

PRODUCT FEATURES

- QSFP28 MSA compliant
- Compliant to IEEE 802.3 Standard
- Hot pluggable 38 pin electrical interface
- 1x50G PAM4 LAN-WDM transmitter
- 26.5625 Gbit/s Channel Electrical Serial Interface (50GAUI-2)
- Maximum power consumption 3.5W
- Single LC duplex connector
- Supports 53.125Gb/s aggregate bit rate
- Up to 10km transmission on single mode fiber
- Operating case temperature: 0°C to 70°C
- Single 3.3V power supply
- RoHS-6 compliant



APPLICATIONS

- 50GBASE-LR
- Telecom networking

DESCRIPTIONS

OPEG10-3327 QSFP28 transceiver module is designed for use in 50 Gigabit Ethernet links on up to 10km of single mode fiber. They are compliant with the QSFP28 MSA (SFF-8679 SFF-8636, etc), IEEE P802.3. Digital diagnostic functions are available via the I2C interface, as specified by the MSA. A block diagram is shown in Figure 1.

Transceiver Block Diagrams

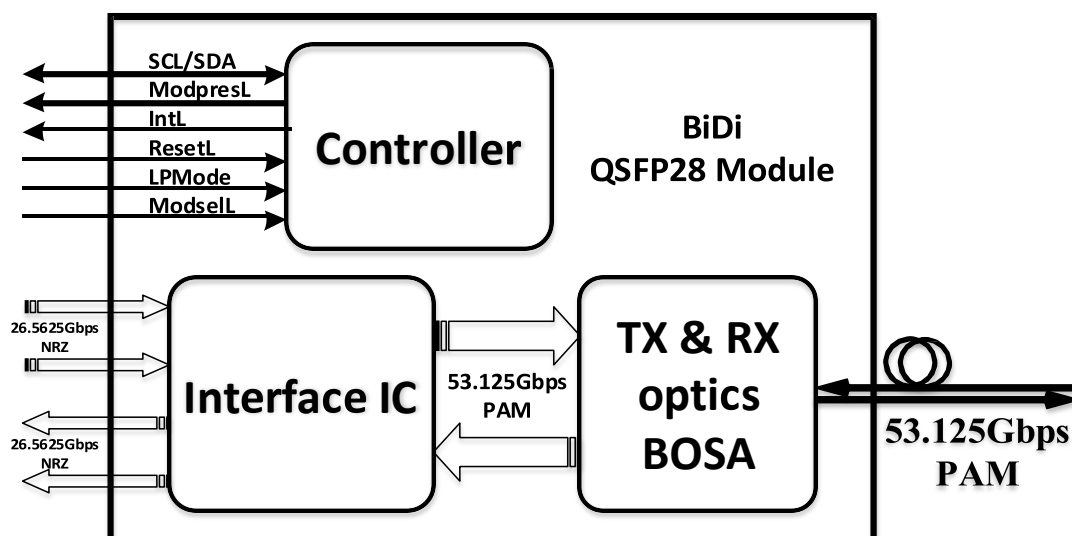


Figure 1. Transceiver Block Diagram

ModSeL:

The ModSeL is an input pin. When held low by the host, the module responds to 2-wire serial communication commands. The ModSeL allows the use of multiple modules on a single 2-wire interface bus. When the ModSeL is "High", the module shall not respond to or acknowledge any 2-wire interface communication from the host. ModSeL signal input node shall be biased to the "High" state in the module.

In order to avoid conflicts, the host system shall not attempt 2-wire interface communications within the ModSeL de-assert time after any modules are deselected. Similarly, the host shall wait at least for the period of the ModSeL assert time before communicating with the newly selected module. The assertion and de-asserting periods of different modules may overlap as long as the above timing requirements are met.

ResetL :

The ResetL pin shall be pulled to Vcc in the module. A low level on the ResetL pin for longer than the minimum pulse length (t_{Reset_init}) initiates a complete module reset, returning all user module settings to their default state. Module Reset Assert Time (t_{init}) starts on the rising edge after the low level on the ResetL pin is released. During the execution of a reset (t_{init}) the host shall disregard all status bits until the module indicates a completion of the reset interrupt. The module indicates this by asserting "low" an IntL signal with the Data_Not_Ready bit negated. Note that on power up (including hot insertion) the module should post this completion of reset interrupt without requiring a reset.

