



**QSFP28 100G MPO MMF 850nm 70m Transceiver**

**AQPMDN85ADLN0782**



**Applications**

- ❑ 100Gb/s Ethernet 100GBASE-SR4
- ❑ Proprietary multi-channel links

**Features**

- ❑ QSFP28 MPO Type Transceiver
- ❑ 850nm VCSEL Laser
- ❑ 100Gb/s aggregated bidirectional data throughput
- ❑ Contain clock and data recovery (CDR)
- ❑ Supports 100 Gbps data rate links of up to 70m via OM3 MMF
- ❑ 3.3V single power supply
- ❑ Power consumption < 3.5 W
- ❑ Hot pluggable electrical interface
- ❑ Standard 12/8 lane optical fiber with MPO optical connector
- ❑ Compliant with QSFP 28 MSA-SFF-8665
- ❑ Compliant with IEEE 802.3bm 100GBASE-SR4 standards
- ❑ Digital diagnostic functions (Via I2C)
- ❑ Compliant with RoHS
- ❑ Compliant with UL & TUV

**Ordering Information**

Form Factor	Date Rate	Media	Distance	Wavelength (nm)	Voltage (V)	Coupling	DDM (Y/N)	Temperature (°C)	Part Number
QSFP28 MPO	100G	MMF	70M	850	3.3	AC/AC	Y	0 ~ +70	AQPMDN85ADLN0782



**Absolute Maximum Ratings**

Parameter	Symbol	Conditions	Min	Max	Unit
Storage Temperature	T <sub>s</sub>	--	-40	+85	°C
Storage Relative Humidity	RH	Non condensing	5	85	%
Supply Voltage	V <sub>cc</sub>	--	-0.5	3.6	V

**Recommended Operating Conditions**

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Temperature (Case)	T <sub>c</sub>	--	0	--	70	°C
Supply Voltage	V <sub>cc</sub>	--	3.13	3.3	3.47	V
Supply Current	I <sub>cc</sub>	--	--	--	1000	mA
Data Rate	DR	--	--	100	--	Gbps
Distance		--	--	--	70	m

**Electrical Characteristics**

<b>Transmitter Electrical Characteristics</b>						
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Data Input Differential Peak-to-Peak Voltage Swing	V <sub>in,pp</sub>	(Note 1)	20	--	1200	mVpp
LOS Assert Threshold	V <sub>in,pp LOS</sub>	(Note 2)	120	--	--	mVpp
<b>Receiver Electrical Characteristics</b>						
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Data Output Differential Peak-to-Peak Voltage Swing, each lane	ΔVDO <sub>pp</sub>	(Note 3)	340	--	650	mVpp

1. AC coupled internally.
2. Tx Data Input Differential Peak-to-Peak Voltage Swing
3. AC coupled with 100ohm differential output impedance.



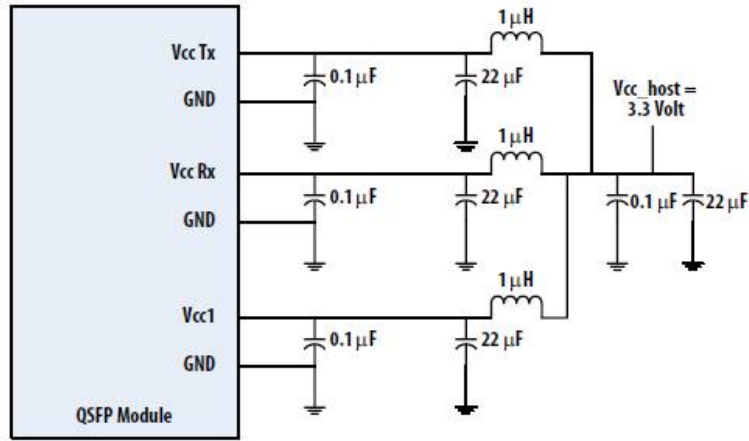
**Optical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Note
<b>Transmitter Optical Characteristics</b>						
Signaling rate, each lane	--	--	25.78125	--	GBd	
Center Wavelength	$\lambda$	840	--	860	nm	
Spectral Width – RMS	$\Delta\lambda$	--	--	0.6	nm	
Transmitter and dispersion penalty (TDP), each lane	--	--	--	5	dB	
Output Optical Power: Average each lane	PO AVE	-9.1	--	2.4	dBm	
Output Optical Modulation Amplitude, each lane	--	-7.1	--	3	dBm	1
Extinction Ratio	ER	2	--	--	dB	
Output Optical Power: Disabled	PO_OFF	--	--	-30	dBm	
Eye Mask	--	Compliant with IEEE 802.3bm				
<b>Receiver Optical Characteristics</b>						
Signaling rate, each lane	--	--	25.78125	--	GBd	
Center wavelength, each lane	$\Lambda$	840	--	860	nm	
Damage Threshold	--	3.4	--	--	dBm	
Receiver Power (OMA), each lane	--	--	--	3	dBm	
Maximum Average power at receiver input, each lane	--	-11	--	2.4	dBm	
Receiver Reflectance	--	--	--	-12	dB	
Stressed receiver sensitivity (OMA)	--	--	--	-5.2	dBm	2
LOS Assert	--	-19	--	--	dB	
LOS De-Assert	--	--	--	-11	dB	
LOS Hysteresis	--	0.5	--	--	dB	

