

SFP+ Single-Mode for DWDM Application

Duplex SFP+ Transceiver

AXSDxx-192-20

Features

- Supports up to 10.3Gbps
- Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid
- Temperature-Stabilized DWDM EML Transmitter
- Duplex LC Connector
- Link length up to 25km
- Power Dissipation <2W
- Hot-Pluggable SFP+ Footprint
- Compliant with SFF-8431 MSA
- Compliant with SFF-8432 MSA
- Operating Case Temperature
Commercial: 0°C to 70°C
Industrial: -40°C~+85°C



Applications

- Wireless

Product Description

The AXSDxx-192-20 & AXSDxx-192-20+ series single mode transceiver is small form factor pluggable module for duplex optical data communications. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528nm to 1566nm as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks.

It is with the SFP+ 20-pin connector to allow hot plug capability. The transmitter section uses a DWDM EML laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses a PIN detector and a limiting post-amplifier IC.

The AXSDxx-192-20 & AXSDxx-192-20+ series are designed to be compliant with SFP+ Multi-Source Agreement (MSA) Specification SFF-8431 and SFF-8432.

Absolute Maximum Ratings*Note1

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Supply Voltage	Vcc	-0.5	4.0	V
Storage Relative Humidity	RH	-	95	%

Note1: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Tc	Commercial	-5	+70	°C
		Industrial	-40	+85	°C
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Supply Current*(note2)	Icc		450	610	mA
Data Rate	DR	0.6		10.3125	Gbps

Note2: Maximum power supply current measured at Vcc equal to 3.465V and compliant with SFF-8431.

Performance Specifications – Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	Vin	190		700	mVpp	AC coupled input *(note5)
Input Impedance (Differential)	Zin	85	100	115	ohm	Rin > 100 kohm @ DC
TX_Dis	Disable	2		Vcc+0.3	V	
	Enable	0		0.8		
TX_FAULT	Fault	2		Vcc+0.3	V	
	Normal	0		0.5		
Receiver						
CML Outputs (Differential)	Vout	300		850	mVpp	AC coupled output*(note5)
Output Impedance (Differential)	Zout	85	100	115	ohm	
RX_LOS	LOS	2		Vcc+0.3	V	
	Normal	0		0.8	V	
MOD_DEF (0:2)	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

Performance Specifications – Optical

Parameter		Symbol	Min.	Typical	Max.	Unit
Data Rate		DR	0.6		10.3125	Gbps
Transmission Distance@9/125um SMF					25	Km
Transmitter						
Center Wavelength Spacing				100		GHz
				0.8		nm
Central Frequency Deviation	EOL		-12.5		12.5	GHz
Spectral width(-20dB)		$\Delta\lambda$		0.15	0.3	nm
Side Mode Suppression Ratio		SMSR	35			dB
Average Output Power*(note3)		Po	-3		4	dBm
Average Launch Power (Tx: OFF)		Poff			-45	dBm
Extinction Ratio		ER	6			dB
Pout@TX Disable Asserted		Pout			-45	dBm
Transmitter Dispersion Penalty@10.3125G@500ps/nm		TDP			2	dB
Relative Intensity Noise		RIN			-128	dB/Hz
TX Jitter		TXj	as per ITU-T G959.1 and IEEE802.3 ae			
Eye Mask Definition						
Eye Mask Margin@10.3G mask			10			%
Transmitter Reflectance					-35	dB
Optical Return Loss Tolerance					12	dB
Receiver						
Receiver Sensitivity*(note4)@10.3125G		Pmin			-17	dBm
Receiver Overload		Pmax	0			dBm
Receiver Reflectance					-30	dB
LOS De-Assert		LOSD			-18	dBm
LOS Assert		LOSA	-30			dBm
LOS Hysteresis			0.5			dB

Note3: Output is coupled into a 9/125 μ m single-mode fiber.

Note4: Minimum average optical power measured at the BER less than 1E-12, OSNR > 30dB. The measure pattern is PRBS31.

Note5: CML logic, internally AC coupled.

Regulatory Compliance*

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12+A2
		EN 60825-1:2014
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
FCC	WTF14F0514417E	47 CFR PART 15 OCT., 2013
FDA	/	CDRH 1040.10
ROHS	/	2011/65/EU

*The above certificate number updated to June 2014, because some certificate will be updated every year, such as FDA and ROHS. For the latest certification information, please check with 10Gtek..