LPMODE:

The LPMODE pin shall be pulled up to Vcc in the module. The pin is a hardware control used to put modules into a low power mode when high. By using the LPMODE pin and a combination of the Power override, Power_set and High_Power_Class_Enable software control bits (Address A0h, byte 93 bits 0,1,2). The host controls how much power a module can consume.

ModPrsL:

ModPrsL is pulled up to Vcc_Host on the host board and grounded in the module. The ModPrsL is asserted "Low" when inserted and deasserted "High" when the module is physically absent from the host connector.

IntL:

IntL is an output pin. When IntL is "Low", it indicates a possible module operational fault or a status critical to the host system. The host identifies the source of the interrupt using the 2-wire serial interface. The IntL pin is an open collector output and shall be pulled to host supply voltage on the host board. The INTL pin is deasserted "High" after completion of reset, when byte 2 bit 0 (Data Not Ready) is read with a value of '0' and the flag field is read (see SFF-8636).

Pin Descriptions

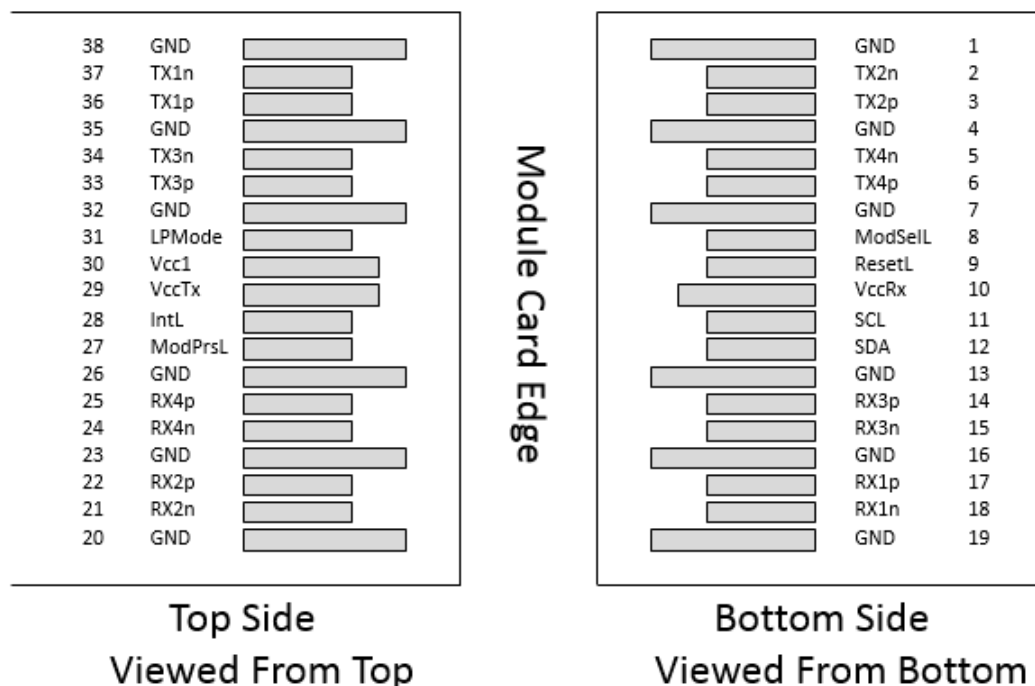


Figure 2. MSA compliant Connector

Pin	Symbol	Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Reserved	
6	Tx4p	Reserved	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Reserved	
15	Rx3n	Reserved	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Reserved	
25	Rx4p	Reserved	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power supply	
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Reserved	
34	Tx3n	Reserved	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes

1. Circuit ground is internally isolated from chassis ground.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Maximum Supply Voltage	Vcc	0		3.6	V	
Storage Temperature	Ts	-40		85	°C	
Relative Humidity	RH	10		85	%	1
Damage Threshold	THd	5.2			dBm	

Notes

1. Non-condensing

Operating Environments

Electrical and optical characteristics below are defined under this operating environment, unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	Vcc	3.135	3.3	3.465	V
Case Temperature	Top	0		70	°C
Link Distance with G.652		0.002		10	km