Notes:

1. Even if the TDP<0.9dB, the OMA(min) must exceed this value
2. Measured with 25.78125-Gbps of PRBS-31 at 10-12 BER.

**Recommended Host Board Power Supply Circuit Filter**



**Pin Description**

38	GND
37	TX1n
36	TX1p
35	GND
34	TX3n
33	TX3p
32	GND
31	LPMODE
30	Vcc1
29	VccTx
28	IntL
27	ModPrsL
26	GND
25	Rx4p
24	Rx4n
23	GND
22	Rx2p
21	Rx2n
20	GND

Top Side  
Viewed From Top

Module Card Edge

	GND	1
	TX2n	2
	TX2p	3
	GND	4
	TX4n	5
	TX4p	6
	GND	7
	ModSelL	8
	ResetL	9
	VccRx	10
	SCL	11
	SDA	12
	GND	13
	Rx3p	14
	Rx3n	15
	GND	16
	Rx1p	17
	Rx1n	18
	GND	19

Bottom Side  
Viewed From Bottom



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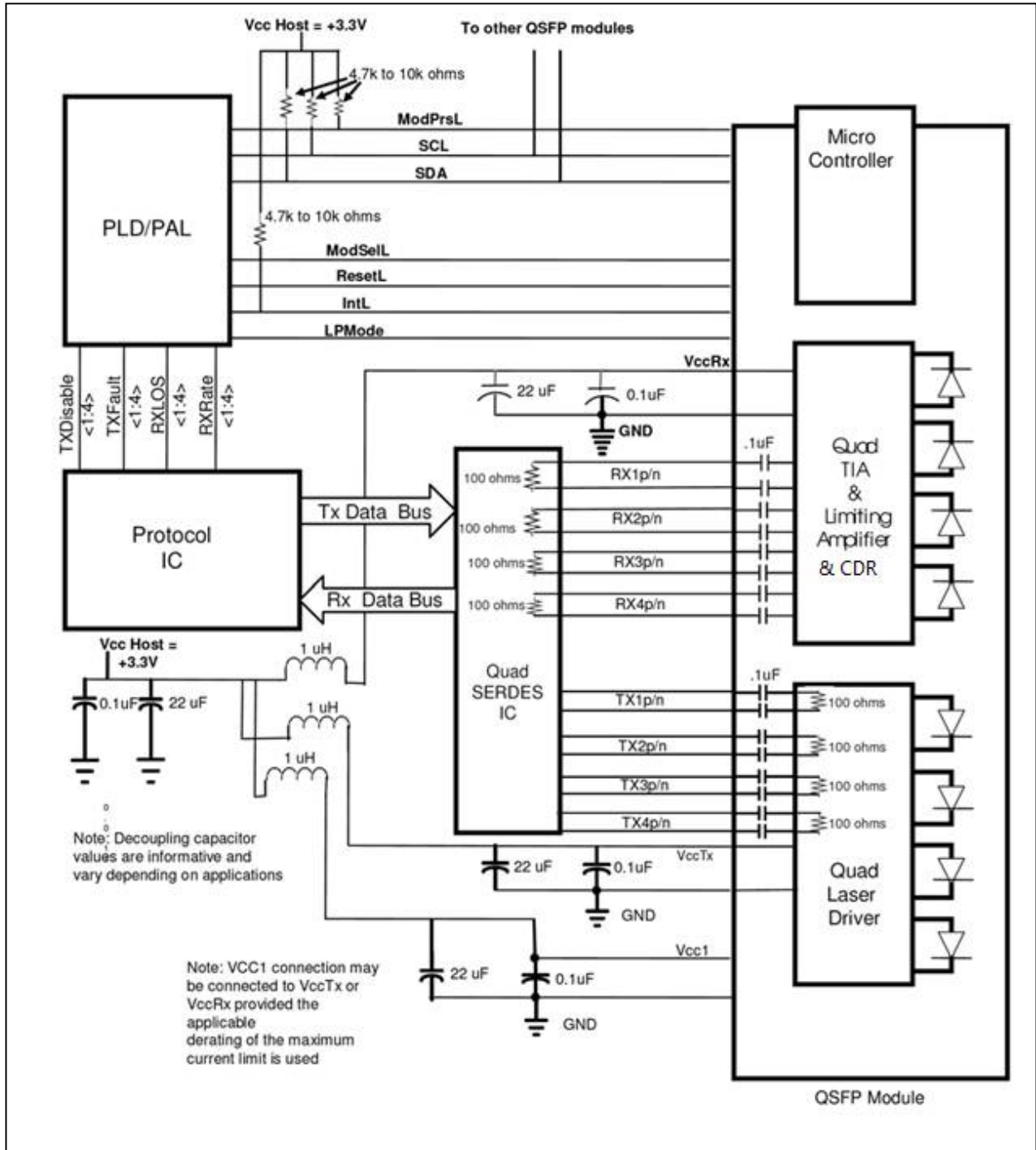
**Pin Function Definitions**

