



RoHS compliant
Small Form Pluggable (SFP+)
CL-SFP+_EZR_100CDR, SFP+ 100KM Optical Transceivers



Features

- Supports 9.95 to 11.3Gb/s
- Duplex LC connector
- Hot-pluggable SFP footprint
- Cooled 1550nm EML laser
- RoHS compliant and Lead Free
- 100Km link length
- Metal enclosure for lower EMI
- Built-in dual CDR
- Power dissipation <2.0W (-5~70°C)
- Commercial and industrial operating temperature optional
- SFP MSA SFF-8472 SFF-8431 SFF-8432
- Compliant

Applications

- 10G Ethernet ZR and 10G Fibre Channel
- OTN G.709 OTU1e/2/2e FEC bit rates
- SDH STM-64

Ordering Information

PART NUMBER	TX/RX	INPUT/OUTPUT	SIGNAL DETECT	TEMPERATURE	PACKAGE	Distance
CL- SFP+_EZR_100CDR		AC/AC	TTL	-5°C to 70 °C	LC SFP +	100km
CL- SFP+_EZR_100CDRi		AC/AC	TTL	-40°C to 85 °C	LC SFP +	100km

General

Carelink's CL-SFP+_EZR_100CDR Small Form Factor Pluggable (SFP+) transceivers are compatible with SFF-8431,SFF-8432 and support 10G Ethernet ZR and 10G Fibre Channel. It is designed for use in 10G-Gigabit multi-rate links up to 100km of G.652. Digital diagnostics unctions are available via a 2-wire serial interface, as specified in SFF-8472.



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Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- ROHS compliant with ROHS 2 (2011/65/EU)

Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	VeeT	Transmitter Ground (Common with Receiver Ground)	1
2	TX Fault	Transmitter Fault. LVTTL-O	2
3	TX Disable	Transmitter Disable. Laser output disabled on high or open. LVTTL-I	3
4	SDA	2-Wire Serial Interface Data Line(Same as MOD-DEF2 in INF-8074i). LVTTL-I/O	2
5	SCL	2-Wire Serial Interface Data Line(Same as MOD-DEF2 in INF-8074i). LVTTL-I	2
6	Mod_ABS	Module Absent, Connect to VeeT or VeeR in Module.	2
7	RS0	Rate Select 0, optionally controls SFP+ module receiver LVTTL-I	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation. LVTTL-O	5
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter. LVTTL-I	4
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1

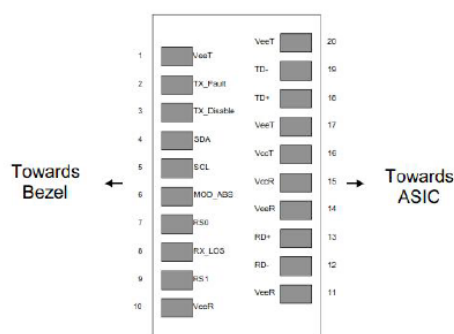


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11	VeeR	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled. CML-O	
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O	
14	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	6
16	VccT	Transmitter Power Supply	6
17	VeeT	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML- I	
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML- I	
20	VeeT	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T_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 Vcc+0.3V. 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 <0.8V.
3. Laser output disabled on TX Disable >2.0V or open, enabled on TX Disable <0.8V.
4. Internally pulled down per SFF-8431 Rev4.1 .
5. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. Internally connected

