



# DATENBLATT

## RPC-CWDM-10G-80D

Produktspezifikationen

Stand: 06/2015



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# RPC-CWDM-10G-80D

## 10Gb/s CWDM Single-mode SFP+ Transceiver

### PRODUCT FEATURES

- 1470nm to 1610nm CWDM Laser.
- Compliant with SFP+ MSA
- Compliant to 802.3ae 10GBASE-ZR
- Compliant to SFP+ SFF-8431 and SFF-8432.
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Maximum Link Length of 80 km
- Single power supply 3.3V
- Class 1 laser product complies with EN 60825-1
- Case temperature range: -5°C to 70°C.
- Power dissipation < 1.5W

### APPLICATIONS

- 10GBASE-ZR/ZW

### DESCRIPTION

The RAPIDCON RPC-CWDM-10G-80D is CWDM SFP+ transceiver for long distance optical communications, the distance is up to 80km. The transceivers include an APD diode and temperature stabilized DFB-EML transmitter. Digital diagnostic functions are available via an I2C. This module is designed for single mode fiber.

## PRODUCT SELECTION

RPC-CWDM-10G-80D

Wavelength	xx	Wavelength	xx
1470 nm	47	1550 nm	55
1490 nm	49	1570 nm	57
1510 nm	51	1590 nm	59
1530 nm	53	1610 nm	61

### I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		3.6	V	
Storage Temperature	TS	-40		85	°C	
Case Operating Temperature	Tcase	-5		70	°C	

## II. Electrical Characteristics (T<sub>case</sub> = -5 to 70°C, V<sub>CC</sub> = 3.14 to 3.46 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Supply Current	I <sub>CC</sub>		300	450	mA	
<b>Transmitter</b>						
Input differential impedance	R <sub>in</sub>		100		Ω	1
Differential data input swing	V <sub>in,pp</sub>	180		1200	mV	
Transmit Disable Voltage	V <sub>D</sub>	V <sub>CC</sub> -1.3		V <sub>CC</sub>	V	
Transmit Enable Voltage	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> + 0.8	V	2
Transmit Disable Assert Time				10	us	
<b>Receiver</b>						
Differential data output swing	V <sub>out,pp</sub>	300		850	mV	3
Data output rise time	t <sub>r</sub>	30			ps	4
Data output fall time	t <sub>f</sub>	30			ps	4
LOS Fault	V <sub>LOS</sub> fault	V <sub>CC</sub> -1.3		V <sub>CC</sub> HOST	V	5
LOS Normal	V <sub>LOS</sub> norm	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	5

### Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 ohms differential termination.
4. These are unfiltered 20-80% values
5. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

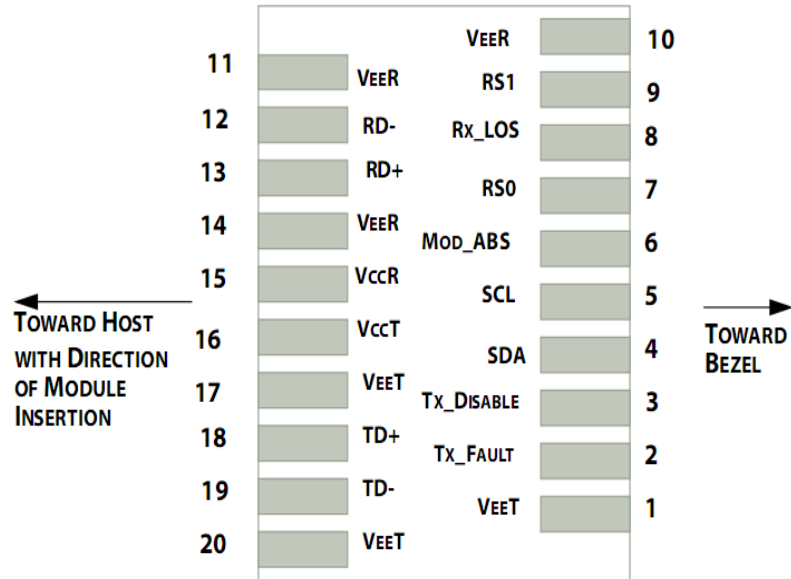
### III. Optical Characteristics ( $T_{case} = -5$ to $70^{\circ}C$ , $VCC = 3.14$ to $3.46$ Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref
<b>Transmitter</b>						
Output Opt. Pwr	P <sub>OUT</sub>	0		+5	dBm	1
Optical Wavelength	$\lambda$	$\lambda-6.5$		$\lambda+6.5$	nm	2
Wavelength Temperature Dependance			0.08	0.125	nm/ <sup>o</sup> C	
Optical Extinction Ratio	ER	6			dB	
Transmitter and Dispersion Peanlty	TDP			3.0	dB	
Side mode Supression ratio	SMSR	30			dB	
RIN	RIN			-128	dB/Hz	
Output Eye Mask		Compliant with IEEE 0802.3ae				
<b>Receiver</b>						
Rx Sensitivity	R <sub>SENS</sub>			-23	dBm	3
Input Saturation Power (Overload)	P <sub>sat</sub>	-7			dBm	
Wavelength Range	$\lambda_C$	1270		1610	nm	
LOS De -Assert	LOSD			-26	dBm	
LOS Assert	LOSA	-32			dBm	
LOS Hysteresis		0.5			dB	