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

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

2. 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 6. Recommended host board power supply filtering is shown in Figure 4. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP28 module in any combination. The connector pins are each rated for a maximum current of 500 mA.

Recommended Interface Circuit





**EEPROM Memory contents Address A0h**

	AOI	AQPMDN85ADLN0782	E130	70
Add	Name of field	Description	ACSII	HEX
128	Identifier	11:QSFP28		11
129	Ext. Identifier	QSFP Transceiver ; bit7-6:11 Power Max 3.5W bit3: 1 CDR present in TX bit2: 1 CDR present in RX		CC
130	Connector	0C:MPO		0C
131	Transceiver	80: The Extended Specification Compliance Codes are maintained in the Transceiver Management section of SFF-8024 Table 4-4 (The extended information show in Byte 192)		80
132		SONET Compliance codes		00
133		SAS/SATA compliance codes		00
134		Gigabit Ethernet compliance codes		00
135		Fiber Channel Compliant codes		00
136		Fiber Channel link length		00
137		Fiber Channel transmission media		00
138		Fiber Channel Speed		00
139	Encoding	05: 64B/66B, (see SFF-8024 Table 4-2)		05
140	BR, Nominal	100Mbps/unit -> HEX FF:25.78125G / each channel (over 25.4G reference Byte 222)		FF
141	Ext. RateSelect	bit7-2:0 reserved bit1:0 no QSFP+ Rate Select Version2 bit0:0 no QSFP+ Rate Select Version1 (see Table 6-18)		00
142	Length(9um, SMF)	1km /unit -> HEX		00
143	Length (50um, OM3)	2m /unit -> HEX 23 :70m		23
144	Length (50um, OM2)	1m /unit -> HEX		00
145	Length (62.5um, OM1)	1m /unit -> HEX		00
146	Length (52um, OM4) / Length (Copper or AOC)	2m /unit -> HEX / 1m /unit -> HEX		00
147	Device Tech	Device technology		00
148	Vendor name	QSFP Vendor Name (ASCII)	A	41
149			O	4F
150			I	49
151				20
152				20
153				20