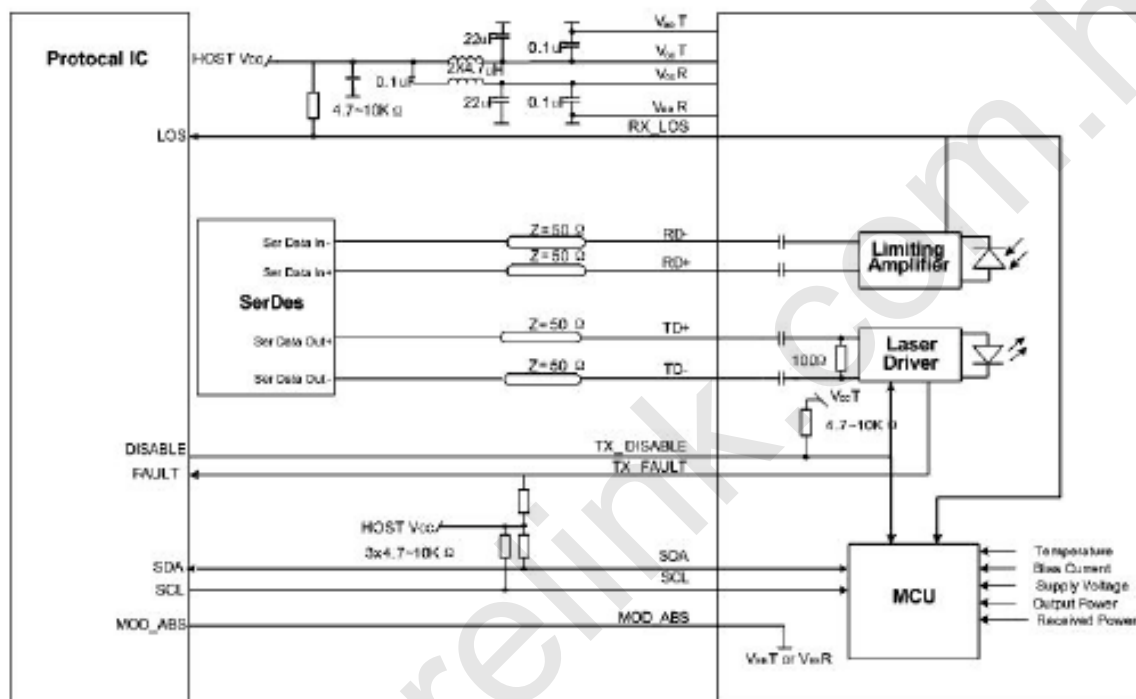


Pin-out of Connector Block on Host Board



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Recommend Circuit Schematic



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		+4.0	V	
Storage Temperature	TS	-40		+85	°C	
Operating Humidity	RH	0		85	%	



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Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	Vcc	3.13	3.30	3.47	V	
Power Supply Current	Icc			600	mA	Commercial
Case Operating Temperature	Tc	-5		+70	°C	Commercial
Bit Rate	Br	9.95		11.3	Gbps	
9/125um G.652 SMF	Lmax			100	km	

Electrical Characteristics (TOP=25°C, Vcc=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Input differential impedance	Rin	80	100	120	Ω	1
Differential data input swing	Vin, pp	120		850	mV	
TX Disable-High		Vcc – 0.8		Vcc	V	
TX Disable-Low		Vee		Vee+ 0.8	V	
TX Fault-High		Vcc-0.8		Vcc	V	
TX Fault-Low		Vee		Vee+0.8	V	
Receiver						
Single ended data output swing	Vout, pp	300		850	mV	2
Data output rise time	Tr	30			ps	3
Data output fall time	Tf	30			ps	3
LOS-High		Vcc – 0.8		Vcc	V	
LOS-Low		Vee		Vee+0.8	V	

Notes:

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %



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Optical Characteristics (TOP=25°C, Vcc=3.3 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	PO	2		6	dBm	
Optical Wavelength	λ	1530		1565	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS Spectral Width(-20dB)	σ			1	nm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Path penalty at 1600ps/nm@9.95Gb/s				4	dB	
Optical Extinction Ratio	ER	8.2			dB	
Receiver						
RX Sensitivity @10.3 Gb/s	SENS			-24	dBm	1,2
Receiver Overload		-7			dBm	
Optical Center Wavelength	λ_C	1260		1600	nm	
LOS De-Assert	LOSD			-28	dBm	
LOS Assert	LOSA	-37			dBm	
LOS Hysteresis		0.5			dB	

Notes:

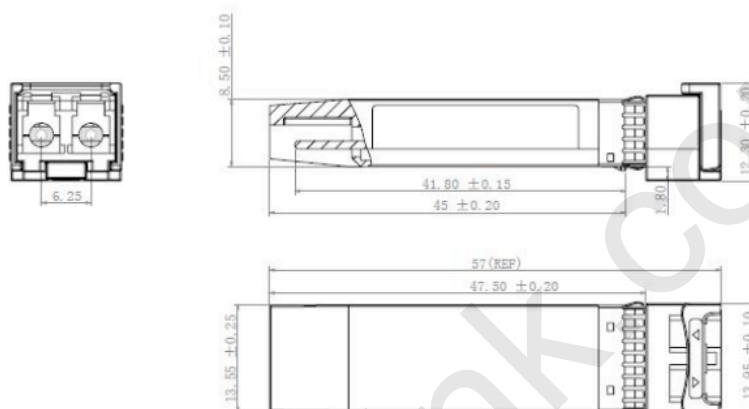
1. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
2. Measured with PRBS 2₃₁-1 at 10⁻¹² BER.



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Mechanical Specifications

Carelink's Small Form Factor Pluggable (SFP+) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)	2 wire address 1010001X (A2h)
0	0
Serial ID Defined by SFP MSA (96 bytes)	Alarm and Warning Thresholds (56 bytes)
95	55
Vendor Specific (32 bytes)	Cal Constants (40 bytes)
127	95
Reserved, SFF8079 (128 bytes)	Real Time Diagnostic Interface (24 bytes)
255	119
	Vendor Specific (8 bytes)
	127
	User Writable EEPROM (120 bytes)
	247
	Vendor Specific (8 bytes)
	255



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Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	-5f to +70°C (C)	±3°C	Internal
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	0 to 6dBm	±3dB	Internal
RX Power	-24 to -7dBm	±3dB	Internal