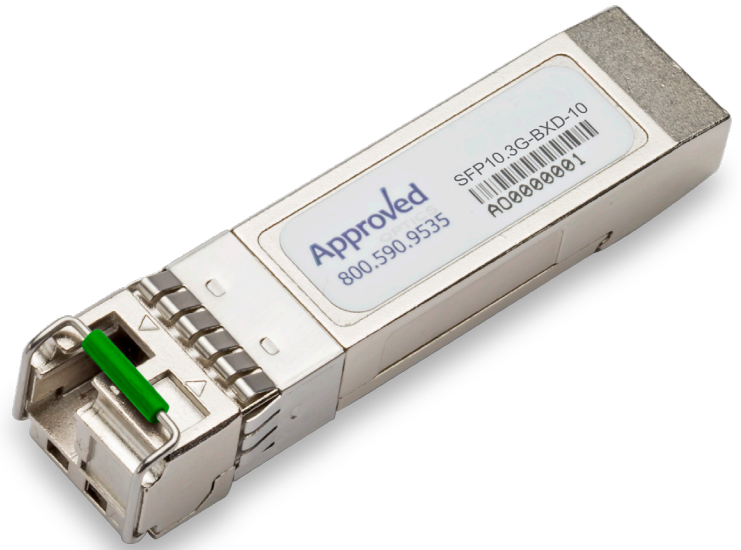# XCVR-S10V31-32-10-A
10GBASE, SFP+, LR, BIDI Transceiver

Features

- Supports up to 10.7Gbps bit rates

- Hot-pluggable SFP+ footprint

- 1330nm DFB laser and PIN photodiode, Up to 10km for SMF transmission

- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle

- Compatible with RoHS

- Single +3.3V power supply

- Real Time Digital Diagnostic Monitoring

- Commercial case operating temperature range: 0°C to +70°C

Applications

- 10Gbps Optical systems

- 10GBASE-LR at 10.3125Gbps

- 10GBASE-LW at 9.953Gbps

- LTE systems

- Other Optical links

1. Description

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 10Gbps and 10km transmission distance with SMF. The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.
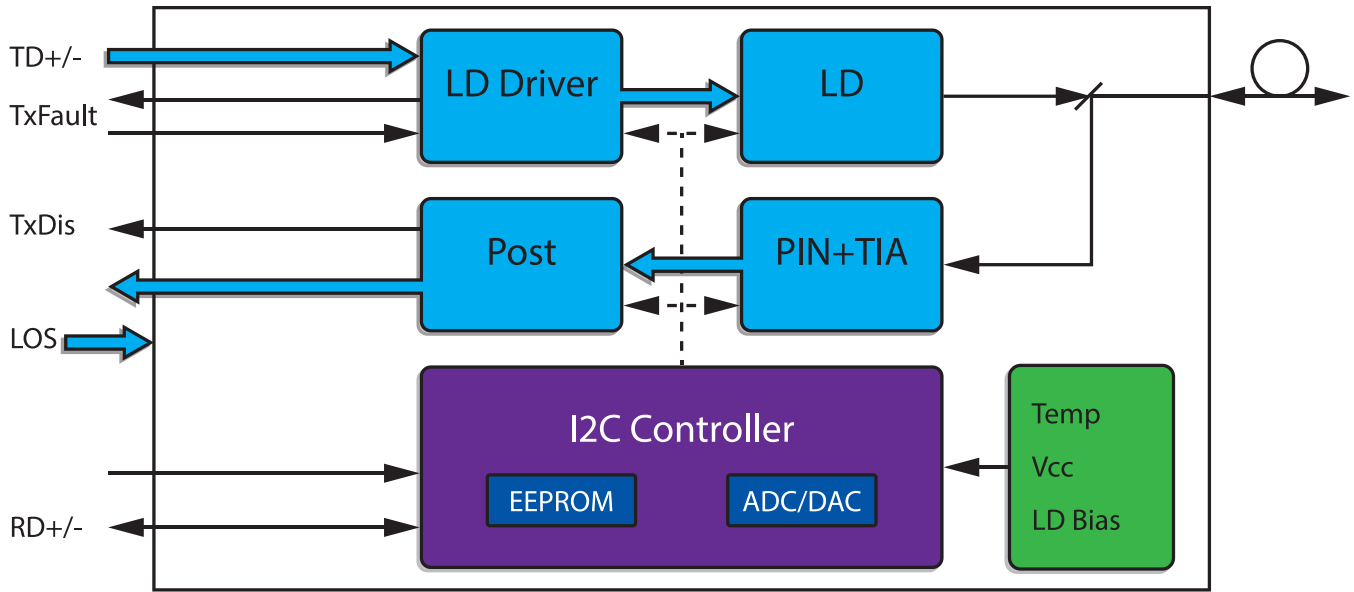
Figure 1. Transceiver functional diagram