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Power dissipation				3.5	W	
Supply Current	Icc			1.0101	A	1
Transmitter						2
Data Rate,			26.5625		Gbps	
Differential Voltage pk-pk	Vpp			900	mV	
Common Mode Noise, RMS	Vrms			17.5	mV	
Differential Termination Resistance Mismatch				10	%	At 1 MHz

Transition time	Trise/Tfall	10			ps	20%~80%
Eye width	EW15	0.46			UI	
Eye height	EH15	95			mV	
Receiver						3
Data Rate			26.5625		Gbps	
Differential Voltage pk-pk	Vpp			900	mV	
Common Mode Voltage	Vcm	-350		2850	mV	
Common Mode Noise, RMS	Vrms			17.5	mV	
Transition time	Trise/Tfall	9.5			ps	20%~80%
Vertical Eye Closure (VEC)				5.5	dB	
Eye width	EW15	0.57			UI	
Eye height	EH15	228			mV	

Notes:

- 1, Maximum total power value is specified across the full temperature and voltage range.
- 2, Refer to OIF-CEI-03.1, CEI-28G-VSR Interface 13.3.2.
- 3, Refer to OIF-CEI-03.1, CEI-28G-VSR Interface 13.3.3.

Optical Characteristics

50GBASE-LR Operation (EOL, TOP = 0 to +70 °C, VCC = 3.135 to 3.465 Volts)

Parameters	Unit	min	type	max	Note
Transmitter					1
Signaling Speed	Gb/s	26.5625 ± 100 ppm			
Transmit wavelength	nm	1324.5	1331	1337.5	2
Average Launch Power	dBm	-4.5		4.2	
Outer Optical Modulation Amplitude, (OMA _{outer})	dBm	-1.5		4	
Launch power in OMA _{outer} minus TDECQ	dBm	-2.9			
Transmitter and dispersion eye closure for PAM4 (TDECQ), each lane	dB			3.2	
Extinction Ratio (ER)	dB	3.5			

Side-Mode Suppression Ratio (SMSR)	dB	30			
Transmitter reflectance	dB			-26	
Receiver					1
Signaling Speed	Gb/s	26.5625 ± 100 ppm			
Receive wavelength	nm	1264.5	1271	1277.5	2
Average receiver power	dBm	-10.8		4.2	
Damage threshold	dBm	5.2			
Receiver power (OMA _{outer})	dBm			4	
Receiver sensitivity (OMA _{outer})	dBm			RS	3
Stressed receiver sensitivity (OMA _{outer})	dBm			-6.6	
LOS Assert	dBm	-30			
LOS Deassert	dBm			-11	
LOS Hysteresis	dB	0.5			
Receiver reflectance	dB			-26	
Conditions of stressed receiver sensitivity test:					
Stressed eye closure for PAM4 (SECQ), lane under test	dB		3.2		3
SECQ-10log10(Ceq)	dBm			3.2	3

Notes:

1, Refer to IEEE P802.3.

2, The Module has two wavelength for interconnection, the TX and RX wavelength is paired for interconnection(TX:1331nm VS RX:1271nm; TX:1271nm VS RX:1331nm)

3, RS=max(-8.4, SECQ-9.8) (dBm). For the requirement of receiver sensitivity, the value of BER is 2e-4(before FEC) and within the average receive power, the BER is 1e-12(after FEC).

EEPROM Definitions

Lower Memory Map

Address	Type	Size	Name	Description	Value(Hex)	Remarks	
0	R	1	Identifier	Identifier	0x11		
1	R	1	Status	Revision Compliance	0x07		
2	R	1		Flat_mem/ IntL/Data_Not_Ready			
3	R	1	Interrupt Flags	Latched TX/RX LOS indicator, Channel 1~4			
4	R	1		Latched TX Adaptive EQ Fault/TX Transmitter/Laser fault indicator, Channel 1~4			
5	R	1		Latched TX CDR LOL/RX CDR LOL indicator, Channel 1~4			
6	R	1		Latched temperature high/low alarm/warning			
7	R	1		Latched supply voltage high/low alarm/warning			
8	R	1		Vendor Specific			
9	R	1		Latched RX Power High/Low Alarm/Warning, Channel 1~2			
10	R	1		Latched RX Power High/Low Alarm/Warning, Channel 3~4			
11	R	1		Latched TX Bias High/Low Alarm/Warning, Channel 1~2			
12	R	1		Latched TX Bias High/Low Alarm/Warning, Channel 3~4			
13	R	1		Latched TX Power High/Low Alarm/Warning, Channel 1~2			
14	R	1		Latched TX Power High/Low Alarm/Warning, Channel 3~4			
15	R	1		Reserved			
16	R	1					
17	R	1					
18	R	1					
19	R	1		Vendor Specific			
20	R	1					

