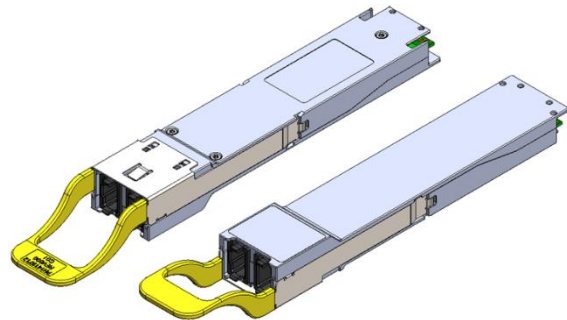

Preliminary Product Specification

**800G (2x400 DR4) OSFP Optical
Finisar Transceiver**

FTCE4517E1PxA-2N

PRODUCT FEATURES

- Hot-pluggable Type 2 OSFP form factor
- Supports 850Gb/s aggregate bit rate
- Power dissipation <17W
- RoHS-6 compliant
- Case temperature range of 20°C to +60°C (limited temp) or 0°C to +70°C (c-temp)
- Single 3.3V power supply
- Aligned with IEEE 802.3bs
- 8x100G PAM4 retimed 106.25Gb/s PAM4 electrical interface aligned to IEEE 802.3ck
- DUAL MPO-12, APC receptacles
- I2C management interface

**APPLICATIONS**

- 8 x 100GbE applications
- 2 x 400GbE applications
- 4 x 200GbE applications
- NDR Infiniband

The FTCE4517E1PxA-2N (2 x DR4) OSFP transceiver modules are designed for use in (2 x 400) Gigabit Ethernet links on up to 500m of single mode fiber. They are compliant with the OSFP MSA, IEEE 802.3bs⁶ and IEEE P802.3ck⁷ Digital diagnostic functions are available via the I2C interface, as specified by the OSFP MSA. The optical transceiver is RoHS compliant as described in Application Note AN-2038^{2,3}.

PRODUCT SELECTION

E:	Ethernet protocol
P:	Pull-tab type release
x:	C = Commercial or L limited temperature
A:	Dual MPO-12 receptacle
2N :	No Heat Sink Design

