SFP-10GB-DW-C-E-AV-C

ADVA® Compatible TAA 10GBase-DWDM 100GHz SFP+ Transceiver (SMF, Tunable, 80km, LC, DOM, -20 to 85C)

Features:

- Small Form Factor Pluggable WDM Optical Transceiver from 191.3 to 196.3THz with 100GHz Spacing
- Self-Tuning Function Enables Automatic Link-Up
- 10G Electrical Interface (SFF-8418)
- Up to 80km Over SMF (ITU-T G.652)
- Loss of Signal (LOS) Function
- Operating Data Rate: 9.83 to 10.31Gbps
- LC Connector Interface
- Single Voltage 3.3V Power Supply
- Hot-Pluggable Electrical Interface
- Operating Temperature: -20 to 85 Celsius, -40C Cold Start
- RoHS Compliant and Lead-Free

Applications:

- 10GBase Ethernet

Product Description

This ADVA® SFP+ transceiver provides 10GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a tunable wavelength via an LC connector. It is guaranteed to be 100% compatible with the equivalent ADVA® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."

TAA COMPLIANT

ITU Channel Wavelength Guide

ITU Channel	Frequency (THz)	Center Wavelength (nm)	ITU Channel	Frequency (THz)	Center Wavelength (nm)
13	191.30	1567.13	**39**	193.90	1546.12
14	191.40	1566.31	**40**	194.00	1545.32
15	191.50	1565.50	**41**	194.10	1544.53
16	191.60	1564.68	**42**	194.20	1543.73
17	191.70	1563.86	**43**	194.30	1542.94
18	191.80	1563.05	**44**	194.40	1542.14
19	191.90	1562.23	**45**	194.50	1541.35
20	192.00	1561.42	**46**	194.60	1540.56
21	192.10	1560.61	**47**	194.70	1539.77
22	192.20	1559.79	**48**	194.80	1538.98
23	192.30	1558.98	**49**	194.90	1538.19
24	192.40	1558.17	**50**	195.00	1537.40
25	192.50	1557.36	**51**	195.10	1536.61
26	192.60	1556.56	**52**	195.20	1535.82
27	192.70	1555.75	**53**	195.30	1535.04
28	192.80	1554.94	**54**	195.40	1534.25
29	192.90	1554.13	**55**	195.50	1533.47
30	193.00	1553.33	**56**	195.60	1532.68
31	193.10	1552.52	**57**	195.70	1531.90
32	193.20	1551.72	**58**	195.80	1531.12
33	193.30	1550.92	**59**	195.90	1530.33
34	193.40	1550.12	**60**	196.00	1529.55
35	193.50	1549.32	**61**	196.10	1528.77
36	193.60	1548.52	**62**	196.20	1527.99
37	193.70	1547.72	**63**	196.30	1527.22
38	193.80	1546.92			

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Relative Humidity (Non-Condensing)		5		85	%	
Operating Case Temperature	Tc	-20		85	°C	1
Storage Temperature	Tstg	-40		85	°C	
Supply Voltage	V	-0.3		3.6		
Data Rate	Gbps	9.8304		10.3125		± 100ppm
Ambient Humidity (Non-Condensing)	%	5		85		
Modulation Type		8B/10B, 64B/66B (NRZ)				2
Transmission Cable		SMF (ITU-T G.6520) 80km				

Notes:

1. Cold start temperature: -40°C.
2. 9.83, 10.31Gbps.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Voltage on LVTTL Input		-0.3		Vcc+0.3	V	
Tx Input Data Signal Levels (AC Coupled)				1.2	Vppd	
Static Discharge Voltage HBM Per JEDEC JESD22-A224-B		-1000		1000	V	
		-2000		2000		
Peak Optical Input Power				-6	dBm	
Power Supply Voltage		3.14	3.3	3.46	Vcc	
Power Consumption				2.5	W	
Low-Speed Electrical Interface						
Tx_Fault, Rx_LOS	VOL	-0.3		0.4	V	1
	IOH	-50		37.5	uA	
Tx_Disable, RS0, RS1	VIL	-0.3		0.8	V	
	VIH	2.0		VccT+0.3	V	