Address	Type	Size	Name	Description	Value(Hex)	Remarks
21	R	1				
22	R	1	Free Side Device Monitors	Internally measured temperature (MSB)		
23	R	1		Internally measured temperature (LSB)		
24	R	1		Reserved		
25	R	1				
26	R	1		Internally measured supply voltage (MSB)		
27	R	1		Internally measured supply voltage (LSB)		
28	R	1		Reserved		
29	R	1				
30	R	1		Vendor Specific		
31	R	1				
32	R	1				
33	R	1				
34	R	1		Channel Monitors	Internally measured RX input power, channel 1 (MSB)	
35	R	1	Internally measured RX input power, channel 1 (LSB)			
36	R	1	Internally measured RX input power, channel 2 (MSB)			
37	R	1	Internally measured RX input power, channel 2 (LSB)			
38	R	1	Internally measured RX input power, channel 3 (MSB)			
39	R	1	Internally measured RX input power, channel 3 (LSB)			
40	R	1	Internally measured RX input power, channel 4 (MSB)			
41	R	1	Internally measured RX input power, channel 4 (LSB)			
42	R	1	Internally measured TX bias, channel 1 (MSB)			
43	R	1	Internally measured TX bias, channel 1 (LSB)			
44	R	1	Internally measured TX bias, channel 2 (MSB)			

Address	Type	Size	Name	Description	Value(Hex)	Remarks
45	R	1		Internally measured TX bias, channel 2 (LSB)		
46	R	1		Internally measured TX bias, channel 3 (MSB)		
47	R	1		Internally measured TX bias, channel 3 (LSB)		
48	R	1		Internally measured TX bias, channel 4 (MSB)		
49	R	1		Internally measured TX bias, channel 4 (LSB)		
50	R	1		Internally measured TX Power, channel 1 (MSB)		
51	R	1		Internally measured TX Power, channel 1 (LSB)		
52	R	1		Internally measured TX Power, channel 2 (MSB)		
53	R	1		Internally measured TX Power, channel 2 (LSB)		
54	R	1		Internally measured TX Power, channel 3 (MSB)		
55	R	1		Internally measured TX Power, channel 3 (LSB)		
56	R	1		Internally measured TX Power, channel 4 (MSB)		
57	R	1		Internally measured TX Power, channel 4 (LSB)		
58	R	1				
59	R	1				
60	R	1				
61	R	1				
62	R	1		Reserved channel monitor set 4		
63	R	1				
64	R	1				
65	R	1				
66	R	1				
67	R	1		Reserved channel monitor set 5		
68	R	1				

Address	Type	Size	Name	Description	Value(Hex)	Remarks
69	R	1				
70	R	1				
71	R	1				
72	R	1				
73	R	1				
74	R	1				
75	R	1				
76	R	1				
77	R	1				
78	R	1				
79	R	1				
80	R	1				
81	R	1				
82	R	1			Reserved	Reserved
83	R	1				
84	R	1				
85	R	1				
86	RW	1	Control	TX Disable, channel 1~4	0x00	
87	RW	1		RX_Rate_select, channel 1~4	0x00	
88	RW	1		TX_Rate_select, channel 1~4	0x00	
89	RW	1		RX4_Application_Select	0x00	
90	RW	1		RX3_Application_Select	0x00	
91	RW	1		RX2_Application_Select	0x00	
92	RW	1		RX1_Application_Select	0x00	
93	RW	1		High Power Class Enable/Power set/Power override	0x00	
94	RW	1		TX4_Application_Select	0x00	
95	RW	1		TX3_Application_Select	0x00	
96	RW	1	TX2_Application_Select	0x00		

