Product Specification

800GBASE 2xFR4/FR8 OSFP 1310nm 2km DOM
Dual Duplex LC/UPC Optical Transceiver Module

PN: OSFP-800G-2FR4

Features

- Hot Pluggable OSFP form factor

- Operating data rate 850Gbps

- Single +3.6V power supply

- Dual Duplex LC connector

- Max power dissipation <16.5W

- Up to 2km transmission on single mode fiber

- PIN receivers

- Built-in digital diagnostic function

- Commercial temperature range 0°C to 70°C

Compliance

- Compliant with OSFP MSA

- Compliant with CMIS 5.1

- RoHS

Applications

- 800G Ethernet

- Cloud Services

- Data Center Interconnect

- Data center Enterprise networking

- Switches with OSFP ports

Description

The 800G-OSFP-2FR4 Optical Transceiver Module is a cutting-edge solution designed to deliver 800G Ethernet and 800G InfiniBand connectivity for high-speed data communication applications. Engineered to support 800GBASE throughput, this module enables reliable data transmission over single-mode fiber (SMF) with a reach of up to 2 kilometers. Featuring dual duplex LC connectors, it ensures seamless integration into existing optical networks while maintaining robust performance for demanding enterprise and data center environments.

This transceiver operates by converting eight channels of 106.25 Gb/s electrical input signals into corresponding 106.25 Gb/s optical wavelengths on the transmitter side, and vice versa on the receiver side. Leveraging advanced modulation technology, the module achieves an aggregate data rate of 800 Gbps, making it ideal for next-generation networking infrastructure. Its design adheres to industry-standard OSFP form factor specifications, ensuring compatibility with high-density switches and routers.

Product performance Specifications

1、Basic Product Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Absolute Maximum Ratings					
Storage Temperature	T_S	-40	-	+85	°C
Supply Voltage	V_{CC}	-0.5	-	3.6	V
Relative Humidity	RH	5	-	95	%
Operating Case Temperature	T_{OP}	0	-	70	°C
Control Input Voltage	V_I	-0.3	-	VCC+0.5	V
Operational Specifications					
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Instantaneous peak current at hot plug	ICC_IP			6800	mA
Sustained peak current at hot plug	ICC_SP	-	-	5670	mA
Maximum Power Dissipation	PD	-	-	16.5	W
Maximum Power Dissipation, Low Power Mode	PDLP	-	-	1.5	W
Signaling Rate per Lane	SRL	-	53.125	-	GBd
Two Wire Serial Interface Clock Rate	-	100	-	1000	kHz
Power Supply Noise Tolerance (10Hz - 10MHz)				25	mA
Rx Differential Data Output Load			100		Ω
Operating Distance		2		2000	m

2、Product Optical and Electrical Characteristics

Parameter		Symbol	Min	Typ.	Max	Unit	Note
Pre FEC Bit Error Ratio					2.40E-04		
Post FEC Bit Error Ratio					1.00E-12		
Transceiver							
Data rate per lane		DR		53.125		GBd	
Modulation format				PAM4			
Center Wavelength	L0		1264.5	1271	1277.5	nm	
	L1		1284.5	1291	1297.5	nm	
	L2		1304.5	1311	1317.5	nm	
	L3		1324.5	1331	1337.5	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Launch power, each lane		P_{AVG}	-3.2		4.4	dBm	1
Optical Power OMA, each Lane,max		P_{OMA}	0.3		3.7	dBm	
Outer Optical Modulation Amplitude (OMAouter), each Lane	for TDECQ <1.4 dB	TOMA	-0.2		3.7	dBm	2
	for 1.4 dB ≤TDECQ ≤3.4 dB		-1.6 + TDECQ				
Transmitter and dispersion eye closure (TDECQ), each lane		TDECQ			3.4	dB	
Difference in launch power between any two lanes (OMAouter) (max)		AOPd			3.9	dB	
TDECQ minus TECQ, each lane		TDECQ-TECQ			2.5	dB	
Average Launch Power of OFF Transmitter, each lane		TOFF			-16	dBm	
Extinction Ratio		ER	3.5			dB	
Transmitter transition time (max)		Tr			17	ps	
RIN21.4OMA		RIN			-136	dB/Hz	
Optical Return Loss Tolerance		ORL			17.1	dB	
Common-mode to differential-mode return loss			IEEE802.3ck Equation (120G–1)			dB	
Differential pk-pk input Voltage tolerance			750			mV	
Differential termination mismatch					10	%	
Single-ended voltage tolerance range			-0.4		3.3	V	
DC Common Mode Voltage			-350		2850	mV	
Transmitter Reflectance					-26	dB	3