Notes:

1. Positive values indicate current flowing into the module. At 0.7mA.

Optical Characteristics

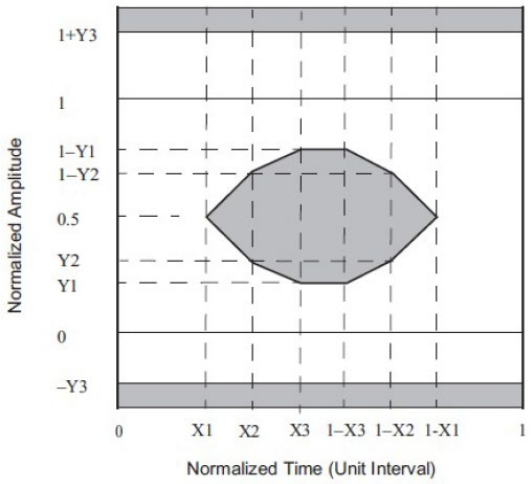
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Frequency Range	FR	191.3		196.3	THz	
Central Frequency Accuracy (EOL)		-12.5		12.5	GHz	
Frequency Spacing			100		GHz	
Side-Mode Suppression Ratio	SMSR	30			dB	
Spectral Width (-20dB)	Δλ			1	nm	
Average Optical Power	Pavg	-1		3	dBm	
Extinction Ratio	ER	8.2			dB	
Average Launch Power of Tx_Disable				-30	dBm	
Optical Return Loss Tolerance	ORL			20	dB	
Transmitter Reflectance	TR			-12	dB	
Transmitter Eye Mask		Transmitter Eye Mask				1
Receiver						
Center Frequency Range	FR	191.3		196.3	THz	
Rx Sensitivity in Average	Pr_Avg			-24	dBm	2
				-21	dBm	3
Rx Overload in Average	OL	-7			dBm	2

Receiver Reflectance	RR			-27	dB	
LOS Assert Level	LOSA	-32			dBm	
LOS De-Assert Level	LOSD			-25	dB	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. 9.8304Gbps to 10.3125Gbps, PRBS31 NRZ, 10GBase-LR mask and filter, at least 500 waveforms, and Hit Ratio meets the standard of $1E^{-12}$ under margin.
2. 10.3125Gbps, PRBS31 NRZ, ER>8.2dB, and BER=$1E^{-12}$, back-to-back.
3. 10.3125Gbps, PRBS31 NRZ, ER>8.2dB, BER=$1E^{-12}$, CD=1400ps/nm, and OSNR>35dB.

Transmitter Eye Mask



{X1, X2, X3, Y1, Y2, Y3} = {0.25, 0.40, 0.45, 0.25, 0.28, 0.40}

Timing Specifications

Parameter	Symbol	Min.	Max.	Unit	Notes
Tx_Disable Assert Time	T_off		100	us	1
Tx_Disable Negate Time	T_on		2	ms	2
Time to Initialize Cooled Module & Time to Power-Up a Cooled Module to Power Level II	T_start_up_cooled		90	s	3
Tx_Fault Assert for Cooled Module	Tx_fault_on_cooled		50	ms	4
Tx_Fault Reset	T_reset	10		us	5
RS0, RS1: Rate Select Timing for Low Input	T_RS0_L, T_RS1_L		N/A		6
RS0, RS1: Rate Select Timing for High Input	T_RS0_H, T_RS1_H		N/A		6
Rx_LOS Assert Delay	T_los_on		100		7
Rx_LOS Negate Delay	T_los_off		20		8
Wavelength Tuning Time	T_wave_change	3	10		9

Notes:

1. Rising edge of Tx_Disable to fall of output signal below 10% of normal.
2. Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start-up or fault recovery.
3. From power on or hot plug, or Tx_Disable negated during power-up or Tx_Fault recovery, until cooled Power Level I part (or cooled Power Level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational.
4. From occurrence of fault to assertion of Tx_Fault.
5. Time Tx_Disable must be held "high" to reset Tx_Fault.
6. From assertion until stable output.
7. From occurrence of loss of signal to assertion of Rx_LOS.
8. From occurrence of presence of signal to negation of Rx_LOS.
9. From writing of wavelength set command to completion of the wavelength tuning and output signal above 90%.