XX- Channel refers to the following table*(note6)

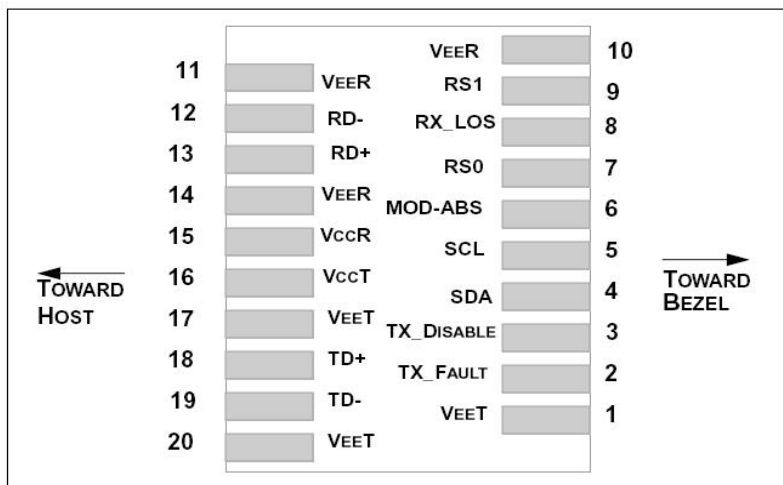
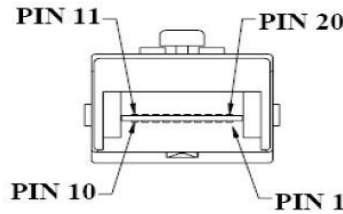
*Channel (XX)	Part NO.	Frequency (THz)	Center Wavelength (nm)
14	AXSD14-192-20	191.4	1566.31
	AXSD14-192-20+		
15	AXSD15-192-20	191.5	1565.50
	AXSD15-192-20+		
16	AXSD16-192-20	191.6	1564.68
	AXSD16-192-20+		
17	AXSD17-192-20	191.7	1563.86
	AXSD17-192-20+		
18	AXSD18-192-20	191.8	1563.05
	AXSD18-192-20+		
19	AXSD19-192-20	191.9	1562.23
	AXSD19-192-20+		
20	AXSD20-192-20	192.0	1561.42
	AXSD20-192-20+		
21	AXSD21-192-20	192.1	1560.61
	AXSD21-192-20+		
22	AXSD22-192-20	192.2	1559.79
	AXSD22-192-20+		
23	AXSD23-192-20	192.3	1558.98
	AXSD23-192-20+		

24	AXSD24-192-20	192.4	1558.17
	AXSD24-192-20+		
25	AXSD25-192-20	192.5	1557.36
	AXSD25-192-20+		
26	AXSD26-192-20	192.6	1556.55
	AXSD26-192-20+		
27	AXSD27-192-20	192.7	1555.75
	AXSD27-192-20+		
28	AXSD28-192-20	192.8	1554.94
	AXSD28-192-20+		
29	AXSD29-192-20	192.9	1554.13
	AXSD29-192-20+		
30	AXSD30-192-20	193.0	1553.33
	AXSD30-192-20+		
31	AXSD31-192-20	193.1	1552.52
	AXSD31-192-20+		
32	AXSD32-192-20	193.2	1551.72
	AXSD32-192-20+		
33	AXSD33-192-20	193.3	1550.92
	AXSD33-192-20+		
34	AXSD34-192-20	193.4	1550.12
	AXSD34-192-20+		
35	AXSD35-192-20	193.5	1549.32
	AXSD35-192-20+		
36	AXSD36-192-20	193.6	1548.51
	AXSD36-192-20+		
37	AXSD37-192-20	193.7	1547.72
	AXSD37-192-20+		
38	AXSD38-192-20	193.8	1546.92
	AXSD38-192-20+		
39	AXSD39-192-20	193.9	1546.12
	AXSD39-192-20+		
40	AXSD40-192-20	194.0	1545.32
	AXSD40-192-20+		
41	AXSD41-192-20	194.1	1544.53
	AXSD41-192-20+		
42	AXSD42-192-20	194.2	1543.73
	AXSD42-192-20+		
43	AXSD43-192-20	194.3	1542.94
	AXSD43-192-20+		

44	AXSD44-192-20	194.4	1542.14
	AXSD44-192-20+		
45	AXSD45-192-20	194.5	1541.35
	AXSD45-192-20+		
46	AXSD46-192-20	194.6	1540.56
	AXSD46-192-20+		
47	AXSD47-192-20	194.7	1539.77
	AXSD47-192-20+		
48	AXSD48-192-20	194.8	1538.98
	AXSD48-192-20+		
49	AXSD49-192-20	194.9	1538.19
	AXSD49-192-20+		
50	AXSD50-192-20	195.0	1537.40
	AXSD50-192-20+		
51	AXSD51-192-20	195.1	1536.61
	AXSD51-192-20+		
52	AXSD52-192-20	195.2	1535.82
	AXSD52-192-20+		
53	AXSD53-192-20	195.3	1535.04
	AXSD53-192-20+		
54	AXSD54-192-20	195.4	1534.25
	AXSD54-192-20+		
55	AXSD55-192-20	195.5	1533.47
	AXSD55-192-20+		
56	AXSD56-192-20	195.6	1532.68
	AXSD56-192-20+		
57	AXSD57-192-20	195.7	1531.90
	AXSD57-192-20+		
58	AXSD58-192-20	195.8	1531.12
	AXSD58-192-20+		
59	AXSD59-192-20	195.9	1530.33
	AXSD59-192-20+		
60	AXSD60-192-20	196.0	1529.55
	AXSD60-192-20+		
61	AXSD61-192-20	196.1	1528.77
	AXSD61-192-20+		

