16G-SFPP-ERD-1557-36-C

Brocade® 16G-SFPP-ERD-1557-36 Compatible TAA 16Gbs Fibre Channel DWDM 100GHz SFP+ Transceiver (SMF, 1557.36nm, 40km, LC, DOM)

Features:

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free

Applications:

- Ethernet over DWDM
- Access, Metro and Enterprise

Product Description

This Brocade® 16G-SFPP-ERD-1557-36 compatible SFP+ transceiver provides 16GBase-DWDM Fibre Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1557.36nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Brocade® 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

Rev. 081722

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

ITU-T Grid Channel (100GHz Spacing)

Channel	THz	nm	Channel	THz	nm
17*	191.7	1563.86	40	194	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73
20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.55	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61*	196.1	1528.77
39	193.9	1546.12			

*This channel is supported with limited availability.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	Vcc	-0.5		3.6	V	
Storage Temperature	TS	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Input Voltage	Vin	-0.5		Vcc	V	
Baud Rate		4.25	14.025		Gbps	

Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Module Supply Voltage		Vcc	+3.15	3.3	3.45	V	
Power Supply Current		ICC		430	610	mA	
Surge Current		Isurge			+30	mA	
Transmitter							
CML Inputs (Differential)		Vin	250		1000	mVpp	AC coupled inputs
Input Impedance (Differential)		Zin	85	100	115	ohm	Rin > 100 kohms @DC
Differential Input S-parameter		SDD11			-10	dB	
Differential to Common Mode Conversion		SCD11			-10	dB	
Tx_DISABLE Input Voltage	High		2		3.45	V	
	Low		0		0.8	V	
Tx_Fault Output Voltage	High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
	Low		0		0.5	V	Io = -4.0mA
Receiver							
CML Outputs (Differential)		Vout	350		700	mVpp	AC coupled outputs
Output AC Common Mode Voltage			0		15	mV	RMS
Output Impedance (Differential)		Zout	85	100	115	ohm	
Differential Output S-parameter		SD22			-10	dB	
Rx_LOS Output Voltage	High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
	Low		0		0.8	V	Io = -4.0mA
MOD_DEF (0:2)		VoH	2.5			V	With Serial ID
		VoL	0		0.5	V	

Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
9µm Core Diameter SMF				40		Km	
Data Rate			4.25	14.025		Gbps	
Transmitter							
Center Wavelength Spacing				50		GHz	
				0.4		nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	0		+4	dBm	1
Extinction Ratio		ER	8.2			dB	
Average Power of OFF Transmitter		Poff			-30	dBm	
Transmitter Dispersion Penalty		TDP			2	dB	
TX Disable Assert Time		t_off			-30	dBm	
TX_DISABLE Negate Time		t_on			1	ms	
TX_DISABLE time to start reset		t_reset	10			us	
Time to initialize, include reset of TX_FAULT		t_init			300	ms	
TX_FAULT from fault to assertion		t_fault			100	us	
Total Jitter		TJ			0.28	UI (p-p)	
Data Dependent Jitter		DDJ			0.1	UI (p-p)	
Uncorrelated Jitter		UJ			0.023	RMS	
Receiver							
Center Wavelength		λ	1260		1565	nm	
Sensitivity		Pmin			-14	dBm	2
Receiver Overload		Pmax	0			dBm	
Optical Return Loss		ORL			-12	dBm	
LOS De-Assert		LOSD			-16	dBm	
LOS Assert		LOSA	-26			dBm	
LOS	**High**		2		Vcc+0.3	V	
	Low		0		0.8	V	

Notes:
1. Output is coupled into a 9/125um SMF
2. Minimum average optical power measured at the BER less than 1E-12, back to back. The measure pattern is PRBS 2^{31}-1.
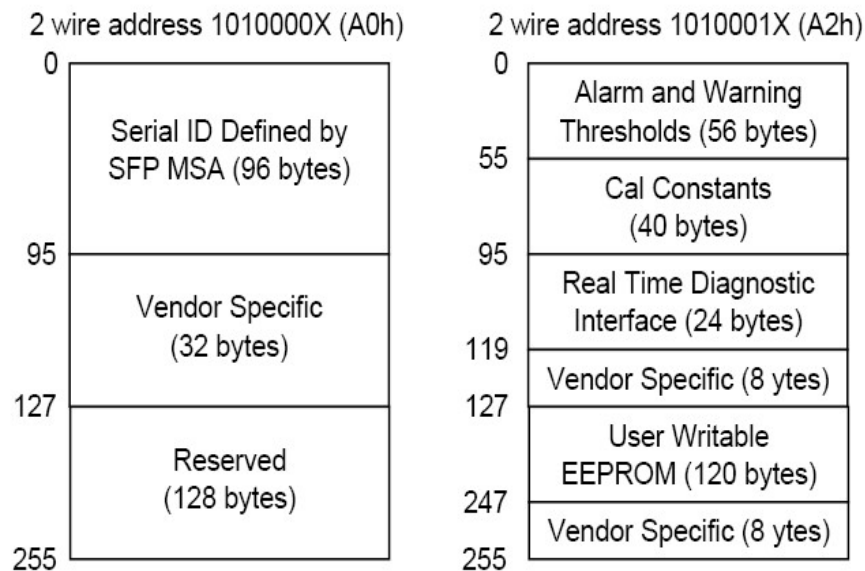
Pin Descriptions