Receiver							
Data rate per lane	BR		53.125			Gbd	
Modulation format			PAM4				
Damage Threshold, average optical power, each lane	AOPD	5.4			dBm		
Average Receive Power, each lane	AOPR	-7.2	-	4.4	dBm		
Receive Power (OMAouter), each lane	OMA-R			3.7	dBm		
Stressed eye closure for PAM4 (SECQ)			3.4		dB		
Receiver Reflectance	RR			-26	dB		
Receiver sensitivity, each lane	SOMA	RS = max (-4.6 , TECQ -7.2)			dBm	4	
Stressed receiver sensitivity, each lane	SRS			-2.6	dBm	5	
Rx LOS	Assert	-15			dBm		
	De-assert			-7.5	dBm		
	Hysteresis	0.5		5	dB		
OMAouter of each aggressor lane			1.5		dBm		
Peak-peak AC common-mode voltage	VCMLF	17		32	mV		
	VCMFB			80			
Differential output Voltage (Long mode)				900	mV		
Differential output Voltage (Short mode)				600	mV		
Eye height, differential		15			mV		
Differential Termination Mismatch				10	%		
Transition Time (min, 20% to 80%)		8.5			ps		
DC common mode Voltage		-350		2850	mV		

Note1: Average launch power, each lane (min) is informative and not the principal indicator of signal strength.

Note2: Even if TDECQ < 1.4dB, OMAouter (min) must exceed this value.

Note3: Transmitter reflectance is defined looking into the transmitter.

Note4: Receiver sensitivity (OMAouter), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.

Note5: Measured with conformance test signal at TP3 for the BER = 2.4×10^{-4}

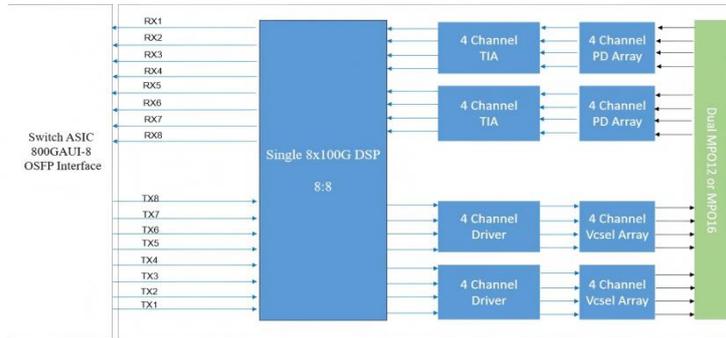## Recommended Host Board Power Supply Circuit