Two-Wire I/O

Parameter	Symbol	Min.	Max.	Unit	Notes
Clock Frequency	fSCL	0.1	400	KHz	1
Clock Pulse Width - Low	tLOW	1.3		us	
Clock Pulse Width - High	tHIGH	0.6		us	
START Hold Time	tHD:STA	0.6		us	
START Set-Up Time	tSU:STA	0.6		us	
Data In Hold Time	tHD:DAT	0		ns	
Data In Set-Up Time	tSU:DAT	100		ns	
Input Rise Time (100KHz) from (VIL, Max.-0.15) to (VIH, Min.+0.15)	Tr,100		1000	ns	
Input Rise Time (400KHz) from (VIL, Max.-0.15) to (VIH, Min.+0.15)	Tr,400		300	ns	
Input Fall Time (100KHz) from (VIH, Min.+0.15) to (VIL, Max.-0.15)	Tf,100		300	ns	
Input Fall Time (400KHz) from (VIH, Min.+0.15) to (VIL, Max.-0.15)	Tf,400		300	ns	
STOP Set-Up Time	tSU:STO	0.6		us	
Time Bus is Free Before a New Transmission Can Start	tBUF	20		us	
Time to Initialize	T_init		300	ms	
Clock Stretching	T_clock_hold		500	us	
Complete Single or Sequential Write Up to 4 Byte	tWR		40	ms	
Complete Sequential Write of 5-8 Bytes	tWR		80	ms	
Endurance of User Writable EEPROM (Write Cycles)		10k		cycle	

Notes:

1. The module shall operate with fSCL up to 100kHz without requiring clock stretching. The module may clock stretch with fSCL greater than 100kHz and up to 400kHz.