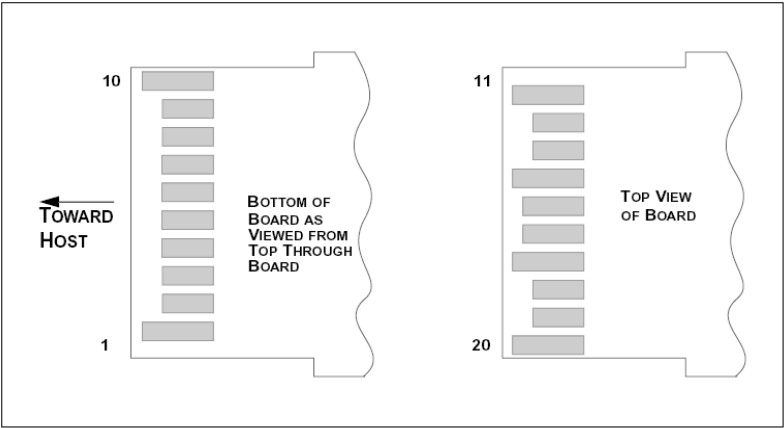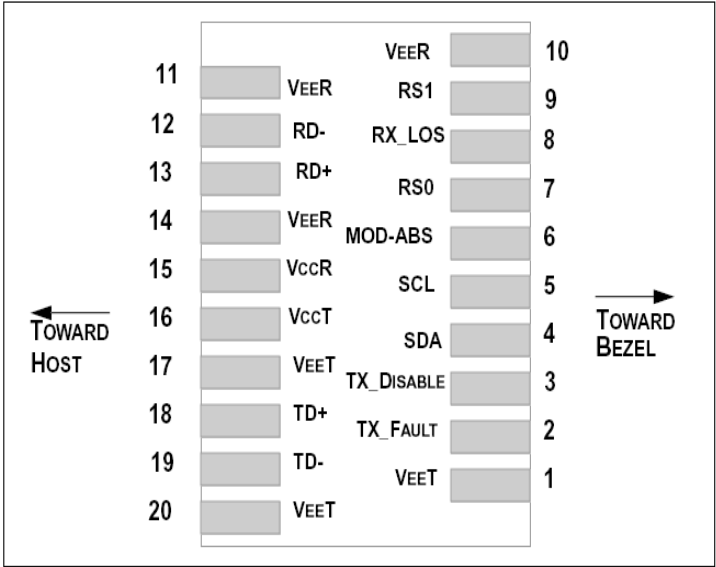| Pin	Symbol	Descriptions	Sequence	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	SDA	Module Definition 2	3	2-wire Serial Interface Data Line.
5	SCL	Module Definition 1	3	2-wire Serial Interface Clock.
6	MOD-ABS	Module Definition 0	3	Note 3
7	RS0	RX Rate Select(LVTTL).	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(LVTTL).	1	Rate Select 1, optionally controls SFP+module transmitter. This pin is pulled low to VeeT with a >30K resistor.
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	3.3V ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3V ± 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 4.7K – 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.
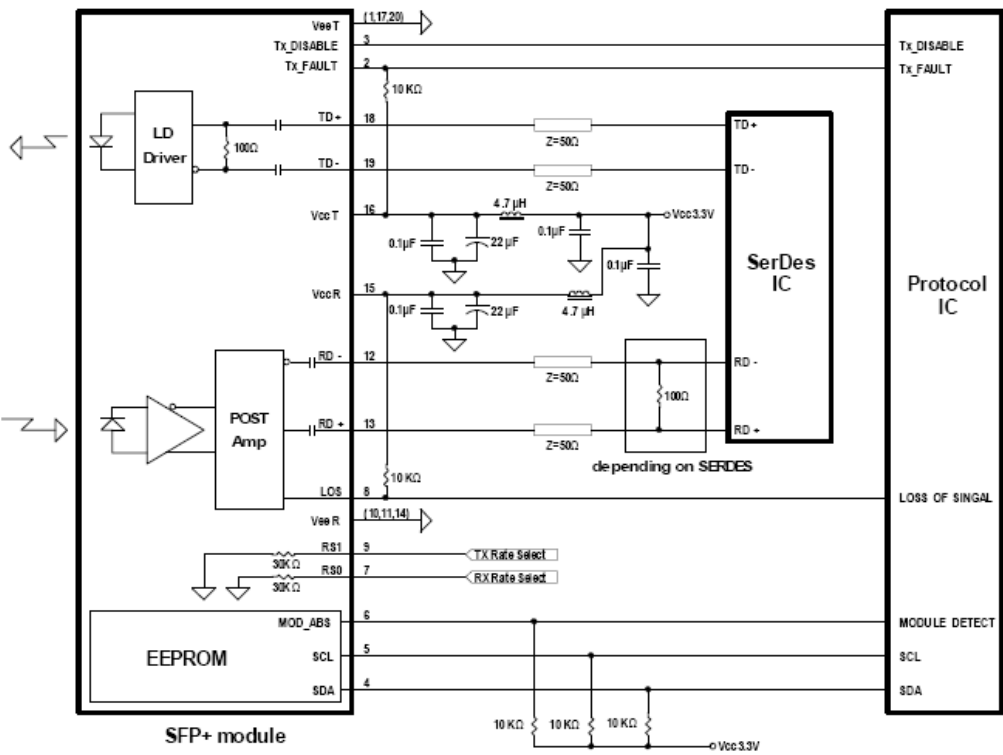
5. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.