*Note6: Please contract with 10Gtek for the channel availability.

SFP+ Transceiver Electrical Pad Layout



Pin Function Definition

Pin Num.	Name	FUNCTION	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select (LVTTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select (LVTTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled

10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 7
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3 ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1)TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2)TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 KΩ resistor. Its states are:

Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Transmitter Disabled Open: Transmitter Disabled

3)Module absent, connected to VEET or VEER in the module.

4)LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5)The module signal ground contacts, VeeR and VeeT, should be isolated from the module case

6)RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

7)VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP+ connector pin. Maximum supply current is 757mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging

of the SFP+ transceiver module will result in an inrush current of no more than 30mA greater than the steady state value.

VccR and VccT may be internally connected within the SFP+ transceiver module.

8)TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

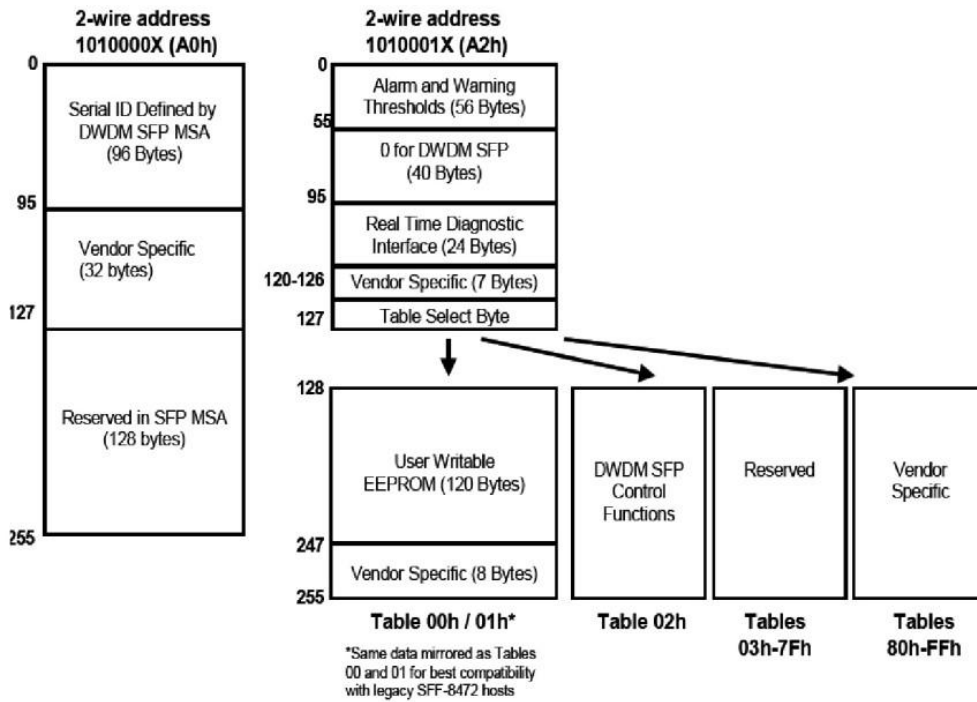
EEPROM

The optical transceiver contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