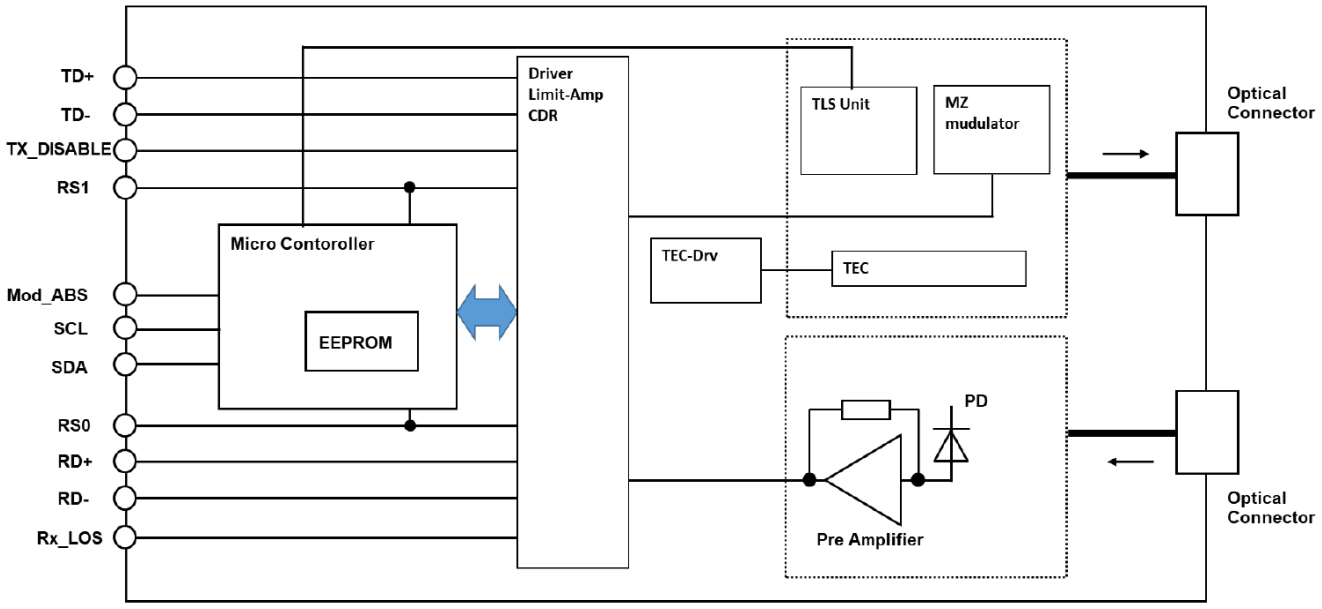
Pin Descriptions

Pin	Symbol	Name/Description	Plug Seq.	Notes
1	VeeT	Transmitter Ground.	1	
2	Tx_Fault	Transmitter Fault Indication.	3	
3	Tx_Disable	Transmitter Disable.	3	
4	SDA	2-Wire Serial Interface Data.	3	
5	SCL	2-Wire Serial Interface Clock.	3	
6	MOD_ABS	Module Absent.	3	
7	RS0	Rate Select 0. Optionally controls.	3	
8	Rx_LOS	Receiver Loss of Signal Indication.	3	
9	RS1	Rate Select 1. Optionally controls.	3	
10	VeeR	Receiver Ground.	1	
11	VeeR	Receiver Ground.	1	
12	RD-	Receiver Inverted Data Output.	3	
13	RD+	Receiver Non-Inverted Data Output.	3	
14	VeeR	Receiver Ground.	1	
15	VccR	Receiver 3.3V Supply.	2	
16	VccT	Transmitter 3.3V Supply.	2	
17	VeeT	Transmitter Ground.	1	
18	TD+	Transmitter Non-Inverted Data Input.	3	
19	TD-	Transmitter Inverted Data Input.	3	
20	VeeT	Transmitter Ground.	1	

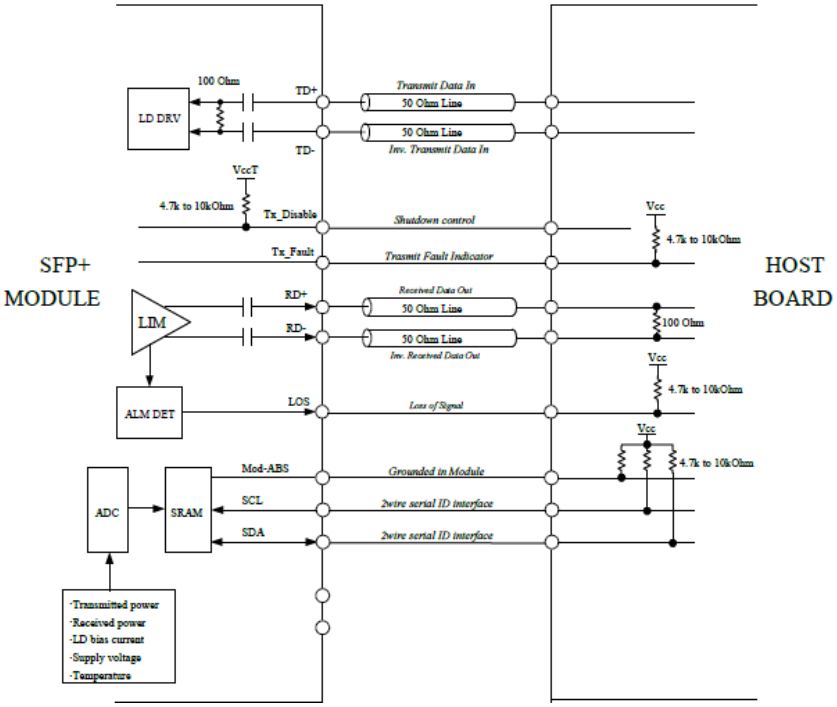
Notes:

1. The case makes electrical contact to the cage before any of the board edge contacts are made.
2. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
3. SCL, SDA, and MOD_ABS should be pulled up with a 4.7kΩ to 10kΩ resistor on the host board.
   The pull-up voltage shall be VccT or VccR.
   SCL is the clock line of the 2-wire serial interface for serial ID.
   SDA is the data line of the 2-wire serial interface for serial ID.
   MOD_ABS is grounded by the module to indicate that the module is present.
4. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP+ connector pin. Recommended host board power supply filtering is shown below.
5. TD- and TD+ are the differential transmitter inputs. They are AC coupled, differential lines with 100Ω differential termination inside the module.
6. RD- and RD+ are the differential receiver outputs. They are AC coupled, 100Ω differential lines which should be terminated with 100Ω (differential) at the host.