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154				20
155				20
156				20
157				20
158				20
159				20
160				20
161				20
162				20
163				20
164	Ext. Transceiver	Ext. Transceiver (see <a href="#">Table 6-21</a> ) 10:EDR		10
165				00
166	Vendor OUI	QSFP+ Vendor IEEE company ID		29
167				26
168			A	41
169			Q	51
170			P	50
171			M	4D
172			D	44
173			N	4E
174			8	38
175			5	35
176	Vendor PN	SFP Vendor Part Number (ASCII)	A	41
177			D	44
178			L	4C
179			N	4E
180			0	30
181			7	37
182			8	38
183			2	32
184	Vendor rev	Hardware Revision (HEX) Ver B	B	42
185				20
186	Wavelength	Nominal laser wavelength (Wavelength = value / 20 in nm) 4268:850nm		42
187				68
188	Wavelength Tolerance	Guaranteed range of laser wavelength (+/- value) from Nominal wavelength. (Wavelength Tol. = value/200 in nm)		07
189		07D0:10nm		D0
190	Max Case Temp	Maximum Case Temperature 46:70°C		46





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191	CC_BASE	Check Sum (128-190)		AF
192	Options (see Table 6-22)	Reference Extended: The Extended Specification Compliance Codes are maintained in the Transceiver Management section of SFF-8024 (see Table 6-17) 10G/40G/100G Ethernet 02:100G BASE-SR4 (see Table 4-4)		02
193		bit7-4:0 reserved bit3:0 no TX Input Equalization Auto Adaptive Capable bit2:0 no TX Input Equalization Fixed Programmable Settings bit1:0 no RX Output Emphasis Fixed Programmable Settings bit0:0 no RX Output Amplitude Fixed Programmable Settings		00
194		bit7:1 TX CDR On/Off Control bit6:1 RX CDR On/Off Control bit5:1 Tx CDR Loss of Lock (LOL) Flag bit4:1 Rx CDR Loss of Lock (LOL) Flag bit3:0 no Rx Squelch Disable bit2:0 no Rx Output Disable capable bit1:0 no Tx Squelch Disable bit0:0 no Tx Squelch		F0
195		bit7:1 memory page02 bit6:0 no memory page01 bit5:0 no RATE_SELECT bit4:1 TX_DISABLE bit3:1 TX_FAULT bit2:0 no TX Squelch bit1:0 no TX Loss bit0:0 reserved		98
196	Vendor SN	Vendor SN (ASCII)		XX
197				XX
198				XX
199				XX
200				XX
201				XX
202				XX
203				XX
204				XX
205				XX
206				XX
207				XX
208		XX		
209		XX		



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210				XX
211				XX
212	Date code	Year (ASCII)		XX
213				XX
214		Month (ASCII)		XX
215				XX
216		Day (ASCII)		XX
217				XX
218		Blank		20
219			20	
220	Diagnostic Monitoring Type	bit3:1 = Average power / 0 = OMA bit2:1 Transmitter power measurement others:0 reserved (see Table 6-24)		0C
221	Enhanced Options	bit7-4:0 Reserved bit3:0 no Rate Select bit2:0 no Application select bit1-0:0 reserved (see Table 6-25)		00
222	BR, Nominal	250Mbps/unit -> HEX 67: 25.78125G / each channel		67
223	CC_EXT	Check Sum 64 to 94 byte		XX
224	Read-only			00
225				00
226				00
227				00
228				00
229				00
230				00
231				00
232				00
233				00
234				00
235				00
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238				00
239				00
240				00
241				00
242				00
243				00
244				00



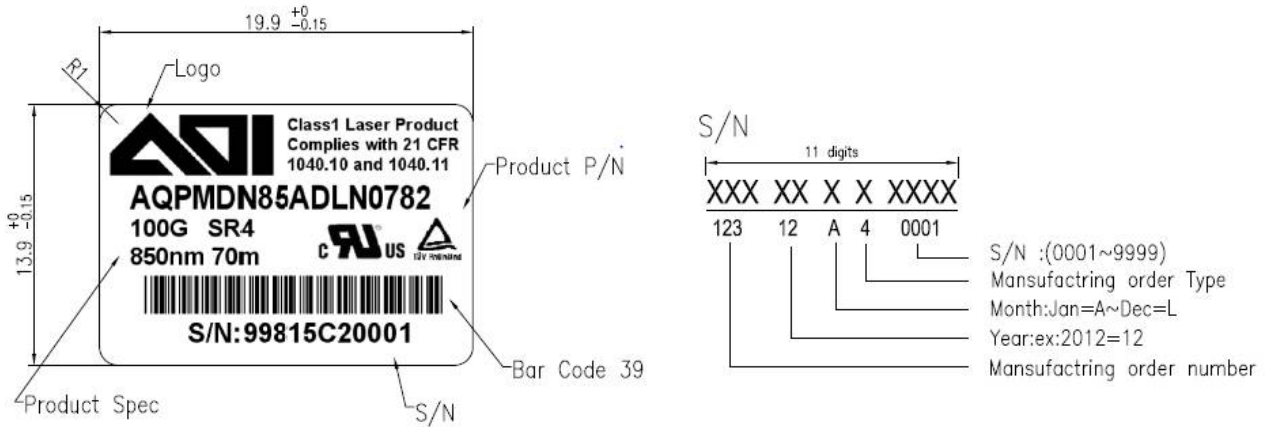
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245			00
246			00
247			00
248			00
249			00
250			00
251			00
252		FW Check sum	DE
253			BF
254	FW Version	03 00 = V3.00	03
255			00

