



SPD28020160C266

Brocade® Compatible 16GBase-DWDM FC SFP+ Transceiver C-Band 100GHz (SMF, 1554.94nm, 40km, LC, DOM)

Product Description

This Brocade® SFP+ transceiver provides 16GBase-DWDM Fibre Channel throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1554.94nm 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. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

Features:

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



Applications:

- 16GBase Fibre Channel
- Access, Metro and Enterprise

For your product safety, please read the following information carefully before any manipulation of the transceiver:



ESD

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 / JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



LASER SAFETY

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.

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.

Wavelength Guide (100GHz ITU-T Channel)

Channel #	Frequency (THz)	Center Wavelength (nm)
17	191.7	1563.86
18	191.8	1563.05
19	191.9	1562.23
20	192.0	1561.42
21	192.1	1560.61
22	192.2	1559.79
23	192.3	1558.98
24	192.4	1558.17
25	192.5	1557.36
26	192.6	1556.55
27	192.7	1555.75
28	192.8	1554.94
29	192.9	1554.13
30	193.0	1553.33
31	193.1	1552.52
32	193.2	1551.72
33	193.3	1550.92
34	193.4	1550.12
35	193.5	1549.32
36	193.6	1548.51
37	193.7	1547.72
38	193.8	1546.92
39	193.9	1546.12
40	194.0	1545.32
41	194.1	1544.53
42	194.2	1543.73
43	194.3	1542.94
44	194.4	1542.14

45	194.5	1541.35
46	194.6	1540.56
47	194.7	1539.77
48	194.8	1538.98
49	194.9	1538.19
50	195.0	1537.40
51	195.1	1536.61
52	195.2	1535.82
53	195.3	1535.04
54	195.4	1534.25
55	195.5	1533.47
56	195.6	1532.68
57	195.7	1531.90
58	195.8	1531.12
59	195.9	1530.33
60	196.0	1529.55
61	196.1	1528.77

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	V _{cc}	-0.5		4.5	V	
Storage Temperature	T _{stg}	-40		85	°C	
Operating Case Temperature	T _c	0		70	°C	
Operating Humidity	RH	5		95	%	
Data Rate	BR	4.25	14.025		Gbps	

Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		V _{CC}	3.135	3.30	3.465	V	
Power Supply Current		I _{CC}			550	mA	
Transmitter							
Differential Data Input Swing		V _{IN}	180		850	mV	1
Input Differential Impedance		Z _{IN}	90	100	110	Ω	
Tx_Disable	Disable	V _{IH}	2.0		V _{CC}	V	
	Enable	V _{IL}	0		0.8	V	
Tx_Fault	Fault	V _{OH}	2.0		V _{CC}	V	
	Normal	V _{OL}	0		0.8	V	
Receiver							
Differential Data Output Swing		V _{OUT}	300		900	mV	2
LOS	High		2.0		V _{CC}	V	
	Low				0.8	V	

Notes:

1. PECL input. Internally AC-coupled and terminated.
2. Internally AC-coupled.

Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter							
Center Wavelength		λ _C	1528.77		1563.86	nm	
Spectral Width (-20dB)		Δλ			1	nm	
Side-Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		P _{OUT}	-1		3	dBm	1
Extinction Ratio		ER	8.2			dB	
Receiver							
Center Wavelength		λ _C	1260		1620	nm	
Receiver Sensitivity		S			-14	dBm	2
Receiver Overload		POL	0.5			dBm	2
LOS De-Assert		LOSD			-15	dBm	
LOS Assert		LOSA	-28			dBm	
LOS Hysteresis		LOSH	0.5			dB	

Notes:

1. The optical power is launched into the SMF.
2. Measured with a PRBS $2^{31}-1$ test pattern @14025Mbps, BER $\leq 1 \times 10^{-12}$.

Timing and Electrical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Tx_Negate Time	T_on			2	ms
Tx_Disable Assert Time	T_off			100	μ s
Time To Initialize Including Reset of Tx_Fault	T_init			300	ms
Tx_Fault Assert Time	T_fault			100	μ s
Tx_Disable To Reset	T_reset	10			μ s
LOS Assert Time	T_loss_on			100	μ s
LOS De-Assert Time	T_loss_off			100	μ s
Serial ID Clock Rate	T_serial_clock		100	400	KHz
MOD_DEF (0:2) - High	VOH	2		Vcc	V
MOD_DEF (0:2) - Low	VOL			0.8	V

Pin Descriptions

Pin	Symbol	Name/Descriptions	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground).	1
2	Tx_Fault	Transmitter Fault. LVTTTL-O.	2
3	Tx_Disable	Transmitter Disable. Laser output disabled on "high" or "open." LVTTT-I.	3
4	SDA	2-Wire Serial Interface Data (Same as MOD-DEF2 in INF-8074i). LVTTTL-I/O.	
5	SCL	2-Wire Serial Interface Clock (Same as MOD-DEF2 in INF-8074i). LVTTTL-I.	
6	MOD_ABS	Module Absent. Connect to VeeT or VeeR in the module.	4
7	RS0	Rate Select 0. Not Used.	5
8	LOS	Loss of Signal Indication. "Logic 0" indicates normal operation. LVTTTL-O.	2
9	RS1	Rate Select 1. Not Used.	5
10	VeeR	Receiver Ground (Common with Transmitter Ground).	1
11	VeeR	Receiver Ground (Common with Transmitter Ground).	1
12	RD-	Receiver Inverted Data Out. AC Coupled. CML-O.	
13	RD+	Receiver Non-Inverted Data Out. AC Coupled. CML-O.	
14	VeeR	Receiver Ground (Common with Transmitter Ground).	1
15	VccR	Receiver Power Supply.	
16	VccT	Transmitter Power Supply.	

17	VeeT	Transmitter Ground (Common with Receiver Ground).	1
18	TD+	Transmitter Non-Inverted Data In. AC Coupled. CML-I.	
19	TD-	Transmitter Inverted Data In. AC Coupled. CML-O.	
20	VeeT	Transmitter Ground (Common with Receiver Ground).	1

Notes:

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output and should be pulled up to the Host_Vcc with resistor in the range 4.7kΩ to 10kΩ. Pull-ups can be connected to one or several power supplies; however, the host board design shall ensure that no module contract has voltage exceeding module VccT/R+0.5V.
3. Tx_Disable is an input contact with a 4.7kΩ to 10kΩ pull-up resistor to VccT inside the module.
4. MOD_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull the contract up to Host_Vcc with a resistor in the range from 4.7kΩ to 10kΩ. MOD_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431.



Pin-Out of Connector Block on the Host Board

Transceiver Functional Diagram



Recommended Interface Circuit Schematic



Mechanical Specifications



EEPROM Information

EEPROM memory map-specific data field description is as below:

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
0	Serial ID Defined by SFP MSA (96 bytes)	0	Alarm and Warning Thresholds (56 bytes)
95		55	Cal Constants (40 bytes)
127		95	Real Time Diagnostic Interface (24 bytes)
	Vendor Specific (32 bytes)	119	Vendor Specific (8 bytes)
255		127	User Writable EEPROM (120 bytes)
	Reserved, SFF8079 (128 bytes)	247	
		255	Vendor Specific (8 bytes)

About Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.