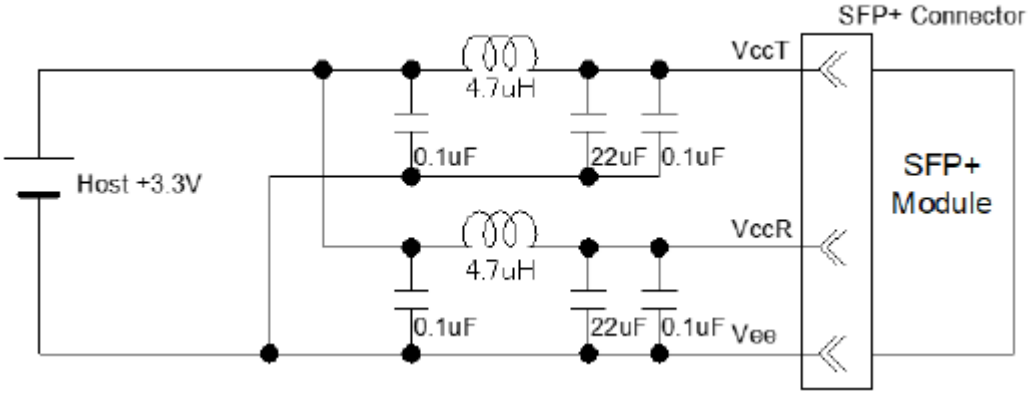
Block Diagram of the Transceiver



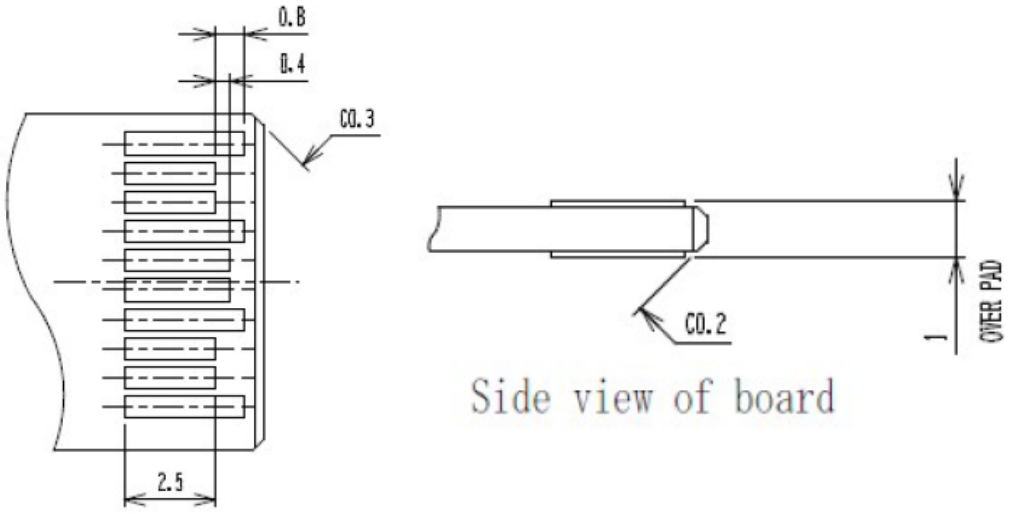
Recommended Interface Circuit



Power Supply Filter

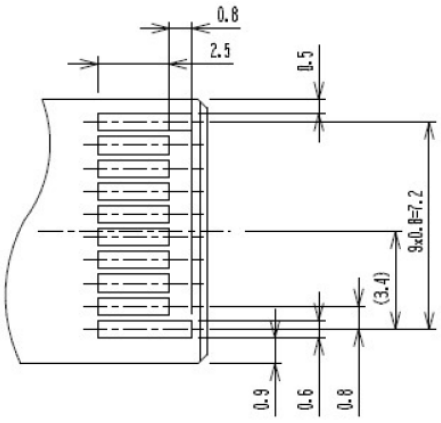


Circuit Board Connector Layout



