Product Specification

100GBASE-CWDM4 QSFP28 1310nm 2km DOM Duplex LC/UPC Optical Transceiver Module

PN: QSFP-100G-CWDM4

Features

- Hot Pluggable QSFP28 form factor
- Operating data rate 103.125Gbps
- Single +3.3V power supply
- LC duplex connector
- Maximum power consumption 3.5W
- Up to 2km transmission on single mode fiber
- 4 CWDM lanes MUX/DEMUX design
- 4 channel PIN receivers
- Built-in digital diagnostic function
- Commercial temperature range 0°C to 70°C

Compliance

- QSFP28 MSA
- Compliant with QSFP Electrical MSA SFF-8636
- Compliant with QSFP Mechanical MSA SFF-8665
- IEEE 802.3bm
- RoHS

Applications

- Switches with QSFP28 ports
- Router with QSFP28 Ports
- Server or Network Adapter Card
- Optical Transmission System
- Other devices with QSFP28 Ports

Description

The QSFP-100G-CWDM4 is a high-performance, industry-compliant optical transceiver module designed for 100Gb/s data transmission over 2km single-mode fiber (SMF). It adheres to the 1000GBASE CWDM4 MSA standard and utilizes Coarse Wavelength Division Multiplexing (CWDM) technology to combine four 25Gb/s electrical channels into a single 100Gb/s optical link. The module operates at CWDM wavelengths of 1271nm,1291nm,1311nm,and 1331nm,as defined by the ITU-T G.694.2 standard.

Featuring a duplex LC connector for optical interfacing and a 38-pin connector for electrical connectivity, the module is designed for seamless integration into high-speed networks. It supports Forward Error Correction (FEC) to ensure reliable performance over extended distances and is built to withstand harsh environmental conditions, including extreme temperatures, humidity, and EMI interference.

Compliant with the QSFP28 MSA form factor, the QSFP-100G-CWDM4 is ideal for data center interconnects, enterprise networks, and telecommunication applications, offering a robust and efficient solution for high-bandwidth, long-haul optical communication.

Product performance Specifications

1、Basic Product Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Storage Temperature	T_S	-40	-	+85	°C
Supply Voltage	V_{CC}	-0.5	-	3.6	V
Relative Humidity	RH	0	-	85	%
Operating Case Temperature	T_C	0	-	70	°C
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Power Supply Current	I_{CC}			1.06	A
Power Dissipation	PD	-	-	3.5	W
Data Rate	DR	-	103.125	-	Gbps

2、Product Optical and Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Overload Differential Voltage pk-pk	TP1a	900			mV
Common Mode Voltage (Vcm)	TP1	-350		2850	mV
Differential Termination Resistance Mismatch	TP1			10	%
Differential Return Loss (SDD11				See CEI- 28G-VSREquation 13-19	dB
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC11, SCD11)	TP1			See CEI- 28G-VSREquation 13-20	dB
Stressed Input Test	TP1a			See CEI- 28G-VSRSection13.3.11.2.1	
Differential Voltage, pk-pk	TP4			900	mV
Common Mode Voltage (Vcm)	TP4	-350		2850	mV
Common Mode Noise, RMS	TP4			17.5	mV
Differential Termination Resistance Mismatch	TP4			10	%
Differential Return Loss(SDD22)	TP4			See CEI- 28G-VSREquation 13-19	dB
Common Mode to Differential conversion and Differential to Common Mode conversion (SDC22,SCD22)	TP4			See CEI- 28G-VSREquation 13-21	dB
Common Mode Return Loss (SCC22)	TP4			-2	dB
Transition Time, 20 to 80%	TP4	9.5			ps
Vertical Eye Closure (VEC)	TP4			5.5	dB
Eye Width at 10-15 probability (EW15)	TP4	0.57			UI
Eye Height at 10-15 probability (EH15)	TP4	228			mV
Transmitter					
Bit Rate per Lane		25.78125 ± 100 ppm			Gbps