Figure 1: Module Block Diagram

Recommended Interface Circuit
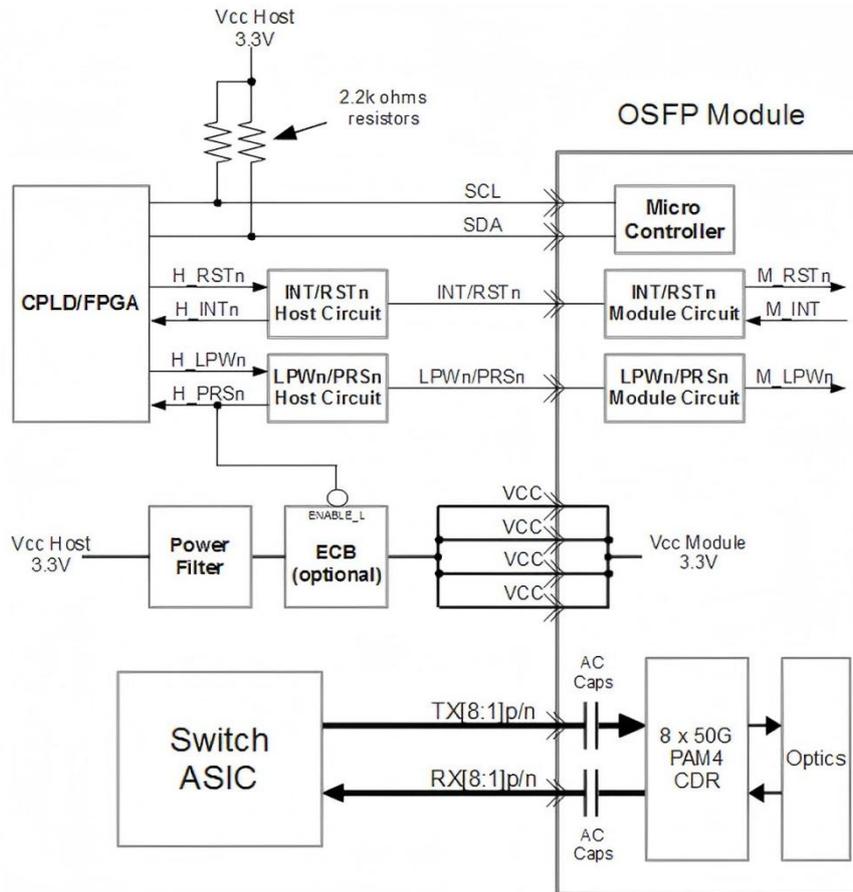

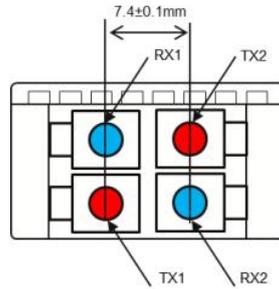**Figure2:** Recommended Interface Circuit

Optical Interface

Figure3: Optical Lane Sequence

Pin-out Definition

Figure4: Pin view

Pin Function Definitions

Pin	Logic	Symbol	Description	Note
1		GND	Ground	
2	CML-I	TX2p	Transmitter Data Non-Inverted	
3	CML-I	TX2n	Transmitter Data Inverted	
4		GND	Ground	
5	CML-I	TX4p	Transmitter Data Non-Inverted	
6	CML-I	TX4n	Transmitter Data Inverted	
7		GND	Ground	
8	CML-I	TX6p	Transmitter Data Non-Inverted	

9	CML-I	TX6n	Transmitter Data Inverted	
10		GND	Ground	
11	CML-I	TX8p	Transmitter Data Non-Inverted	
12	CML-I	TX8n	Transmitter Data Inverted	
13		GND	Ground	
14	LVCMOS-I/O	SCL	2-wire Serial interface clock	1
15		VCC	+3.3V Power	
16		VCC	+3.3V Power	
17	Multi-Level	LPWn/PRSn	Low-Power Mode / Module Present	2
18		GND	Ground	
19	CML-O	RX7n	Receiver Data Inverted	
20	CML-O	RX7p	Receiver Data Non-Inverted	
21		GND	Ground	
22	CML-O	RX5n	Receiver Data Inverted	
23	CML-O	RX5p	Receiver Data Non-Inverted	
24		GND	Ground	
25	CML-O	RX3n	Receiver Data Inverted	
26	CML-O	RX3p	Receiver Data Non-Inverted	
27		GND	Ground	
28	CML-O	RX1n	Receiver Data Inverted	
29	CML-O	RX1p	Receiver Data Non-Inverted	
30		GND	Ground	
31		GND	Ground	
32	CML-O	RX2p	Receiver Data Non-Inverted	
33	CML-O	RX2n	Receiver Data Inverted	
34		GND	Ground	
35	CML-O	RX4p	Receiver Data Non-Inverted	
36	CML-O	RX4n	Receiver Data Inverted	
37		GND	Ground	
38	CML-O	RX6p	Receiver Data Non-Inverted	
39	CML-O	RX6n	Receiver Data Inverted	
40		GND	Ground	
41	CML-O	RX8p	Receiver Data Non-Inverted	
42	CML-O	RX8n	Receiver Data Inverted	
43		GND	Ground	
44	Multi-Level	INT/RSTn	Module Interrupt / Module Reset	2
45		VCC	+3.3V Power	
46		VCC	+3.3V Power	

47	LVCMOS-I/O	SDA	2-wire Serial interface data	1
48		GND	Ground	
49	CML-I	TX7n	Transmitter Data Inverted	
50	CML-I	TX7p	Transmitter Data Non-Inverted	
51		GND	Ground	
52	CML-I	TX5n	Transmitter Data Inverted	
53	CML-I	TX5p	Transmitter Data Non-Inverted	
54		GND	Ground	
55	CML-I	TX3n	Transmitter Data Inverted	
56	CML-I	TX3p	Transmitter Data Non-Inverted	
57		GND	Ground	
58	CML-I	TX1n	Transmitter Data Inverted	
59	CML-I	TX1p	Transmitter Data Non-Inverted	
60		GND	Ground	

Note1: Open-Drain with pull up resistor on Host.