I. Pin Descriptions

The electrical pinout of the OSFP module is shown in Figure 1 below

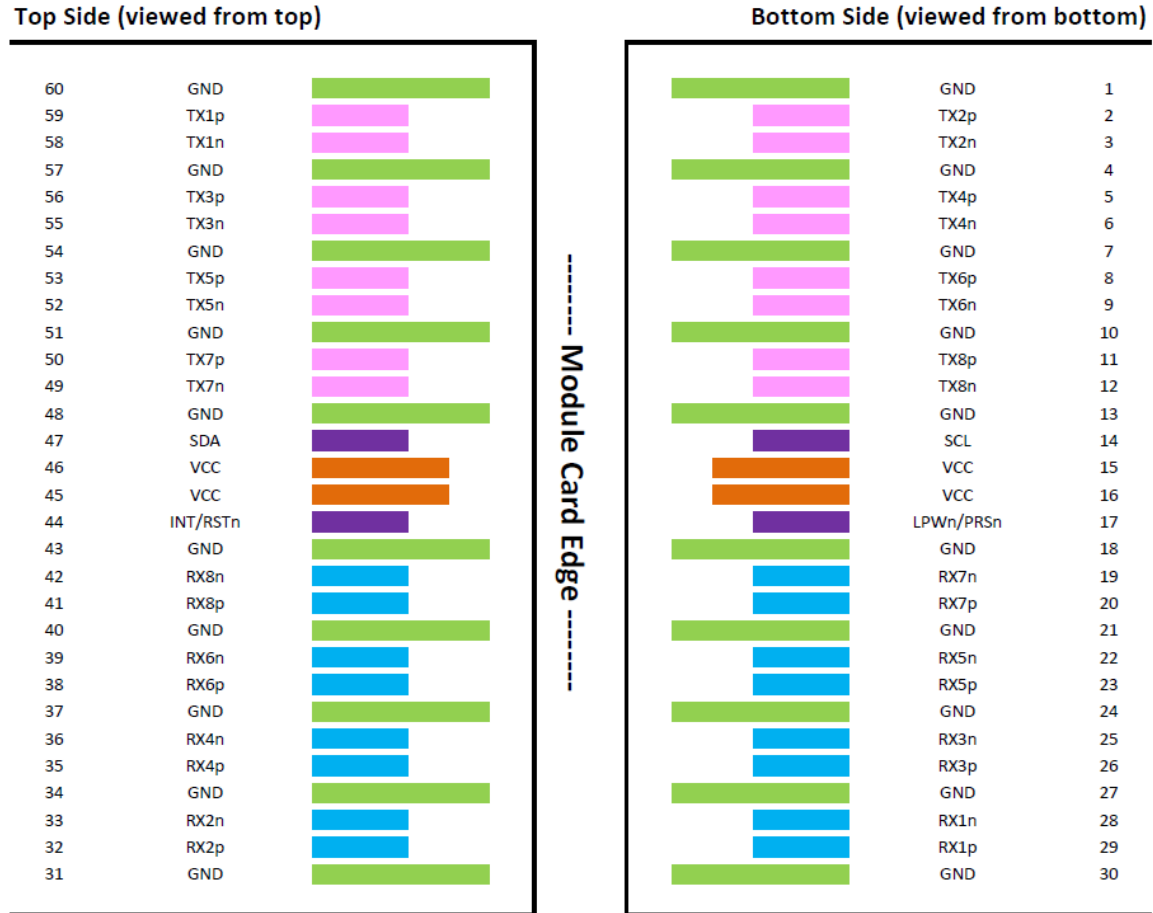


Figure 1 – OSFP Module Pinout (per OSFP MSA)

II. Absolute Maximum Ratings

Module performance is not guaranteed beyond the operating range (see Section VI). Exceeding the limits below may damage the transceiver module permanently.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	V _{cc}	-0.5		4.0	V	
Storage Temperature	T _s	-40		+85	°C	
Case Operating Temperature	T _{OP}	0		+70	°C	c-temp
		20		+60		limited temp
Relative Humidity	RH	15		85	%	1
Receiver Damage Threshold, per Lane	P _{Rdmg}	5			dBm	

Notes:

1. Non-condensing.

III. Electrical Characteristics (EOL, T_{OP} = 0 to +70 °C, V_{CC} = 3.135 to 3.465 Volts)

Aligned to IEEE P802.3ck

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	V _{cc}	3.135	3.3	3.465	V	
Supply Current	I _{cc}			tba	A	
Module total power	P			17	W	1
Transmitter						
Signaling rate per lane		53.125 ± 100 ppm.			Gbd	
Differential pk-pk input voltage tolerance		900			mV	
Differential to common mode input return loss		Per equation (120G-2) IEEE802.3ck			dB	
Effective return loss, ERL		8.5			dB	
Differential termination mismatch				10	%	
Module stress input test		Per 120G.3.4.1, IEEE802.3ck				2
Single-ended voltage tolerance range		-0.4		3.3	V	
DC common mode voltage		-350		2850	mV	3
Receiver						
Signaling rate per lane		53.125			Gbd	
AC common-mode output voltage (RMS)				17.5	mV	
Differential output voltage				900	mV	
Eye height, differential		15			mV	
Vertical eye closure				12	dB	
Common-mode to differential return loss		Equation (120G-1)			dB	
Effective return loss, ERL		8.5			dB	
Differential termination mismatch				10	%	
Transition time (min, 20% to 80%)		8.5			ps	
DC common mode voltage		-350		2850	mV	3,4

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.
2. Meets BER specified in 120G.1.1.
3. DC common-mode voltage is generated by the host. Specification includes effects of ground offset voltage
4. The signaling rate range is derived from the PMD receiver input.

IV. Optical Characteristics (EOL, T_{OP} = 0 to +70 °C, V_{CC} = 3.135 to 3.465 Volts)

Meets 400GBASE-DR4 as being defined by IEEE P802.3bs

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Signaling rate (each lane (range))		53.125 ± 100 ppm			GBd	
Modulation format		PAM4				
Lane wavelength (range)		1304.5 to 1317.5			nm	
Side-mode suppression ratio (SMSR)		30			dB	
Average launch power, each lane				4	dBm	
Average launch power, each lane		-2.9			dBm	1
Outer Optical Modulation Amplitude (OMA _{outer}), each lane		-0.8		4.2	dBm	2
Launch power in OMA _{outer} minus TDECQ, each lane		-2.2			dBm	
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane				3.4	dB	