#### **Notes:**

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. “ $\lambda$ ” is: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, please the “product selection”
3. With worst-case extinction ratio. Measured with a PRBS 231-1 test pattern, @10.325Gb/s, BER<10<sup>-12</sup> .

## IV. Pin Descriptions



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	Ref.
1	$V_{EET}$	Transmitter Ground (Common with Receiver Ground)	1
2	$T_{FAULT}$	Transmitter Fault.	2
3	$T_{DIS}$	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	$V_{EER}$	Receiver Ground (Common with Transmitter Ground)	1
11	$V_{EER}$	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	$V_{EER}$	Receiver Ground (Common with Transmitter Ground)	1
15	$V_{CCR}$	Receiver Power Supply	
16	$V_{CCT}$	Transmitter Power Supply	
17	$V_{EET}$	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	$V_{EET}$	Transmitter Ground (Common with Receiver Ground)	1

### **Notes:**

1. Circuit ground is internally isolated from chassis ground.
2.  $T_{\text{FAULT}}$  is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to  $V_{\text{CC}} + 0.3\text{V}$ . A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to  $<0.8\text{V}$ .
3. Laser output disabled on  $T_{\text{DIS}} > 2.0\text{V}$  or open, enabled on  $T_{\text{DIS}} < 0.8\text{V}$ .
4. Should be pulled up with 4.7k $\Omega$ - 10k $\Omega$  host board to a voltage between 2.0V and 3.6V. MOD\_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7k $\Omega$  – 10k $\Omega$  on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## **V. Digital Diagnostic Functions**

RAPIDCON RPC-CWDM-10G-80D transceivers support the 2-wire serial communication protocol as defined in the SFP MSA.