2. Absolute Maximum Ratings

Any stress beyond the maximum ratings can result in permanent damage. The device specifications are guaranteed only under the recommended operating conditions.

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

3. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage @3.3V	Vcc	3.135	3.30	3.465	V
Power Supply Current	Icc			350	mA
Data Rate		1.0	10.3	10.7	Gbps

4. Optical and Electrical Characteristics

Transmitter							
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Centre Wavelength		λc	1320	1330	1340	nm	
Spectral Width (-20dB)		Δλ			1	nm	
Side-Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	-5		0	dBm	1
Extinction Ratio		ER	3.5			dB	
Data Input Swing Differential		VIN	180		850	mV	2
Input Differential Impedance		ZIN	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc		
	Normal		0		0.8		
Receiver							
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes**
Centre Wavelength		λc	1260	1270	1280	nm	
Receiver Sensitivity					-14.4	dBm	3
Receiver Overload			0.5			dBm	3
LOS De-Assert		LOSD			-15.5	dBm	
LOS Assert		LOSA	-30			dBm	
LOS Hysteresis			0.5			dB	
Data Output Swing Differential		Vout	300		900	mV	4
LOS	High		2.0		Vcc	V	
	Low				0.8	V	

Notes:

1. The optical power is launched into SMF.

2. PECL input, internally AC-coupled and terminated.

3. Measured with a PRBS 2^{31}-1 test pattern @10312 Mbps, BER $\leq 1 \times 10^{-12}$.

4. Internally AC-coupled.

5. Timing and Electrical

Parameter	Symbol	Min	Typ	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	µs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	µs
Tx Disable To Reset	t_reset	10			µs
LOS Assert Time	t_loss_on			100	µs
LOS De-assert Time	t_loss_off			100	µs
Serial ID Clock Rate	f_serial_clock		100	400	KHz
MOD_DEF (0:2)-High	VH	2			Vcc
MOD_DEF (0:2)-Low	VL			0.8	V

6. Diagnostics

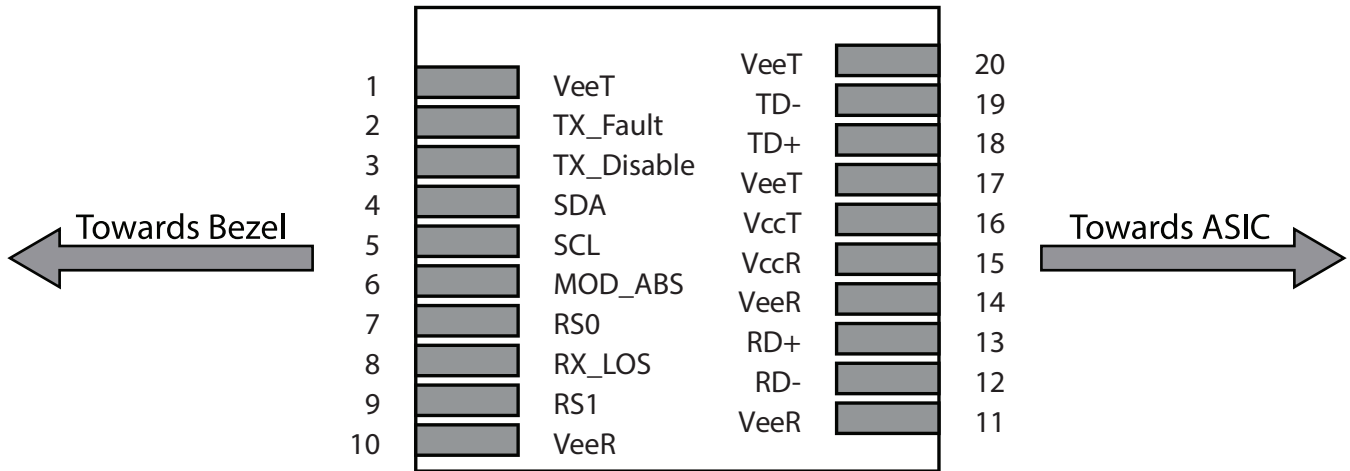| Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
	-20 to +80			
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-1 to +5	dBm	±3dB	Internal
RX Power	-17 to +1	dBm	±3dB	Internal

7. Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.

2 wire address 1010000X(A0h)

2 wire address 1010001X(A2h)

0	Serial ID Defined by SFP MSA (96 bytes)
95	Vendor Specific (32 bytes)
127	Reserved in SFP MSA (128 bytes)
255	

0	Alarm and Warning Thresholds (56 bytes)
55	Cal Constants (40 bytes)
95	Real-Time Diagnostic Interface (24 bytes)
119	Vendor Specific (8 bytes)
127	User Writable EEPROM (102 bytes)
247	
255	Vendor Specific (8 bytes)

8. Pin Descriptions

Towards Bezel

Pin	Signal
1	VeeT
2	TX_Fault
3	TX_Disable
4	SDA
5	SCL
6	MOD_ABS
7	RS0
8	RX_LOS
9	RS1
10	VeeR

Signal	Pin
VeeT	20
TD-	19
TD+	18
VeeT	17
VccT	16
VccR	15
VeeR	14
RD+	13
RD-	12
VeeR	11

Towards ASIC

Pin	Signal Name	Description	Plug Seq.	Notes
1	VEET	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	1
3	TX DISABLE	Transmitter Disable	3	2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	3

| Pin	Signal Name	Description	Plug Seq.	Notes
9	RS1	Not Connected	3	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RD- Inv.	Received Data Out	3	4
13	RD+	Received Data Out	3	4
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TD+	Transmit Data In	3	5
19	TD-	Inv. Transmit Data In	3	5
20	VEET	Transmitter Ground	1	

Notes:

Plug Seq: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

3. LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

4. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

5. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

9. Recommended Interface Circuit
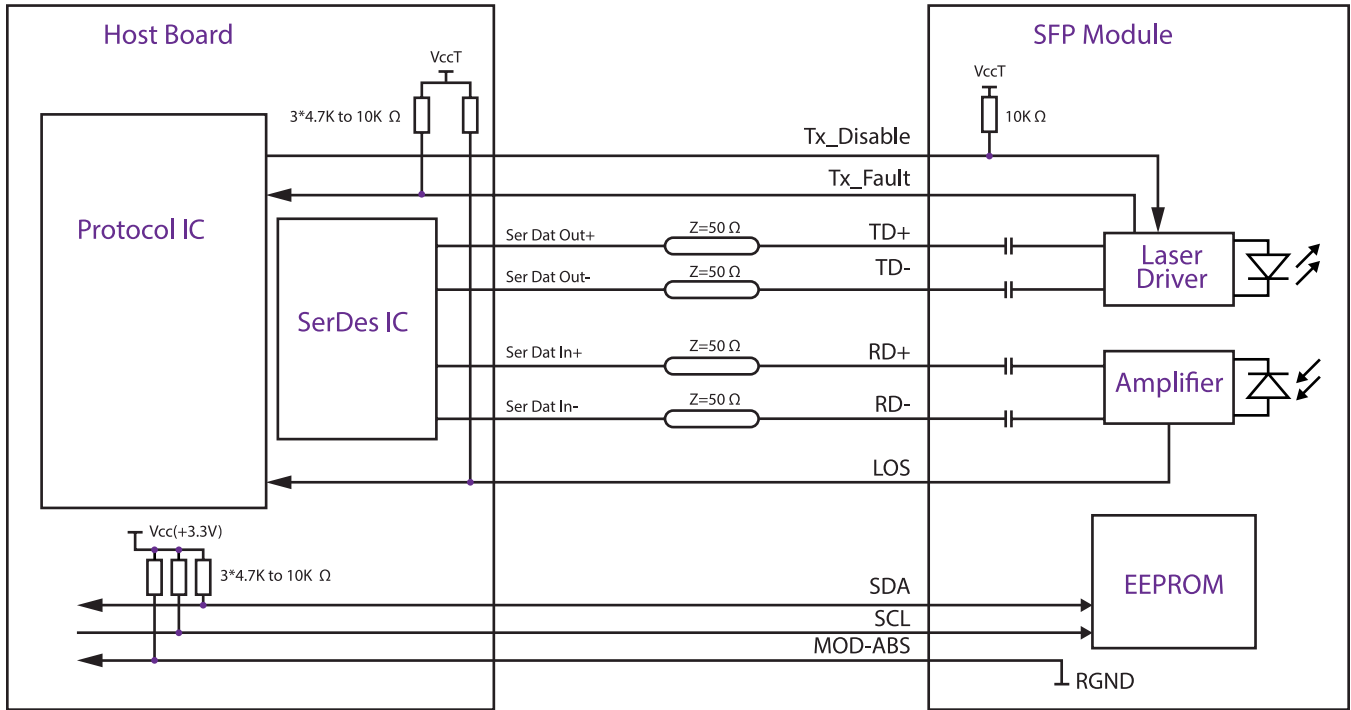
10. Mechanical Dimentions
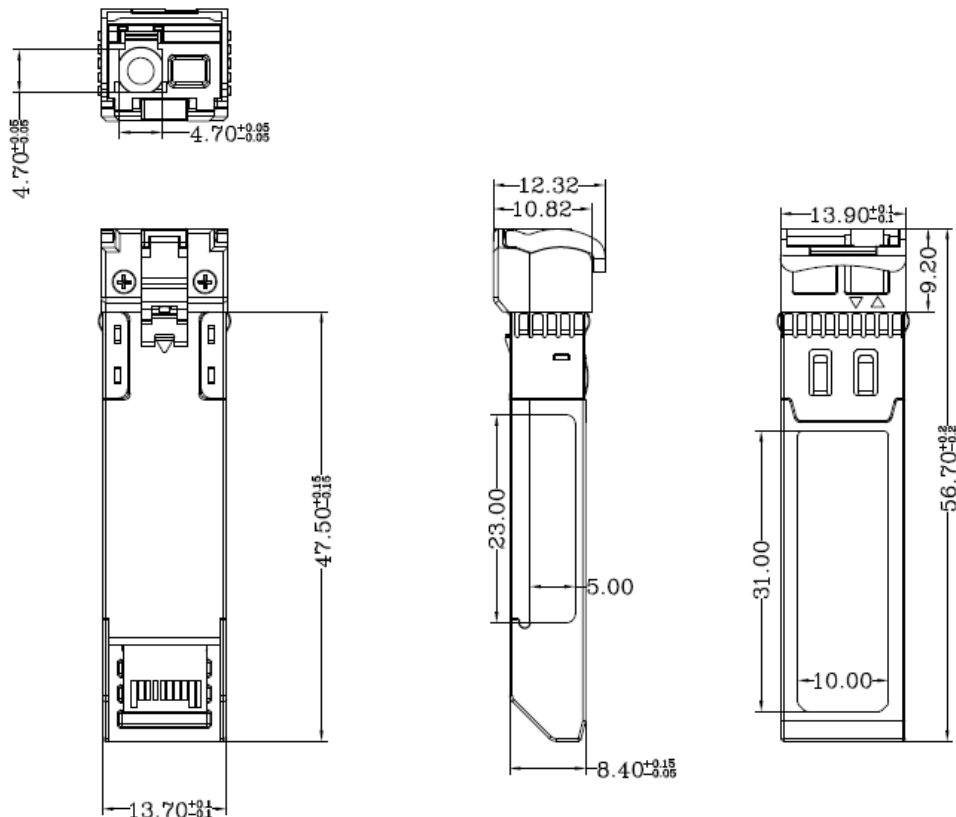
11. Contact Information

Approved Networks is a leading supplier of Network Transceivers and Connectivity products to Channel Partners, Resellers, and OEMs. With more than 9 years of direct industry experience, our products are resident in the most demanding and mission critical functional networks Worldwide. We serve as a Master Distributor to the largest CMs in the world and deploy the most rigorous testing and firmware management programs to bring the highest level of functional product to the market at a cost that makes sense.

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