Center Wavelength	λc1	1264.5	1271	1277.5	nm
	λc2[1]	1284.5	1291	1297.5	nm
	λc3	1304.5	1311	1317.5	nm
	λc4	1324.5	1331	1337.5	nm
Side Mode Suppression Ratio	SMSR	30			dB
Total Average Launch Power	PT			8.5	dBm
Average Launch Power, each Lane	PAVG	-6.5		2.5	dBm
Optical Modulation Amplitude (OMA),each Lane[1]	POMA	-4		2.5	dBm
Launch Power in OMA minus Transmitter and Dispersion Penalty (TDP), each Lane		-5			dBm
TDP, each Lane	TDP			3.0	dB
Extinction Ratio	ER	3.5			dB
Relative Intensity Noise	RIN			-130	dB/Hz
Optical Return Loss Tolerance	TOL			20	dB
Transmitter Reflectance	RT			-12	dB
Average Launch Power OFF Transmitter,each Lane	Poff			-30	dBm
Transmitter Eye Mask Definition {X1, X2,X3, Y1, Y2, Y3}		{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}			
Receiver					
Damage Threshold, each Lane[2]	THd	3.5			dBm
Total Average Receive Power				8.5	dBm
Average Receive Power, each Lane		-10		2.5	dBm
Receive Power (OMA), each Lane				2.5	dBm
Receiver Sensitivity (OMA),each Lane	SEN			-11.5	dBm
Stressed Receiver Sensitivity (OMA),each Lane[3]				-7.3	dBm
Receiver Reflectance	RR			-26	dBm
LOS Assert	LOSA	-30			dBm
LOS Deassert	LOSD			-12	dBm
LOS Hysteresis	LOSH	0.5			dB
Receiver Electrical 3 dB upper Cutoff Frequency, each Lane				31	GHz

Note1: Even if the TDP <1.0 dB, the OMA min must exceed the minimum value specified here

Note2: The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power

Note3: Measured with conformance test signal for BER = 5x10-5.