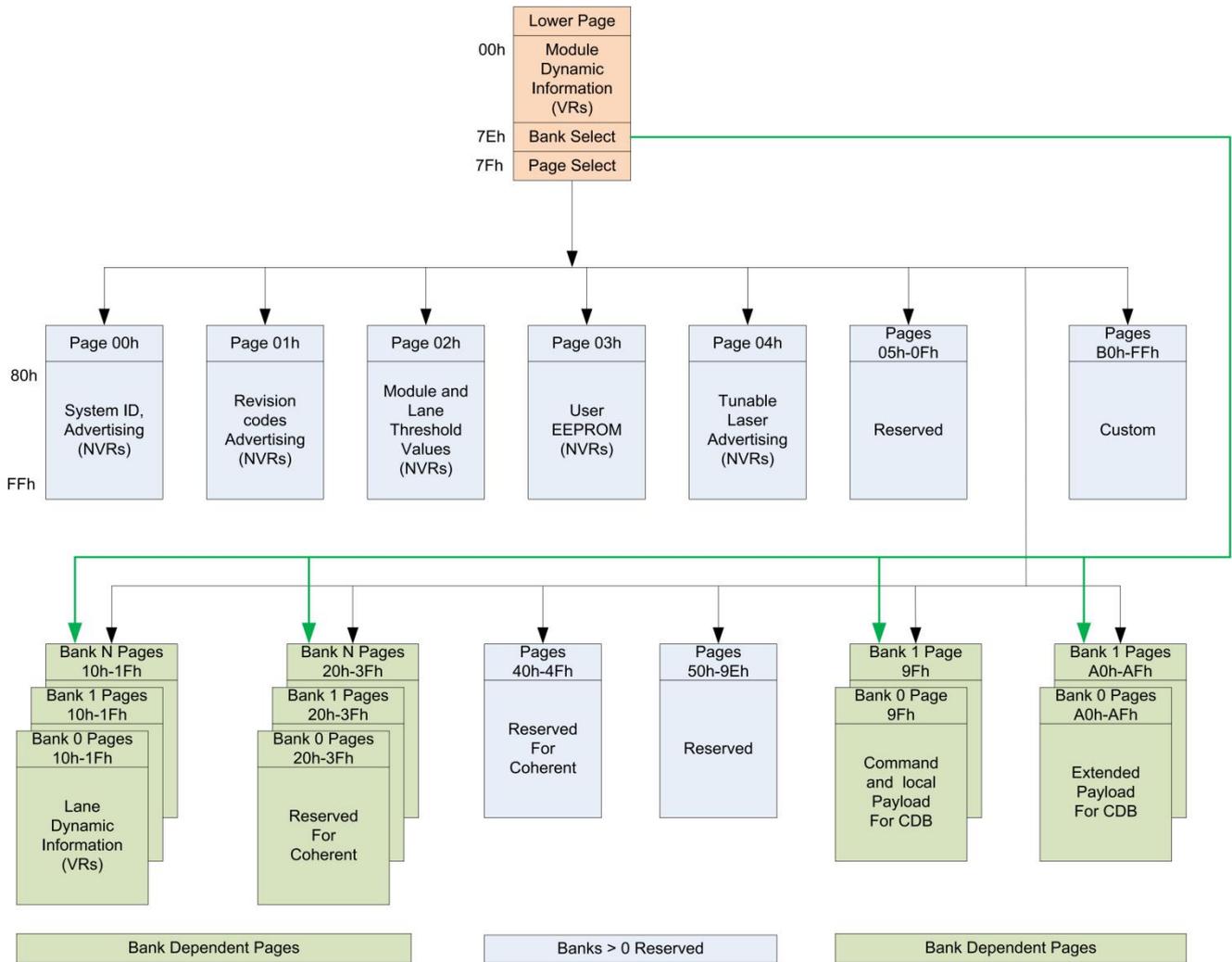**Note2:**See pin description for required circuit.

Monitoring Specification

Figure5: Memory map

Memory map Table

Byte	Unit	Name	Description
			Lower Page 00h
0	1	Identifier	Identifier - Type of Serial Module - See SFF-8024.
1	1	Revision Compliance	Identifier – CMIS revision; the upper nibble is the whole number part and the lower nibble is the decimal part. Example: 01h indicates version 0.1, 21h indicates version 2.1.
2-3	2	ID and Status Area	Flat mem indication, CLEI present indicator, Maximum TWI speed, Current state of Module, Current state of the Interrupt signal.