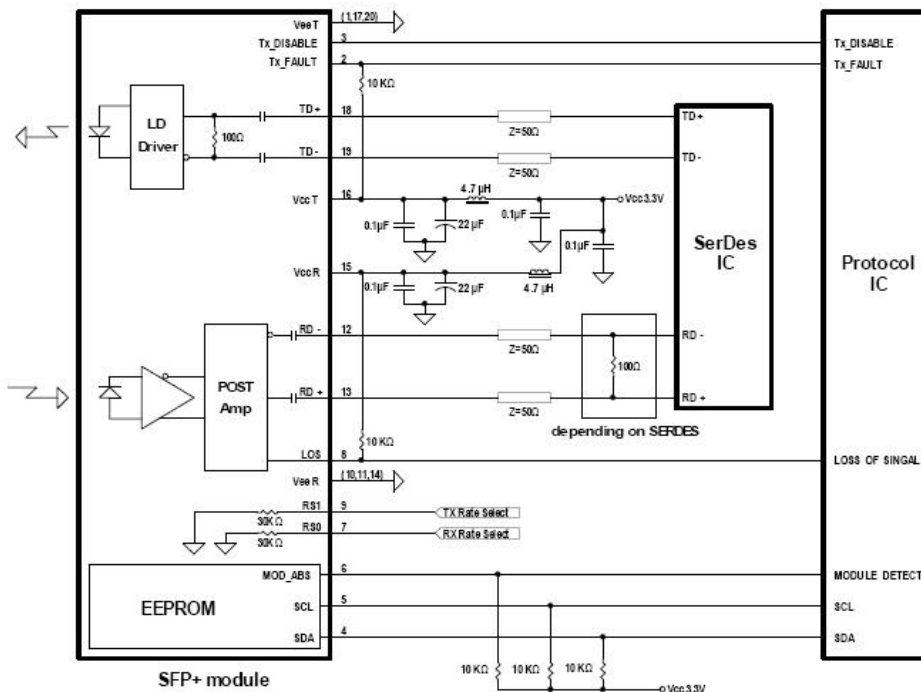
The serial interface uses the 2-wire serial CMOS EEPROM protocol. When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP+ transceiver. The negative 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.

The module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals.

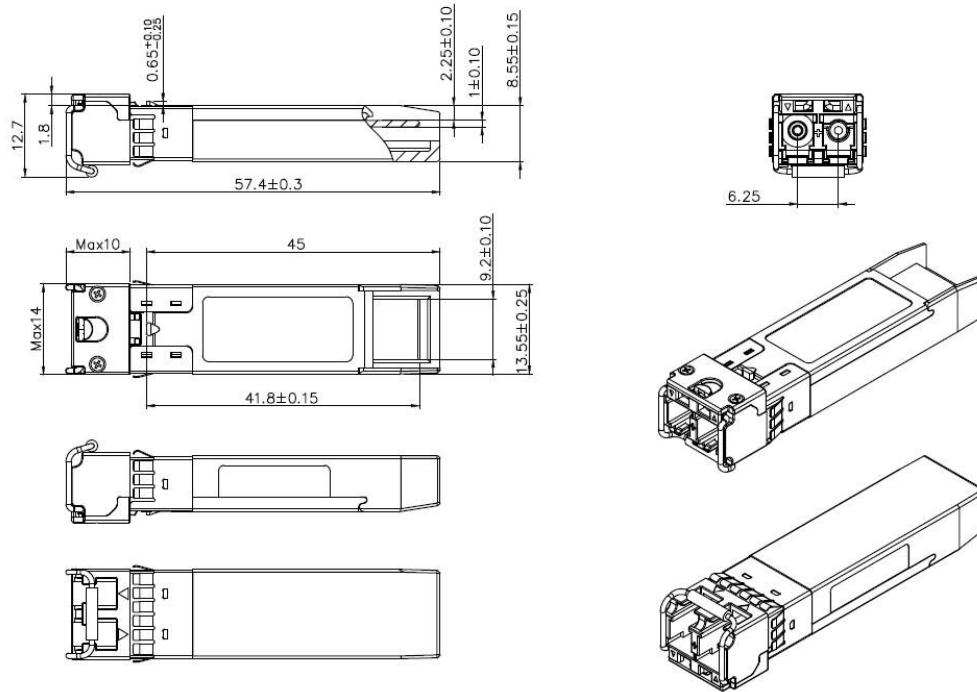
Alarm/warning threshold data is written during device manufacture. TEC current monitoring, laser temperature monitoring, received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and transceiver temperature monitoring all are implemented. The diagnostic data are internal calibration and stored in memory locations 96 – 109 at wire serial bus address A2h. The transceiver memory map specific data field defines as following.



Recommend Circuit Schematic



Mechanical Specifications



Unremarked tolerances ±0.2mm

*This 2D drawing only for reference, please check with 10Gtek before ordering.

Laser Emission



Notice

10Gtek reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. 10Gtek makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Ordering Information

Part No.	Data Rate	Laser	Power budget	CDR	Temp.
AXSDxx-192-20	0.6~10.3125Gbps	DWDM EML	14dB	NO	Commercial
AXSDxx-192-20+	0.6~10.3125Gbps	DWDM EML	14dB	NO	Industrial

Note7: XX refers to DWDM Wavelength channel as ITU-T specified, please refer the following table for detailed center wavelength information.

*The product image only for reference purpose.

Revision History

Revision	Initiated	Approved	content	Release Date
Ver1.0	QR.HUANG	Nicky	Released	June/2017

Further Information

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