Recommended Host Board Power Supply Circuit

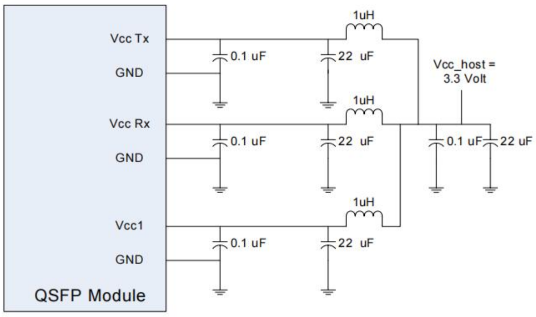

Figure 1:Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

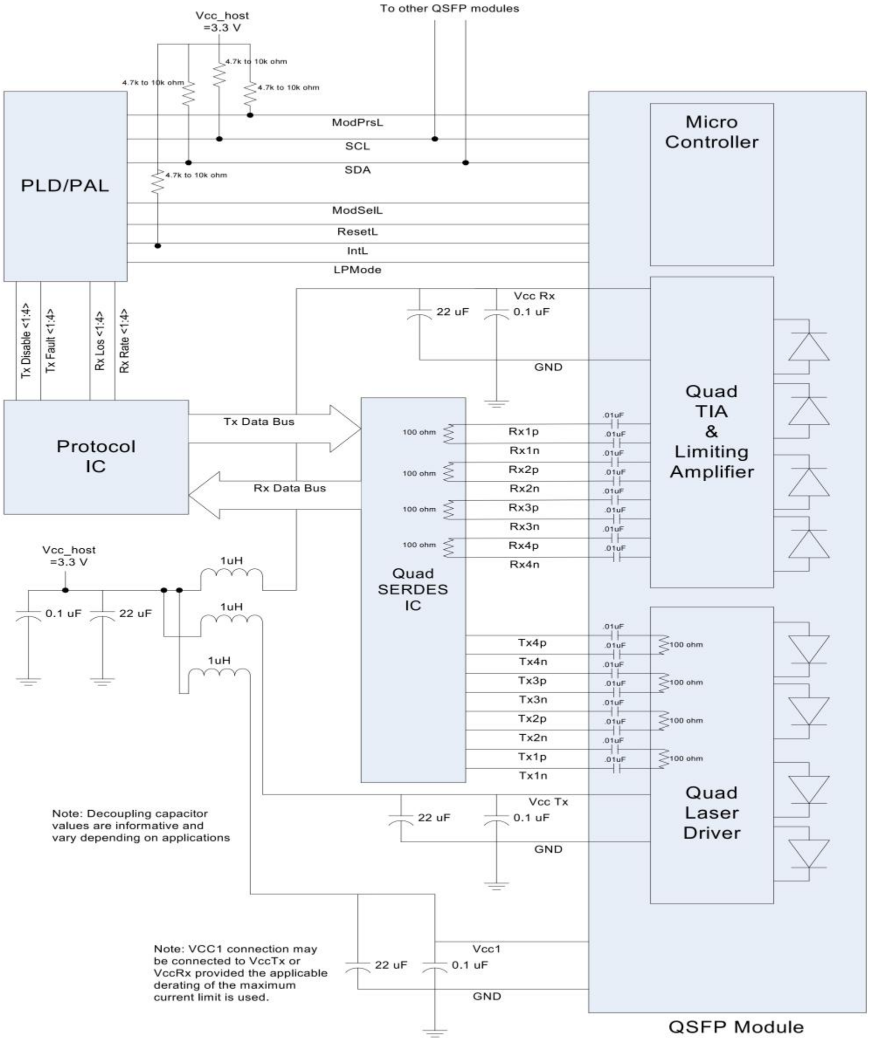

Figure2:Recommended Interface Circuit

Optical Interface

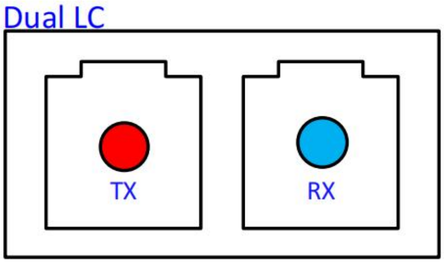

Figure3:Optical Lane Sequence

Pin-out Definition

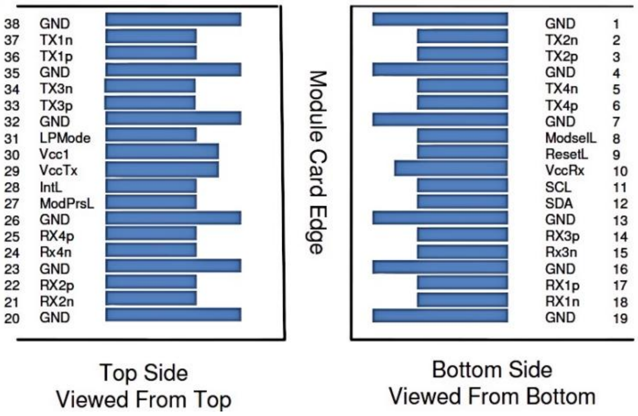

Figure4:Pin view

Pin Function Definitions

Pin	Logic	Symbol	Description	Note
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	4
9	LVTTL-I	ReSelL	Module Select	4
10		Vcc Rx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-wire serial interface clock	4
12	LVCMOS-I/O	SDA	2-wire serial interface data	4
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3

15	CML-O	Rx3n	Receiver Inverted Data Output	3
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3
18	CML-O	Rx1n	Receiver Inverted Data Output	3
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3
25	CML-O	Rx4p	Receiver Non-Inverted Data Output Ground	3
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	4
28	LVTTL-O	IntL	Interrupt	4
29		Vcc Tx	+3.3V Power supply transmitter	2
30		Vcc1	+3.3V Power supply	2
31	LVTTL-I	LPMode	Low Power Mode	4
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3
34	CML-I	Tx3n	Transmitter Inverted Data Input	3
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3
37	CML-I	Tx1n	Transmitter Inverted Data Input	3
38		GND	Ground	1

Note1:GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

Note2: Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table. Recommended host board power supply filtering is shown in Host board power supply circuit. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP module in any combination. The connector pins are each rated for a maximum current of 500 mA.

Note3: High-speed signal interfaces require differential pairs (e.g. TX1+/TX1-) with tightly matched impedances (typically 100Ω).

Note4: The management and control signals are based on LVTTL level logic and are used for functions such as module selection and reset.