4-7	4	Lane Flag Summary	Flag summary of all lane flags on pages 10h-1Fh.
8-13	6	Module-Level Flags	All flags that are not lane or data path specific.
14-25	12	Module-Level Monitors	Monitors that are not lane or data path specific.
26-30	5	Module Global Controls	Controls applicable to the module as a whole
31-36	6	Module-Level Flag Masks	Masking bits for the Module-Level flags
37-38	2	CDB Status Area	Status of most recent CDB command
39-40	2	Module Firmware Version	Module Firmware Version.
41-63	23	Reserved Area	Reserved for future standardization
64-82	19	Custom Area	Vendor or module type specific use
83-84	2	Inactive Firmware Version	Version Number of Inactive Firmware. Values of 00h indicates module supports only a single image.
85-117	33	Application Advertising	Combinations of host and media interfaces that are supported by module data path(s)
118-125	8	Password Entry and Change	Password Entry and Change
126	1	Bank Select Byte	Bank address of currently visible Page
127	1	Page Select Byte	Page address of currently visible Page
Upper Page 00h			
128	1	Identifier	Identifier - Type of Serial Module - See SFF-8024.
129-144	16	Vendor name	Vendor name (ASCII)
145-147	2	Vendor OUI	Vendor IEEE company ID
148-163	16	Vendor PN	Part number provided by vendor (ASCII)
164-165	8	Vendor rev	Revision level for part number provided by vendor (ASCII)
166-181	10	Vendor SN	Vendor Serial Number (ASCII)
182-183	2	Date code year	ASCII code, two low order digits of year (00=2000)
184-185	2	Date code month	ASCII code digits of month (01=Jan through 12=Dec)
186-187	2	Date code day of month	ASCII code day of month (01-31)
188-189	2	Lot code	ASCII code, custom lot code, may be blank
190-199	10	CLEI code	Common Language Equipment Identification code
200-201	2	Module power characteristics	Module power characteristics
202	1	Cable assembly length	Cable assembly length
203	1	Media Connector Type	Media Connector Type
204	1	5 GHz attenuation	Passive copper cable attenuation at 5 GHz in 1 dB increments
205	1	7 GHz attenuation	Passive copper cable attenuation at 7 GHz in 1 dB increments
206	1	12.9 GHz attenuation	Passive copper cable attenuation at 12.9 GHz in 1 dB increments
207	1	25.8 GHz attenuation	Passive copper cable attenuation at 25.8 GHz in 1 dB increments
208-209	2	Reserved	Reserved
210-211	2	Cable Assembly Lane Information	Cable Assembly Lane Information

212	1	Media Interface Technology	Media Interface Technology
213-220	8	Reserved	Reserved
221	1	Custom	Custom
222	1	Checksum	Includes bytes 128-221
223-255	33	Custom Info NV	Custom Info NV
Page 01h (Optional)			
128	1	Inactive Module firmware major revision	Numeric representation of inactive module firmware major revision
129	1	Inactive Module firmware minor revision	Inactive Module firmware minor revision
130	1	Module hardware major revision	Module hardware major revision
131	1	Module hardware minor revision	Module hardware minor revision
132	1	Length (SMF)	Bits7-6 Length multiplier(SMF),Bits 5-0 Base Length (SMF)
133	1	Length (OM5)	Link length supported for OM5 fiber, units of 2 m (2 to 510 m)
134	1	Length (OM4)	Link length supported for OM4 fiber, units of 2 m (2 to 510 m)
135	1	Length (OM3)	Link length supported for EBW 50/125 μm fiber (OM3), units of 2m (2 to 510 m)
136	1	Length (OM2)	Link length supported for 50/125 μm fiber (OM2), units of 1m (1 to 255 m)
137	1	Reserved	Reserved
138-139	2	Nominal Wavelength	Nominal Wavelength
140-141	2	Wavelength Tolerance	Wavelength Tolerance
142-144	3	Implemented Memory Pages and Durations advertising	Implemented Memory Pages and Durations advertising
145-154	10	Module Characteristics advertising	Module Characteristics advertising
155-156	2	Implemented Controls advertising	Implemented Controls advertising
157-158	2	Implemented Flags advertising	Implemented Flags advertising
159-160	2	Implemented Monitors advertising	Implemented Monitors advertising
161-162	2	Implemented Signal Integrity Controls advertising	Implemented Signal Integrity Controls advertising
163-166	4	CDB support advertising	CDB support advertising
167-168	2	Additional Durations advertising	Additional Durations advertising
169-175	7	Reserved	Reserved
176-190	15	Module Media Lane advertising	Coded 1 if the Application is allowed to begin on a given media lane. Bits 0-7 correspond to Host Lanes 1-8. In multi-lane Applications each instance of an Application shall use contiguous media lane numbers. If multiple instances of a single Application are allowed each starting point is identified. If multiple instances are advertised, all instance must be supported concurrently.