Address	Type	Size	Name	Description	Value(Hex)	Remarks
97	RW	1		TX1_Application_Select	0x00	
98	RW	1		TX/RX CDR_control, channel 1~4	0x33	
99	RW	1	Reserved	Reserved		
100	RW	1	Free Side De- vice and Chan- nel Masks	Masking Bit for TX/RX LOS indicator, channel 1~4	0x00	
101	RW	1		Masking Bit for TX Adaptive EQ fault/TX Transmitter/Laser fault indica- tor, channel 1~4	0x00	
102	RW	1		Masking Bit for TX/RX CDR Loss of Lock indicator, channel 1~4	0x00	
103	RW	1		Masking Bit for Temperature High/Low Alarm/Warning	0x00	
104	RW	1		Masking Bit for Vcc High/Low Alarm/Warning	0x00	
105	RW	1	Vendor Specific	Vendor Specific		
106	RW	1				
107	RW	1	Reserved	Reserved		
108	R	1	Free Side De- vice Properties	Propagation Delay MSB	0x00	
109	R	1		Propagation Delay LSB	0x05	
110	R	1		Advanced Low Power Mode/Far Side Managed/Min Operating Voltage	0x08	
111	RW	1	Assigned for use by PCI Ex- press	Assigned for use by PCI Express		
112	RW	1				
113	R	1	Free Side De- vice Properties	Far End Implementation/Near End Im- plementation	0x0e	
114	RW	1	Reserved	Reserved		
115	RW	1				
116	RW	1				
117	RW	1				
118	RW	1				
119	W	1	Password Change Entry Area			
120	W	1				
121	W	1				

Address	Type	Size	Name	Description	Value(Hex)	Remarks
122	W	1	Password Entry Area			
123	W	1				
124	W	1				
125	W	1				
126	W	1				
127	RW	1	Page Select Byte	Page Select		

Upper Memory Map Page 00h

Address	Type	Size	Name	Description	Value(Hex)	Remarks
128	R	1	Identifier	Identifier Type of free side device	0x11	
129	R	1	Ext. Identifier	Extended Identifier Type of free side device	0xcc	
130	R	1	Connector Type	Code for connector type	0x07	
131	R	1	Specification Compliance	10/40G/100G Ethernet Compliance Codes	0x80	
132	R	1		SONET Compliance Codes	0x00	
133	R	1		SAS/SATA Compliance Codes	0x00	
134	R	1		Gigabit Ethernet Compliance Codes	0x00	
135	R	1		Fibre Channel link length/Fibre Channel Transmitter Technology	0x00	
136	R	1		Fibre Channel Transmitter Technology	0x00	
137	R	1		Fibre Channel transmission media	0x01	
138	R	1		Fibre Channel Speed	0x00	
139	R	1	Encoding	Code for serial encoding algorithm	0x08	
140	R	1	BR, nominal	Nominal bit rate, units of 100 Mbps. For BR > 25.4G, set this to FFh and use Byte 222	0xff	
141	R	1	Extended Rate Select Compliance	Tags for extended rate select compliance	0x00	
142	R	1	Length (SMF)	Link length supported for SMF fiber in km	0x0a	
143	R	1	Length (OM3 50 um)	Link length supported for EBW 50/125 um fiber (OM3), units of 2 m	0x00	
144	R	1	Length (OM2)	Link length supported for EBW 50/125 um	0x00	

Address	Type	Size	Name	Description	Value(Hex)	Remarks
			50 um)	fiber (OM2), units of 1 m		
145	R	1	Length (OM1 62.5 um)	Link length supported for 62.5/125 um fi- ber (OM1), units of 1 m	0x00	
146	R	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 for OM4 50/125 um fiber (units of 2 m) as in- dicated by Byte 147	0x00	
147	R	1	Device technol- ogy	Device technology	0x40	
148	R	1	Vendor name	"OPWAY" in ASCII	0x48	
149	R	1			0x49	
150	R	1			0x53	
151	R	1			0x49	
152	R	1			0x4c	
153	R	1			0x49	
154	R	1			0x43	
155	R	1			0x4f	
156	R	1			0x4e	
157	R	1			0x20	
158	R	1			0x20	
159	R	1			0x20	
160	R	1			0x20	
161	R	1			0x20	
162	R	1			0x20	
163	R	1	0x20			
164	R	1	Extended Mod- ule	Extended Module codes for InfiniBand	0x00	
165	R	1	Vendor OUI	Free side device vendor IEEE company ID	0x00	
166	R	1			0x00	
167	R	1			0x00	
168	R	1	Vendor PN	Part number provided by free side device vendor(ASCII)		
169	R	1				