Monitoring Specification

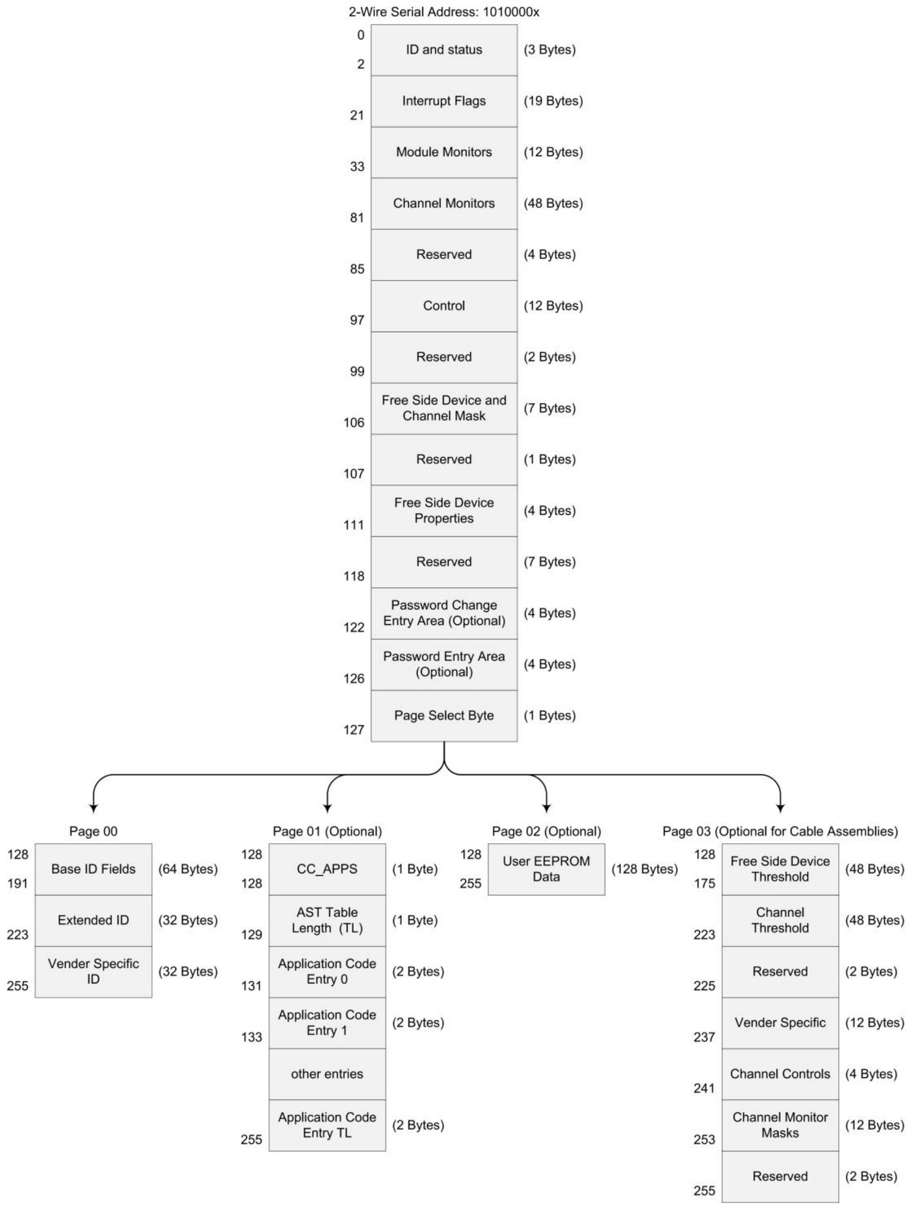

Figure5: Memory map

Memory map Table

Byte	Unit	Name	Description
		Lower Page 00h	
0	1	Identifier	Type of transceiver,Page 00h Byte 0 and Page 00h Byte 128 shall contain the same parameter values.
1	1	Status	Revision Compliance
2	1	Status	Status indicators

