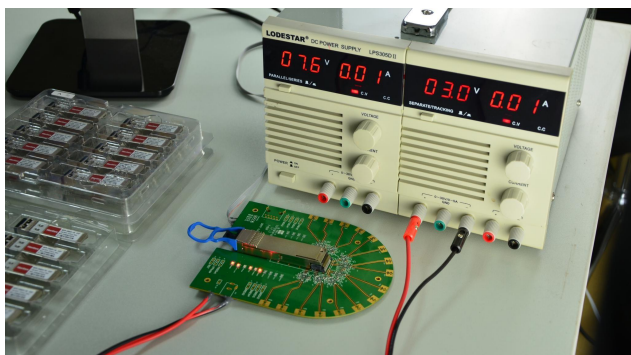
HP 5406R ZL2 V3(J9996A)



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.



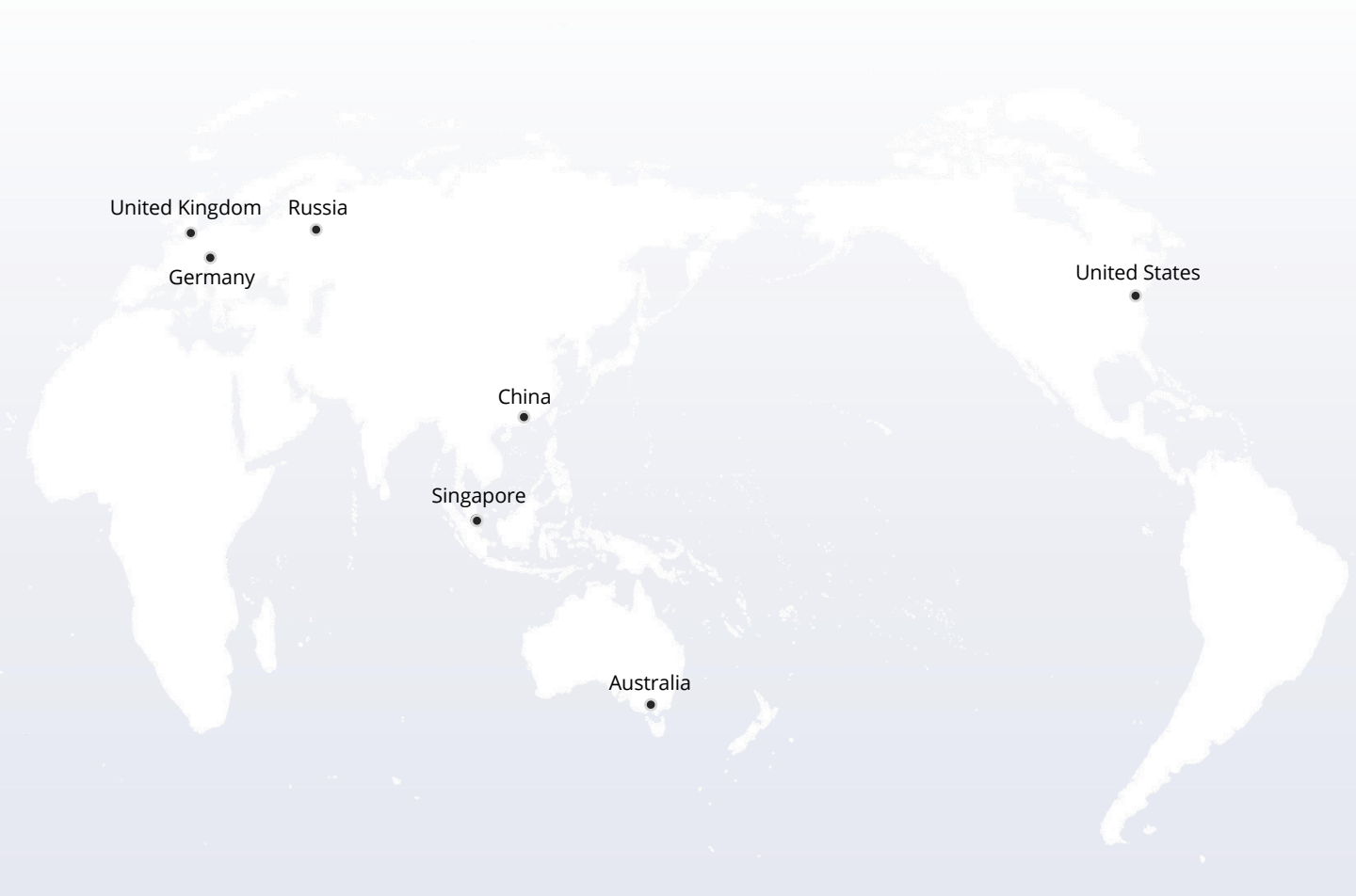
Our smart data system allows effective product management. Our in-house coding facility programs all of our parts to and quality control according to the unique serial number, standard OEM specs for compatibility on all major vendors and properly tracing the order, shipment and every part. systems such as Cisco, Juniper, Brocade, HP, Dell, Arista and so on.



With a comprehensive line of original-brand switches, we can The last test assured step to ensure our products to be shipped recreate an environment and test each optics in practical with perfect package. application to ensure quality and distance.

Order Information

Product part Number	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range (Tcase) (°C)	With/Without CDR
1471NM	Single-mode fiber	Refer towavelength selection	40	0~70	Without CDR
1491 nm	Single-mode fiber	Refer towavelength selection	40	-40~85	Without CDR
1511 nm	Single-mode fiber	Refer to wavelengthselection	40	0~70	With CDR
1531 nm	Single-mode fiber	Refer to wavelengthselection	40	-40~85	With CDR



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