Address	Type	Size	Name	Description	Value(Hex)	Remarks
170	R	1				
171	R	1				
172	R	1				
173	R	1				
174	R	1				
175	R	1				
176	R	1				
177	R	1				
178	R	1				
179	R	1				
180	R	1				
181	R	1				
182	R	1				
183	R	1				
184	R	1	Vendor rev	Revision level for part number provided by vendor(ASCII)	0x41	
185	R	1			0x30	
186	R	1	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)	0x67	1331nm
187	R	1			0xfc	
186	R	1	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)	0x63	1271nm
187	R	1			0x4c	
188	R	1	Wavelength tolerance or Copper Cable Attenuation	Guaranteed 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 12GHz (Byte 189)	0x05	±6.5nm
189	R	1			0x14	
190	R	1	Max case temp.	Maximum case temperature in degrees C	0x46	
191	R	1	CC_BASE	Check code for base ID fields (Bytes 128-190)		
192	R	1	Link codes	Extended Specification Compliance Codes	0x00	

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Address	Type	Size	Name	Description	Value(Hex)	Remarks
193	R	1	Options	Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, VCC, RX power, TX Bias, TX EQ, Adap- tive TX EQ, RX EMPH, CDR Bypass, CDR LOL Flag.	0x00	
194	R	1			0x00	
195	R	1			0x98	
196	R	1	Vendor SN	Serial number provided by vendor (ASCII)		
197	R	1				
198	R	1				
199	R	1				
200	R	1				
201	R	1				
202	R	1				
203	R	1				
204	R	1				
205	R	1				
206	R	1				
207	R	1				
208	R	1				
209	R	1				
210	R	1				
211	R	1				
212	R	1	Date Code	Vendor's manufacturing date code		
213	R	1				
214	R	1				
215	R	1				
216	R	1				
217	R	1				
218	R	1				
219	R	1				
220	R	1	Diagnostic Monitoring	Indicates which type of diagnostic monitoring is implemented (if any) in the free	0x0c	

Address	Type	Size	Name	Description	Value(Hex)	Remarks
			Type	side device. Bit 1,0 Reserved.		
221	R	1	Enhanced Op- tions	Indicates which optional enhanced features are implemented in the free side device.	0x00	
222	R	1	BR, nominal	Nominal bit rate per channel, units of 250 Mbps. Complements Byte 140.	0xd5	
223	R	1	CC_EXT	Check code for the Extended ID Fields (Bytes 192-222)		
224	R	1	Vendor Specific	Vendor Specific EEPROM		
225	R	1				
226	R	1				
227	R	1				
228	R	1				
229	R	1				
230	R	1				
231	R	1				
232	R	1				
233	R	1				
234	R	1				
235	R	1				
236	R	1				
237	R	1				
238	R	1				
239	R	1				
240	R	1				
241	R	1				
242	R	1				
243	R	1				
244	R	1				
245	R	1				
246	R	1				

Address	Type	Size	Name	Description	Value(Hex)	Remarks
247	R	1				
248	R	1				
249	R	1				
250	R	1				
251	R	1				
252	R	1				
253	R	1				
254	R	1				
255	R	1				

Digital Diagnostic Monitoring Functions

OPEG10-3327 support the I2C-based Diagnostic Monitoring Interface (DMI) defined in document SFF- 8472.

The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Performance Item	Related Bytes(A0[00] memory)	Monitor Error	Notes
Module temperature	96 to 97	+/-3 °C	1, 2
Module voltage	98 to 99	< 5%	2
LD Bias current	100 to 101	< 10%	2
Transmitter optical power	102 to 103	< 3dB	2
Receiver optical power	104 to 105	< 3dB	2

Note

- 1, Actual temperature test point is fixed on module case around Laser.
- 2, Full operating temperature range

Alarm and Warning Thresholds

OPEG10-3327 support alarms function, indicating the values of the preceding basic performance are lower or higher than the thresholds.