6. RD-/+: These are the different receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is doneinside 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 pinn. Maximum supply current is 610mA. 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.

2 wire address 1010000X (A0h)	
0	
Serial ID Defined by SFP MSA (96 bytes)	
95	
Vendor Specific (32 bytes)	
127	
Reserved (128 bytes)	
255	

2 wire address 1010001X (A2h)	
0	
Alarm and Warning Thresholds (56 bytes)	
55	
Cal Constants (40 bytes)	
95	
Real Time Diagnostic Interface (24 bytes)	
119	
Vendor Specific (8 ytes)	
127	
User Writable EEPROM (120 bytes)	
247	
Vendor Specific (8 ytes)	
255	

SFP+ Transceiver Electrical Pad Layout

Recommended Circuit Schematic

Mechanical Specifications

Unremarked tolerances ±0.2mm
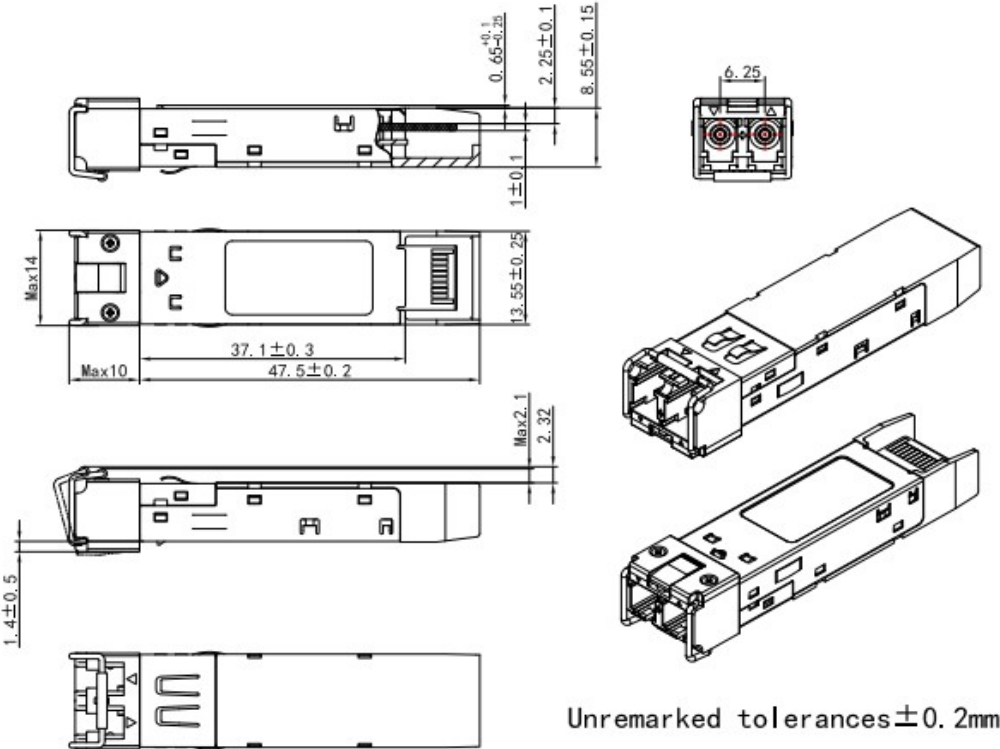
About ProLabs

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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