3-21	19	Interrupt Flags	Consist of interrupt flags for LOS, Tx Fault, warnings and alarms. The non-asserted state shall be 0b.
22	1	Temperature MSB	Internally measured temperature (MSB)
23	1	Temperature LSB	Internally measured temperature (LSB)
24-25	2	Reserved	Reserved
26	1	Supply Voltage MSB	Internally measured supply voltage (MSB)
27	1	Supply Voltage LSB	Internally measured supply voltage (LSB)
28-29	2	Reserved	Reserved
30-33	4	Vendor Specific	Vendor Specific
34	1	Rx1 Power MSB	Internally measured Rx1 input power
35	1	Rx1 Power LSB	
36	1	Rx2 Power MSB	Internally measured Rx2 input power
37	1	Rx2 Power LSB	
38	1	Rx3 Power MSB	Internally measured Rx3 input power
39	1	Rx3 Power LSB	
40	1	Rx4 Power MSB	Internally measured Rx4 input power
41	1	Rx4 Power LSB	
42	1	Tx1 Bias MSB	Internally measured Tx1 bias
43	1	Tx1 Bias LSB	
44	1	Tx2 Bias MSB	Internally measured Tx2 bias
45	1	Tx2 Bias LSB	
46	1	Tx3 Bias MSB	Internally measured Tx3 bias
47	1	Tx3 Bias LSB	
48	1	Tx4 Bias MSB	Internally measured Tx4 bias
49	1	Tx4 Bias LSB	
50	1	Tx1 Power MSB	Internally measured Tx1 Power
51	1	Tx1 Power LSB	
52	1	Tx2 Power MSB	Internally measured Tx2 Power
53	1	Tx2 Power LSB	
54	1	Tx3 Power MSB	Internally measured Tx3 Power
55	1	Tx3 Power LSB	
56	1	Tx4 Power MSB	Internally measured Tx4 Power
57	1	Tx4 Power LSB	
58-65	8	Reserved	Reserved channel monitor set 4
66-73	8	Reserved	Reserved channel monitor set 5
74-81	8	Vendor Specific	Vendor Specific
82-85	4	Reserved	Reserved
86-99	14	Control	Control
100-106	7	Free Side Device and Channel Masks	Free Side Device and Channel Masks
107-110	4	Free Side Device Properties	Free Side Device Properties

111-112	2	Assigned for use by PCI Express	Used for: - The PCI Express External Cable Specification - The PCI Express OCuLink Specification
113-117	4	Free Side Device Properties	Free Side Device Properties
118	1	Reserved	Reserved
119-122	4	Password Change Entry Area	Password Change Entry Area
123-126	4	Password Entry Area	Password Entry Area
127	1	Page Select Byte	Page Select Byte
Upper Page 00h			
128	1	Identifier	Identifier Type of free side device.(See SFF-8024 Transceiver Management)
129	1	Ext. Identifier	Extended Identifier of free side device. Includes power classes, CLEI codes, CDR capability.
130	1	Connector Type	Code for media connector type. (See SFF-8024 Transceiver Management)
131-138	8	Specification Compliance	Code for electronic or optical compatibility.
139	1	Encoding	Code for serial encoding algorithm. (See SFF-8024 Transceiver Management)
140	1	Signaling rate, nominal	Nominal signaling rate, units of 100 MBd. For rate > 25.4 GBd, set this to FFh and use Byte 222.
141	1	Extended Rate Select Compliance	Tags for extended rate select compliance.
142	1	Length (SMF)	Link length supported at the signaling rate in byte 140 or page 00h byte 222, for SMF fiber in km *. A value of 1 shall be used for reaches from 0 to 1 km.
143	1	Length (OM3 50 um)	Link length supported at the signaling rate in byte 140 or page 00h byte 222, for EBW 50/125 um fiber (OM3), units of 2 m *
144	1	Length (OM2 50 um)	Link length supported at the signaling rate in byte 140 or page 00h byte 222, for 50/125 um fiber (OM2), units of 1 m *
145	1	Length (OM1 62.5 um) or Copper Cable Attenuation	Link length supported at the signaling rate in byte 140 or page 00h byte 222, for 62.5/125 um fiber (OM1), units of 1 m *, or copper cable attenuation in dB at 25.78 GHz.
146	1	Length (passive copper or active cable or OM4 50 um)	Length of passive or active cable assembly (units of 1 m) or link length supported at the signaling rate in byte 140 or page 00h byte 222, for OM4 50/125 um fiber (units of 2 m) as indicated by Byte 147. See 6.3.12.
147	1	Device technology	Device technology
148-163	16	Vendor name	Free side device vendor name (ASCII)
164	1	Extended Module	Extended Module codes for InfiniBand.
165-167	3	Vendor OUI	Free side device vendor IEEE company ID.
168-183	16	Vendor PN	Part number provided by free side device vendor(ASCII)
184-185	2	Vendor rev	Revision level for part number provided by the vendor(ASCII)