Average launch power of OFF transmitter, each lane				-15	dBm	
Extinction ratio		3.5			dB	
RIN _{21.4OMA}				-136	dB/Hz	
Optical return loss tolerance				21.4	dB	
Transmitter reflectance				-26	dB	3

Notes:

1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. Even if the TDECQ < 1.4 dB, the OMA_{outer} (min) must exceed this value
3. Transmitter reflectance is defined looking into the transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Receiver						
Signaling rate (each lane (range))		53.125 ± 100 ppm			GBd	
Modulation format		PAM4				
Lane wavelength (range)		1304.5 to 1317.5			nm	
Damage threshold, each lane		5			dBm	1
Average receive power, each lane				4	dBm	
Average receive power, each lane		-5.9			dBm	2
Receive power (OMA _{outer}), each lane				4.2	dBm	
Receiver reflectance				-26	dB	
Receiver sensitivity (OMA _{outer}), each lane				-4.4	dBm	3
Stressed receiver sensitivity (OMA _{outer}), each lane				-1.9	dBm	4
Conditions of stressed receiver sensitivity test:						
Stressed eye closure for PAM4 (SECQ), lane under test		3.4			dB	5
OMA _{outer} of each aggressor lane		4.2			dBm	

Notes:

1. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
2. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
3. Receiver sensitivity (OMA_{outer}), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.
4. Measured with conformance test signal at TP3 (see 124.8.9) for the BER specified in 124.1.1.
5. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate (all wavelengths combined)	BR			850	Gb/s	1
Bit Error Ratio	BER			2.4E-4		2
Maximum Supported Distances						
Fiber Type						
SMF per G.652	L _{max1}			500	m	

Notes:

1. Supports 400GBASE-DR4 per IEEE P802.3bs.
2. As defined by IEEE P802.3bs.

VI. Environmental Specifications

Finisar FTCE4517E1PxM -2N (2 x DR4) OSFP transceivers have an operating case temperature range of 0°C to +70°C.

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T _{op}	0		+70	°C	
Storage Temperature	T _{sto}	-40		+85	°C	

VII. Regulatory Compliance

The FTCE4517E1PCA-2N transceivers are RoHS compliant. Copies of certificates are available from Coherent Corp. upon request.

FTCE4517E1PCA-2N transceiver modules are Class 1 laser eye safety compliant per IEC 60825-1.

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

III. Digital Diagnostics Functions

FTCE4517E1PxA-2N (2 x DR4) OSFP transceivers support the I2C-based diagnostics interface specified by the SFF Committee¹. See also Finisar Application Note AN-20xx (TBD).

IX. Memory Contents

CMIS 4.0 Per MSA. CMIS 5.X available upon request
Firmware upgrade Supported via CDB commands

The following AppSel are supported:

- 2x400 long mode Application1
- 2x400 short mode Application2
- 4x200 long mode Application3
- 4x200 short mode Application4
- 8x100 long mode Application5
- 8x100 short mode Application6

ApSel	Media interface ID	Host interface ID	Host lanes, Media Lanes
400G-DR4-long mode	400GBASE-DR4 (0x1C)	400GAUI-4-L C2M (0x50)	4, 4 (0x44)
400G-DR4-short mode	400GBASE-DR4 (0x1C)	400GAUI-4-S C2M (0x4F)	4, 4 (0x44)
200G-DR2-long mode	400GBASE-DR4 (0x1C)	200GAUI-2-L C2M (0x4E)	2, 2 (0x22)
200G-DR2-short mode	400GBASE-DR4 (0x1C)	200GAUI-2-S C2M (0x4D)	2, 2 (0x22)
100G-DR-long mode	100GBASE-DR (0x14)	100GAUI-1-L C2M (0x4C)	1, 1 (0x11)
100G-DR-short mode	100GBASE-DR (0x14)	100GAUI-1-S C2M (0x4B)	1, 1 (0x11)

The following App Sel can be supported via customization.

200G-DR4	200GBASE-DR4 (0x17)	200GAUI-4 C2M (0x0F)	4, 4 (0x44)
100G-PSM4	100G PSM4 MSA Spec (0x0F)	CAUI-4 C2M (0x0B)	4, 4 (0x44)

XI. Mechanical Specifications

Finisar FTCE4517E1PxA-2N (2 x DR4) OSFP transceivers are compatible with the OSFP Specification for pluggable form factor type 2 modules.