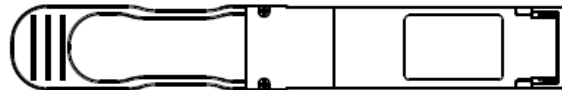
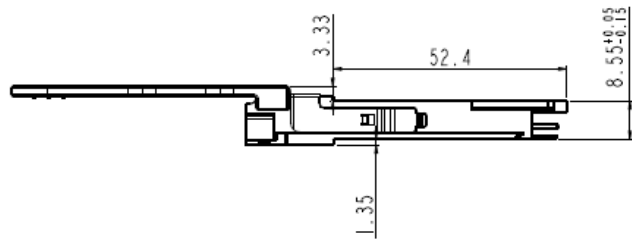
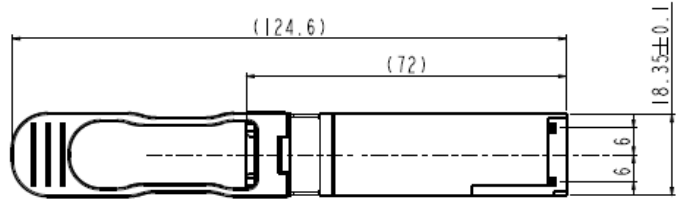
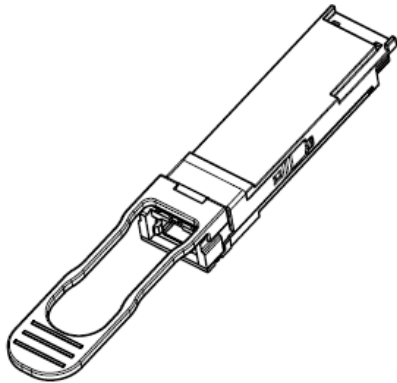


**Module Label Diagram**



Unit:mm

Mechanical Diagram



UNIT: mm  
TOLERANCE: ±0.2



**Regulatory Compliance**

Item	Standard
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
Electrostatic Discharge to the Electrical Pins (ESD)	MIL-STD-883E Method 3015.7
Electrostatic Discharge to the Receptacle (ESD)	IEC 61000-4-2
RoHS	2011/65/EU
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11
Component Recognition	UL and TUV

**Laser Safety Information**

All versions of this laser are Class 1 laser products per IEC1/EN2 60825-1. Users should observe safety precautions such as those recommended by ANSI<sup>3</sup> Z136.1, ANSI Z36.2 and IEC 60825-1.

This product conforms to FDA (CDRH) 21 CFR 1040.10 and 1040.11 except for deviations of laser safety class designation pursuant to ['Laser Notice No.50'](#)

Product labeling:

Class 1 Laser Product  
Compliance with 21 CFR  
1040.10 and 1040.11

If labeling is not affixed to the module due to size constraints; then rather, labeling is placed on the outside of the shipping box.

This product is not shipped with a power supply.

**Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

**Certifications**

<b>UL</b>	<b>60950-1 (E243407)</b>
<b>TUV</b>	<b>EN60950-1, EN 60825-1, EN 60825-2</b>

Documentation is available upon request.

(1) IEC is a registered trademark of the International Electrotechnical Commission

(2) Within Europe the IEC standard has been adopted as a European Normative standard known as EN 60825, and each European country will have its own version of this standard, for example, the British Standards version known as BS EN 60825. There can be small differences between the different countries versions of EN 60825, and these are in part caused by the process of translating the standard into the native language of that country.

(3) ANSI is a registered trademark of the American National Standards Institute

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