186-187	2	Wavelength or Copper Cable Attenuation	Nominal laser wavelength (wavelength=value/20 in nm) or copper cable attenuation in dB at 2.5 GHz (Byte 186) and 5.0 GHz (Byte 187)
188-189	2	Wavelength tolerance or Copper Cable Attenuation	The range of laser wavelength (+/- value) from nominal wavelength. (wavelength Tol. =value/200 in nm) or copper cable attenuation in dB at 7.0 GHz (Byte 188) and 12.9 GHz (Byte 189)
190	1	Max case temp	Maximum case temperature
191	1	CC_BASE	Check code for base ID fields (Bytes 128-190)
192	1	Link codes	Extended Specification Compliance Codes (See SFF-8024)
193-195	3	Options	Optional features implemented.
196-211	16	Vendor SN	Serial number provided by vendor.(ASCII)
212-219	8	Date Code	Vendor's manufacturing date code.
220	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the free side device. Bit 1,0 Reserved.
221	1	Enhanced Options	Indicates which optional enhanced features are implemented in the free side device.
222	1	CC_EXT	Check code for the Extended ID Fields (Bytes 192-222)
224-255	32	Vendor Specific	Vendor Specific EEPROM
Page 02h (Optional)			
128-255	128	User EEPROM Data	
Page 03h (Optional)			
128-129	2	Temp High Alarm	MSB at lower byte address
130-131	2	Temp Low Alarm	MSB at lower byte address
132-133	2	Temp High Warning	MSB at lower byte address
134-135	2	Temp Low Warning	MSB at lower byte address
136-143	8	Reserved	Reserved
144-145	2	Vcc High Alarm	MSB at lower byte address
146-147	2	Vcc Low Alarm	MSB at lower byte address
148-149	2	Vcc High Warning	MSB at lower byte address
150-151	2	Vcc Low Warning	MSB at lower byte address
152-159	8	Reserved	Reserved
160-175	16	Vendor Specific	Vendor Specific
176-177	2	Rx Power High Alarm	MSB at lower byte address
178-179	2	Rx Power Low Alarm	MSB at lower byte address
180-181	2	Rx Power High Warning	MSB at lower byte address
182-183	2	Rx Power Low Warning	MSB at lower byte address
184-185	2	Tx Bias High Alarm	MSB at lower byte address
186-187	2	Tx Bias Low Alarm	MSB at lower byte address
188-189	2	Tx Bias High Warning	MSB at lower byte address
190-191	2	Tx Bias Low Warning	MSB at lower byte address
192-193	2	Tx Power High Alarm	MSB at lower byte address
194-195	2	Tx Power Low Alarm	MSB at lower byte address
196-197	2	Tx Power High Warning	MSB at lower byte address

198-199	2	Tx Power Low Warning	MSB at lower byte address
200-207	8	Reserved	Reserved thresholds for channel parameter set 4
208-215	8	Reserved	Reserved thresholds for channel parameter set 5
216-223	8	Vendor Specific	Vendor Specific
224	1	Tx EQ & Rx Emphasis Magnitude ID	Tx EQ & Rx Emphasis Magnitude ID
225	1	Rx output amplitude support indicators	Rx output amplitude support indicators
226-229	4	Control options advertising	Control options advertising
230-241	12	Optional Channel Controls	Optional Channel Controls
242-247	6	Channel Monitor Masks	Channel Monitor Masks
248-249	2	Reserved	Reserved channel monitor masks set 4
250-251	2	Reserved	Reserved channel monitor masks set 5
252-255	4	Reserved	Reserved

Mechanical Dimension