191-222	32	Custom	Custom
223-250	28	Extended Module Host-Media Interface Advertising options	Extended Module Host-Media Interface Advertising options
251-254	4	Reserved	Reserved
255	1	Checksum	Checksum
Page 02h (Optional)			
128-129	2	Temperature monitor high alarm	Thresholds for internally measured temperature monitor: signed 2's complement in 1/256 degree Celsius increments
130-131	2	Temperature monitor low alarm	
132-133	2	Temperature monitor high warning	
134-135	2	Temperature monitor low warning	
136-137	2	Supply 3.3-volt monitor high alarm	Thresholds for internally measured 3.3 volt input supply voltage: in 100 µV increments
138-139	2	Supply 3.3-volt monitor low alarm	
140-141	2	Supply 3.3-volt monitor high warning	
142-143	2	Supply 3.3-volt monitor low warning	
144-145	2	Aux 1 monitor high alarm	Thresholds for TEC Current or Reserved monitor TEC Current: signed 2's complement in 100/32767% increments of maximum TEC current +32767 is max TEC current (100%) – Max Heating -32767 is min TEC current (100%) – Max Cooling
146-147	2	Aux 1 monitor low alarm	
148-149	2	Aux 1 monitor high warning	
150-151	2	Aux 1 monitor low warning	
152-153	2	Aux 2 monitor high alarm	Thresholds for TEC Current or Laser Temperature monitor TEC Current: signed 2's complement in 100/32767%increments of maximum TEC current +32767 is max TEC current (100%) – Max Heating -32767 is min TEC current (100%) – Max Cooling Laser Temperature: signed 2's complement in 1/256 degree Celsius increments
154-155	2	Aux 2 monitor low alarm	
156-157	2	Aux 2 monitor high warning	
158-159	2	Aux 2 monitor low warning	
160-161	2	Aux 3 monitor high alarm	Thresholds for Laser Temperature or additional supply voltage monitorLaser Temperature: signed 2's complement in 1/256 degree Celsius increments NOTE: Laser Temp can be below 0 if uncooled or in Tx Disable.Additional supply voltage monitor: in 100 µV increments
162-163	2	Aux 3 monitor low alarm	
164-165	2	Aux 3 monitor high warning	
166-167	2	Aux 3 monitor low warning	
168-169	2	Custom monitor high alarm	Custom monitor: signed or unsigned 16 bit value
170-171	2	Custom monitor low alarm	
172-173	2	Custom monitor high warning	
174-175	2	Custom monitor low warning	

176-177	2	Tx optical power high alarm	Threshold for Tx optical power monitor: unsigned integer in 0.1 uW increments, yielding a total measurement range of 0 to 6.5535 mW (~-40 to +8.2 dBm)See section 8.8.3 for monitor details including accuracy
178-179	2	Tx optical power low alarm	
180-181	2	Tx optical power high warning	
182-183	2	Tx optical power low warning	
184-185	2	Tx bias current high alarm	Threshold for Tx bias monitor: unsigned integer in 2 uA increments, times the multiplier from Table 8-33. See section 8.8.3 for monitor details including accuracy
186-187	2	Tx bias current low alarm	
188-189	2	Tx bias current high warning	
190-191	2	Tx bias current low warning	
192-193	2	Rx optical power high alarm	Threshold for Rx optical power monitor: unsigned integer in 0.1 uW increments, yielding a total measurement range of 0 to 6.5535 mW (~-40 to +8.2 dBm) See section 8.8.3 for accuracy.
194-195	2	Rx bias current low alarm	
196-197	2	Rx bias current high warning	
198-199	2	Rx bias current low warning	
200-229	30	Reserved	Reserved
230-254	25	Custom	Custom
255	1	Checksum	Covers bytes 128-254

Mechanical Dimension