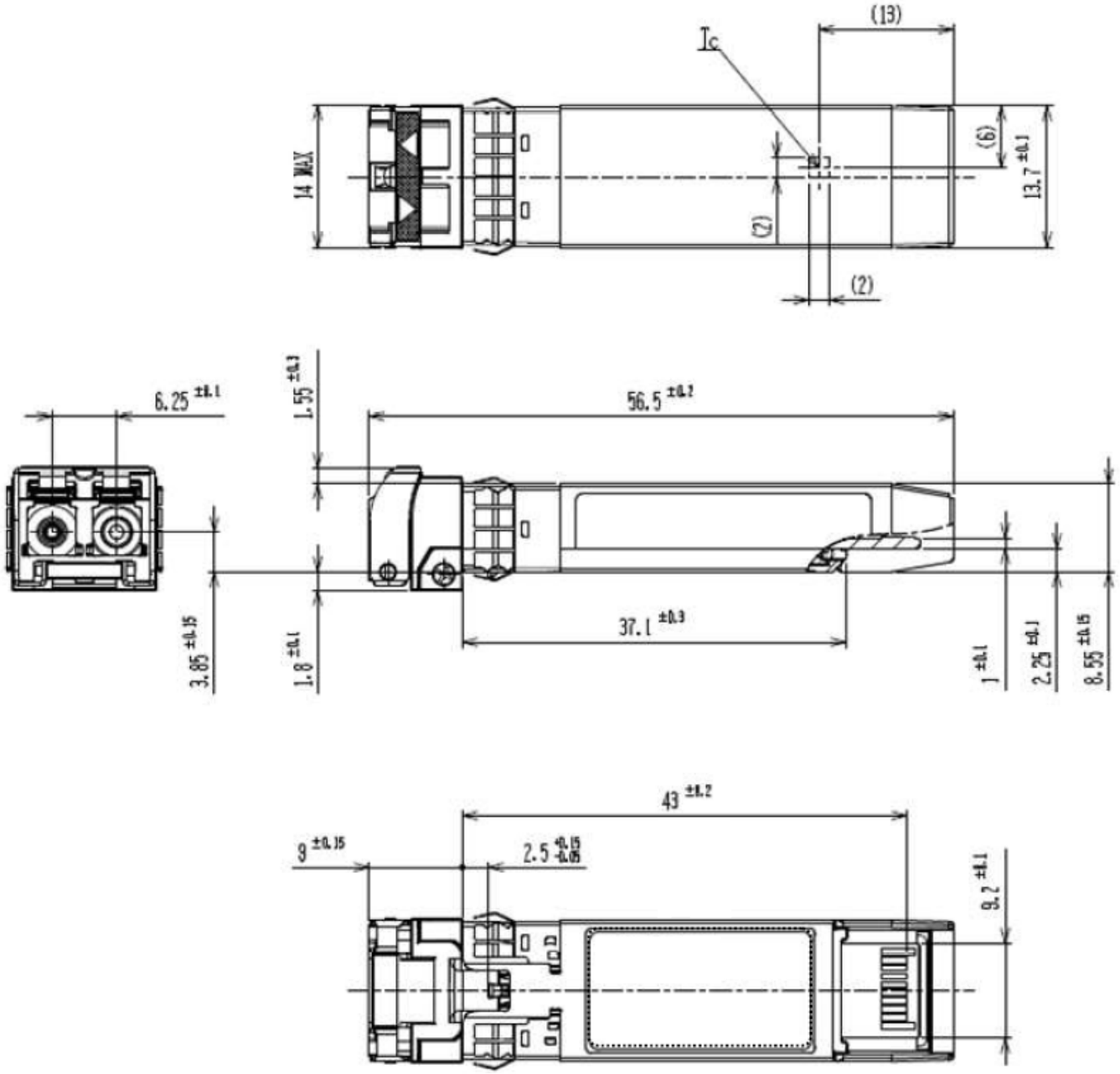
Side view of board

Top view of board



Bottom view of board

Mechanical Specifications



About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

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