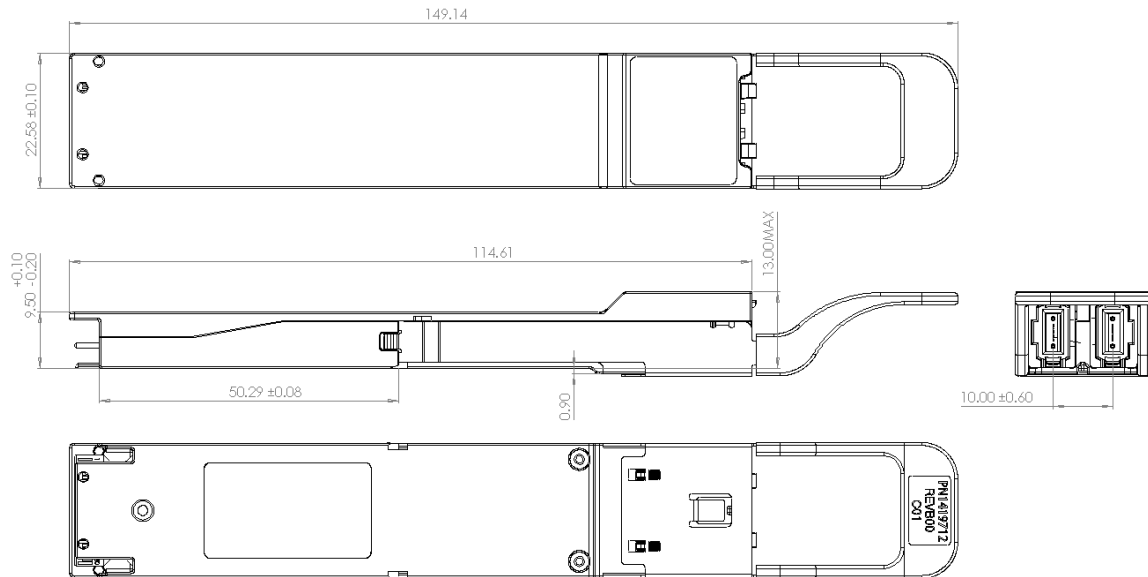


Figure 2. FTCE4517E1PxA-2N Mechanical Dimensions.

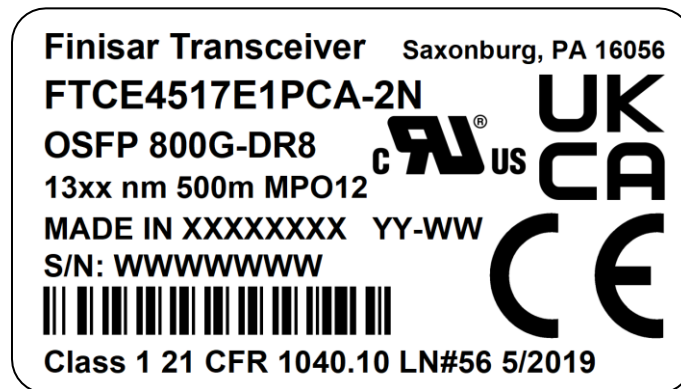


Figure 3. Product Label

XII. References

1. OSFP Specification for OSFP Octal small form factor pluggable module
2. Directive 2011/65/EU of the European Council Parliament and of the Council, “on the restriction of the use of certain hazardous substances in electrical and electronic equipment” as well as Commission Delegated Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU. Certain products may use one or more exemptions as allowed by the Directive.
3. “Application Note AN-2038: Finisar Implementation Of RoHS Compliant Transceivers”, Finisar Corporation, January 21, 2005.
4. Application Note AN-2153, Initialization, Finisar Corporation.
5. Application Note AN-2154, EEPROM Map, Finisar Corporation.
6. IEEE P802.3bs, 400GBASE-DR4
7. IEEE P802.3ck Physical Layer Specifications and Management Parameters for 100 Gb/s, 200 Gb/s, and 400 Gb/s Electrical Interfaces Based on 100 Gb/s Signaling, 400GAUI-4 C2M

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