Performance Item	Alarm Threshold Bytes(A0[03] memory)	Unit	Low threshold	High threshold
Temp Alarm	128 to 131	℃	-10	80
Temp Warning	132 to 135	℃	0	70
Voltage Alarm	144 to 147	V	2.97	3.63
Voltage Warning	148 to 151	V	3.135	3.465
TX Power Alarm	192 to 195	dBm	-7.5	7.2
TX Power Warning	196 to 199	dBm	-4.5	4.2
RX Power Alarm	176 to 179	dBm	-13.8	7.2
RX Power Warning	180 to 183	dBm	-10.8	4.2

Mechanical Specifications

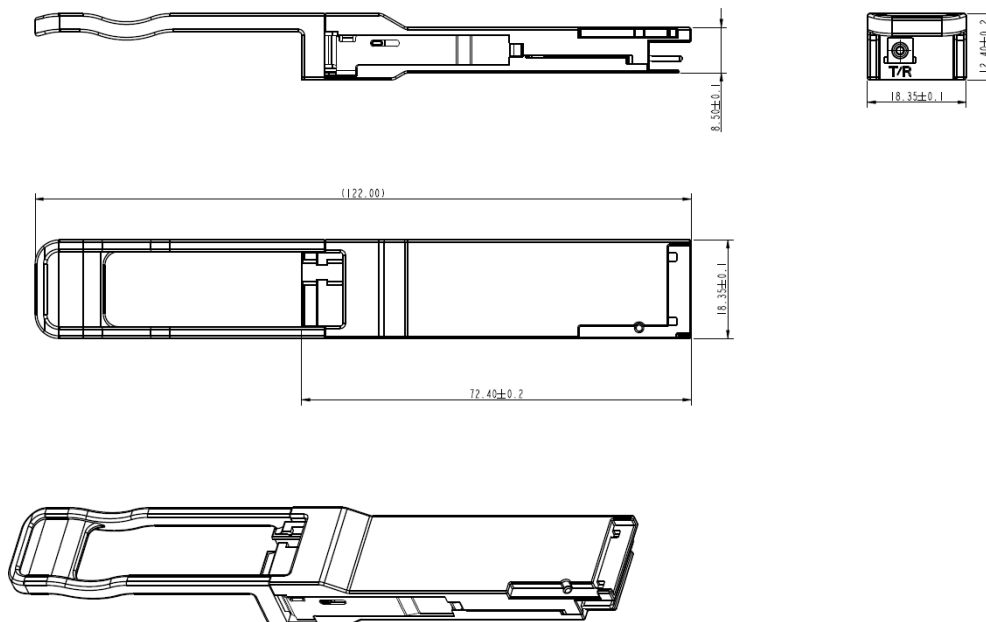


Figure 3. Mechanical Dimensions

Regulatory Compliance

OPEG10-3327 Optical Transceiver is RoHS 6/6 compliant and complies with international electromagnetic compatibility (EMC) and product safety requirements and standards.

Feature	Standard	Performance
Safety		
TUV	EN 60950-1	TUV certificate
	EN/IEC 60825-1:2007, Edition 2	
	EN/IEC 60825-1:2014, Edition 3	
	EN/IEC 60825-2:2004+A1:2006+A2:2010	
Electromagnetic Compatibility		
Radiated emissions	EMC Directive 2014/30/EU	Class B digital device with a minimum -6dB margin to the limit when tested with a metal enclosure. Final margin may vary depending on system application, good system EMI design practice, ie: suitable metal enclosure and well-bonding, is required to achieve Class B margins at the system level. Tested frequency range: 30 MHz to 40 GHz or 5th harmonic (5 times the highest frequency), whichever is less.
	EN 55032	
	CISPR 32	
	AS/NZS CISPR 32	
ESD	EN 55024	Withstands discharges of ± 8 k V contact, ± 15 k V air.
	CISPR 24	
	IEC/EN 61000-4-2	
Radiated immunity	EN 55024	Field strength of 10 V/m from 80 MHz to 6 GHz.
	CISPR 24	
	IEC/EN 61000-4-3	
Restriction of Hazardous Substances		
RoHS	EU Directive 2011/65/EU (EU) 2015/863	

ESD Design

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and otherwise handled in an ESD protected environment utilizing standard grounded benches, floor mats, and wrist straps.

Parameter	Threshold value	Notes
ESD of high-speed pins	1KV	Human Body Model
ESD of low-speed pins	2KV	Human Body Model
Air discharge during operation	15KV	
Direct contact discharges to the case	8KV	

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