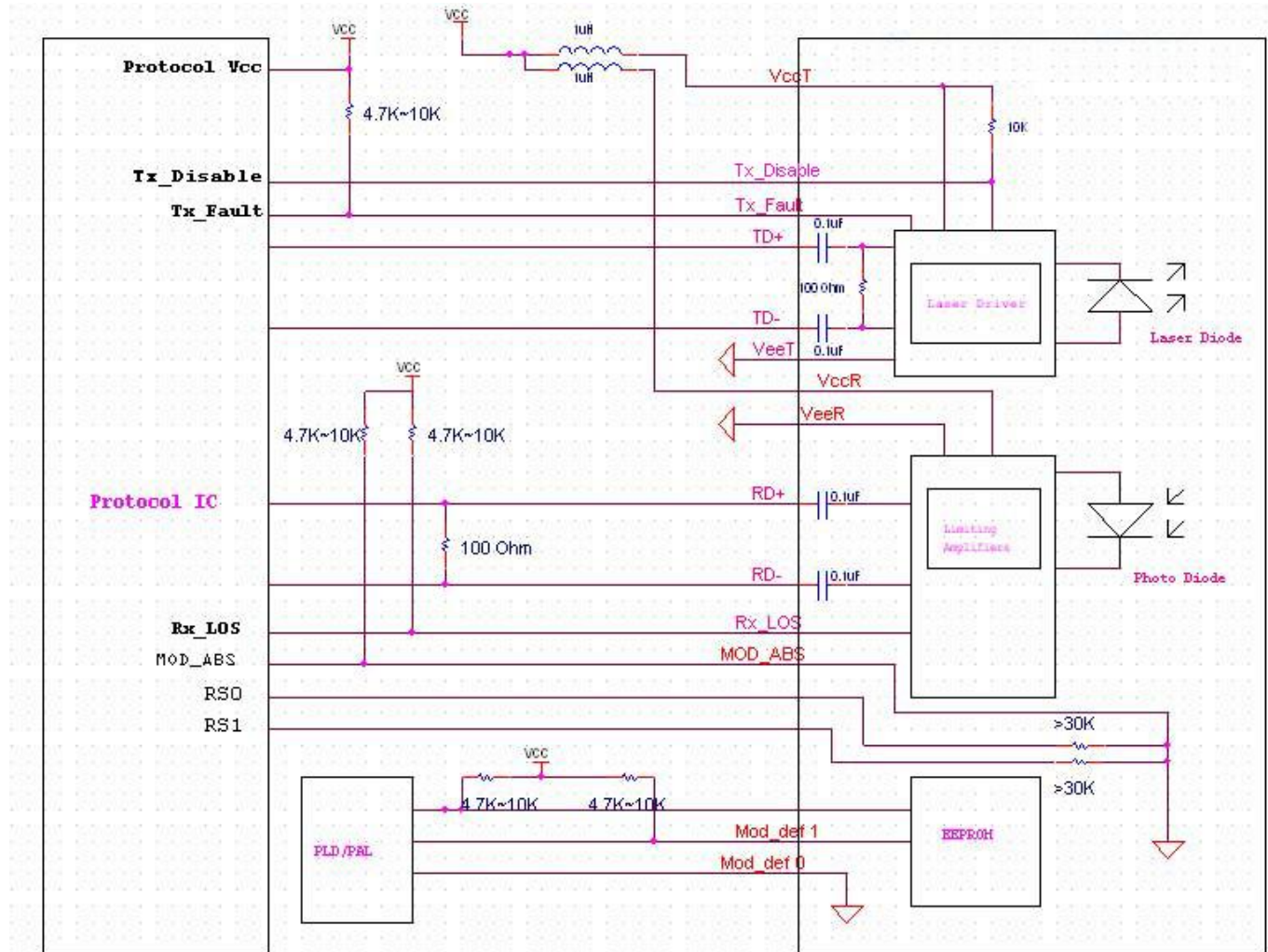
The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, RAPIDCON SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

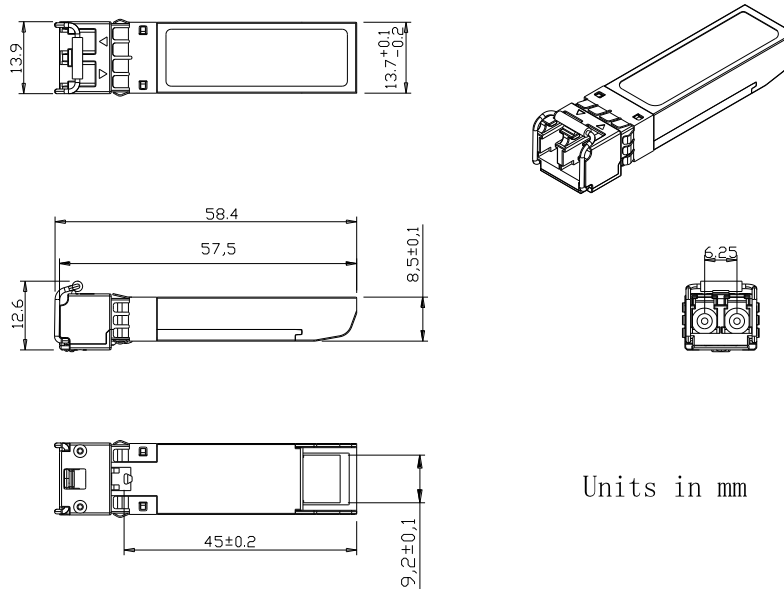
## VI. Host - Transceiver Interface Block Diagram





## VII. Outline Dimensions

Comply to SFF-8432 rev5.0, the improved Pluggable form factor specification.



## VIII. Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950 , UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards