

FiberPlex SFP-SHDVX-3131-B

3G VIDEO OPTIMIZED SINGLEMODE OPTICAL TRANSCEIVER



Description

The SFP-SHDVX-3131-B is an optical transceiver module engineered for exceptional performance in the presence of SDI pathological patterns. The transceiver features best-in-class optical receiver sensitivity for SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M serial rates, thus providing superior optical link budget and robustness. The SFP-SHDVX-3131-B contains a PIN photodiode receiver and a 1310nm Fabry-Perot laser transmitter designed to provide error-free transmission of signals from 50Mbps to 3Gbps over single mode fiber (9/125). It is also hot-pluggable.

The SFP-SHDVX-3131-B provides extensive operational status monitoring through an I2C interface. Input optical power is monitored in the receiver; output optical power and bias current are monitored in the transmitter. Other operating conditions, such as power supply and operating temperature, are also monitored. If a monitored parameter falls outside the pre-defined range, an alarm flag associated with the parameter will be raised.



Can be used with
WDM16 and FOI-6010

Features:

- Hot-pluggable, SFP MSA compatible
- Digital diagnostics and control via I2C interface including:
 - Monitoring of the laser bias current, average output power, receive optical power, supply voltage and temperature
 - Alarm reporting
 - Module ID polling
- RoHS compliant
- Operating temperature range: [...](#)

Summary of Benefits

Best-in-class optical receiver sensitivity: -22dBm(over all supported video rates with pathological data)

Robust error free transmission of signals from 50Mbps to 3Gbps with up to 30km single-mode fiber

Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI

Typical Applications

- SMPTE 297-2006 compatible optical-to-electrical interfaces
- Broadcast cameras

2. Pin Specifications

Figure 2.1-1 Pin Configuration

Figure 2.1-1 shows the host board pad configuration for the SFP-SHDVX-3131-B.

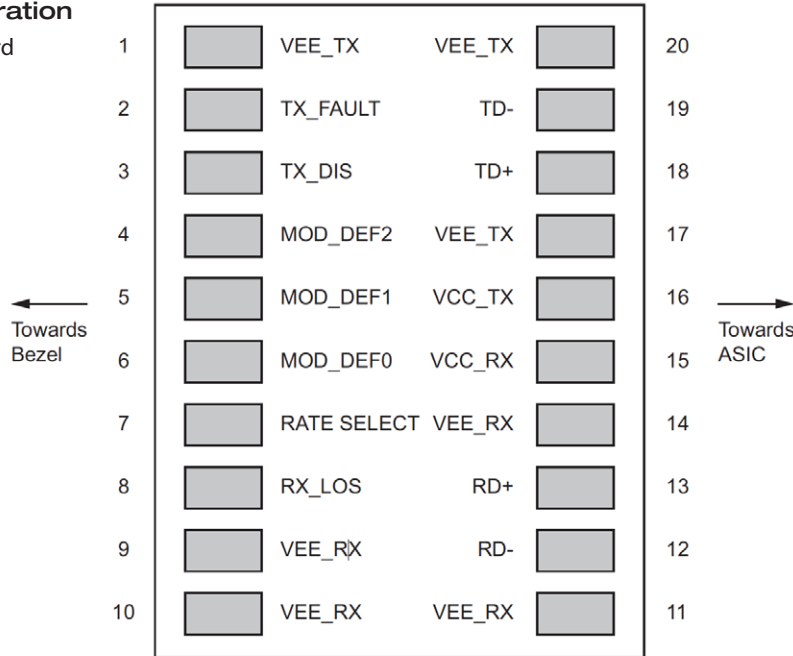


Table 2.1-1: Pin Descriptions

Number	Name	Type	Description	Notes
1	VEE_TX	Ground	Transmitter ground connection	1
2	TX_FAULT	Output	Transmitter fault indicator (Active high, open-drain)	-
3	TX_DIS	Digital (Input)	Transmitter disable. Laser is disabled when high. Internal 6kΩ pull-up.	-
4	MOD_DEF2	Digital (Bi-Directional)	I2C Data	-
5	MOD_DEF1	Digital (Input)	I2C Clock	-
6	MOD_DEF0	Ground	Module definition pin. Grounded within module.	-
7	RATE_SELECT	NC	No connection	-
8	RX_LOS	Output	Receiver loss of signal indicator (Active high, open-drain)	-
9	VEE_RX	Ground	Receiver ground connection.	1
10	VEE_RX	Ground	Receiver ground connection.	1
11	VEE_RX	Ground	Receiver ground connection	1
12	RD-	Output	Negative differential input (AC-coupled internally)	-
13	RD+	Output	Positive differential output	-
14	VEE_RX	Ground	Receiver ground connection	1
15	VCC_RX	Power	Receiver power supply	2
16	VCC_TX	Power	Transmitter power supply	2
17	VEE_TX	Ground	Transmitter ground connection	1
18	TD+	Input	Positive differential input (AC-coupled internally)	-
19	TD-	Input	Negative differential input (AC-coupled internally)	-
20	VEE_TX	Ground	Transmitter ground connection.	1

NOTES:

- All VEE signals are connected together inside the module.
- VCC_TX and VCC_RX are independent supplies.

2.2 Host Board Power Supply Requirements

The host board is required to provide a regulated and filtered power supply of 3.3V +/- 5% for the SFP-SHDVX-3131-B via the on board SFP connector. Figure 2-2 shows the recommended board supply filtering. When the host board is loaded with a resistive load in place of the SFP module and sourcing the maximum rated current, the peak-to-peak power supply noise measured on the SFP connector should comply to Table 2-2.

Figure 2.2-1: Recommended Host Board Supply Filtering

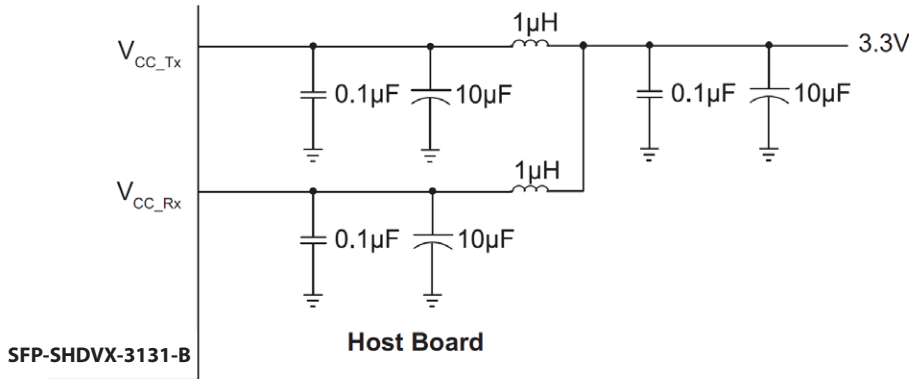


Table 2.2-1: Host Board Power Supply Noise Requirement at VCC_TX and VCC_RX

Frequency (MHz)	Peak-to-Peak Noise Amplitude (%)
0.02-1	2
1-10	3

2.3 Optical Connector Requirements

An LC connector with PC/UPC polish is required for each port.

3. Product Specifications

3.1 Absolute Maximum Ratings

Table 3-1 lists the absolute maximum ratings for the SFP-SHDVX-3131-B. Conditions exceeding the limits listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those listed in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 3.1-1: Absolute Maximum Ratings

Parameter	Value
Supply Voltage	4V
Operating Case Temperature	-25°C < TAMB < 85°C
Storage Temperature	-40°C < TSTG < 85°C
ESD tolerance on all pins	±1kV HBM
Relative Humidity (non-condensing)	5% - 95% RH

3. Product Specifications continued

3.2 Optical Performance Specifications

Table 3.2-1 lists the optical performance specifications for the transmitter of the SFP-SHDVX-3131-B.

Table 3.2-2 lists the optical performance specifications for the receiver of the SFP-SHDVX-3131-B.

Table 3.2-1: Transmitter Optical Performance Specifications

$V_{CC} = 3.3V \pm 5\%$, $T_A = -25^\circ C$ to $85^\circ C$. Typical values are at $V_{CC} = 3.3V$, $T_A = 25^\circ C$ unless otherwise specified.

Parameter	Symbol	Condition	Min	Typ	Max	Units	Notes
Wavelength	λ	-	1280	1310	1340	nm	1
Spectral Line Width (RMS)	-	-	-	1.5	3	nm	-
Average Optical Output Power	p_{OUT}	-	-5	-2	0	dBm	-
Extinction Ratio	ER	-	7	-	-	dB	-
Optical Signal Intrinsic Jitter	-	2.97Gbps, 1.485Gbps, 270Mbps PRBS	-	30	60	ps	-
		2.97Gbps SMPTE 424M Pathological	-	50	70	ps	-
		1.485Gbps SMPTE 292M Pathological	-	60	100	ps	-
		270Mbps SMPTE 259M Pathological	-	110	180	ps	-
Optical Signal Rise Time (20% to 80%)	t_r	2.97Gbps SMPTE 424M	-	-	135	ps	-
Optical Signal Fall Time (20% to 80%)	t_f	2.97Gbps SMPTE 424M	-	-	135	ps	-
Laser Power Monitoring Accuracy	-	-	-2	-	+2	dB	-
NOTES							
1. Measured at 25°C.							

Table 3.2-2: Receiver Optical Performance Specifications

$V_{CC} = 3.3V \pm 5\%$, $T_A = -25^\circ C$ to $85^\circ C$. Typical values are at $V_{CC} = 3.3V$, $T_A = 25^\circ C$ unless otherwise specified.

Parameter	Symbol	Condition	Min	Typ	Max	Units	Notes
Wavelength	λ	-	1260	-	1620	nm	-
Sensitivity	-	ER = 7dB	-	-25	-22	dBm	1
Overload	-	-	0	-	-	dBm	1
Loss of Signal Asserted	-	2.97Gbps PRBS ER = 7dB	-31	-	-	dBm	-
Loss of Signal De-asserted	-	2.97Gbps PRBS ER = 7dB	-	-	-23	dBm	-
Loss of Signal Optical Hysteresis	-	2.97Gbps PRBS ER = 7dB	0.5	-	-	dB	-
Maximum Back Reflection	-	-	-	-	-27 dB	-	-
Input Power Monitoring Accuracy	-	-	-2	-	2	dB	-
NOTES							
1. The sensitivity and the overload specifications refer to the input power levels for BER = 1E-12 against both PRBS and pathological pattern at SMPTE 259, SMPTE 292M and SMPTE 424M rates.							

3. Product Specifications continued

3.3 DC Electrical Specifications

Table 3-3 lists the DC electrical specifications of the SFP-SHDVX-3131-B.

Figure 3-3 shows the definition of the differential signal level.

Table 3.3-1: DC Electrical Specifications

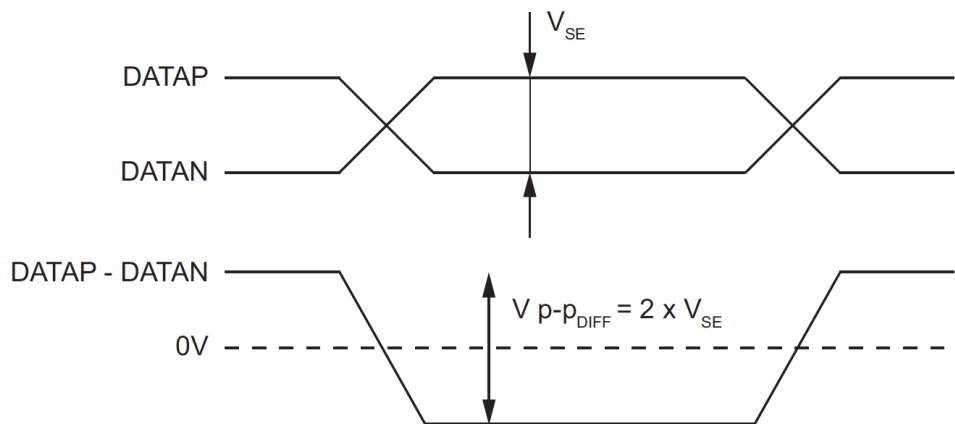
$V_{CC} = 3.3V \pm 5\%$, $T_A = -25^{\circ}C$ to $85^{\circ}C$. Typical values are at $V_{CC} = 3.3V$, $T_A = 25^{\circ}C$ unless otherwise specified.

Parameter	Symbol	Condition	Min	Typ	Max	Units	Notes
Operating Temperature Range	T_{CASE}	–	0	–	70	$^{\circ}C$	1
Power Supply Voltage	V_{CC}	–	3.13	3.3	3.47	V	1
Total Power Consumption	–	–	–	650	940	mW	–
Differential Input Data Amplitude	$V_{p-pDiff}$	–	0.4	–	2.4	V_{pp}	2
Differential Output Data Amplitude	$V_{p-pDiff}$	–	0.550	0.660	0.850	V_{pp}	3
Digital Input Low	V_{IL}	–	0		0.8	V	–
Digital Input High	V_{IH}	–	2		V_{CC}	V	–

NOTES

1. Outside the specified range, performance is not guaranteed.
2. Signals are AC coupled internally within the module and terminated to a 50Ω single-ended termination.
3. Each leg must be terminated to a 50Ω (single-ended) termination. Signals are AC coupled internally within the module.

Figure 3.3-1: Definition of Differential Signal Level



3. Product Specifications continued

3.4 AC Electrical Specifications

Table 3.4-1 lists the AC electrical specifications for the SFP-SHDVX-3131-B

Table 3.4-1: AC Electrical Specifications

$V_{CC} = 3.3V \pm 5\%$, $T_A = -25^{\circ}C$ to $85^{\circ}C$. Typical values are at $V_{CC} = 3.3V$, $T_A = 25^{\circ}C$ unless otherwise specified.

Parameter	Symbol	Condition	Min	Max	Units
Bit Rate	BR	-	50	3000	Mbps
Time to Initialize	t_init	From power on	-	300	ms
Rise/Fall Time	t _r / t _f	20% to 80%	-	135	ps
Tx_Disable Assert Time	t_off	Time from rising edge of Tx_Disable to when the optical output falls below 10% of nominal.	-	10	μs
Tx_Disable Negate Time	t_on	Time from falling edge of Tx_Disable to when the modulated optical output rises above 90% of nominal.	-	1	ms
Rx_LOS Assert Time	t_loss_on	Time from Rx_LOS state to Rx_LOS assert.	-	10	ms
Rx_LOS De-assert Time	t_loss_off	Time from non-Rx_LOS state to Rx_LOS de-assert.	-	10	ms
Serial ID Clock Rate	f_serial_clock	-	-	400	kHz

3.5 Supporting Circuit Specifications

3.5.1 In-Rush Current Control Circuit

Due to the hot-pluggable requirement, the SFP-SHDVX-3131-B has built-in circuits to limit the in-rush current upon hot insertion. The specifications of the in-rush limiting circuits are summarized in Table 3.5-1.

Table 3.5-1: In-rush Current Limiting Circuits Specifications

Parameter	Value
Maximum in-rush current ramp rate	50mA/ms
Maximum in-rush current	30mA over steady state