Features

- SMPTE 297-2006 compatible
- Robust error free transmission of signals from 50Mbps to 3Gbps
- Supports video pathological patterns for SD-SDI,HD-SDI and 3G-SDI
- SFP Package.Hot-pluggable
- Metal enclosure for lower EMI
- +3.3V single power supply.
- Laser disable pin
- Digital diagnostics and control via I²C interface, including:
  - Monitoring laser bias current, average output power, receive optical power, supply voltage and temperature
  - Alarm reporting when transceiver is at fault
  - Module ID polling
- Compliant ROHS and lead free

Applications

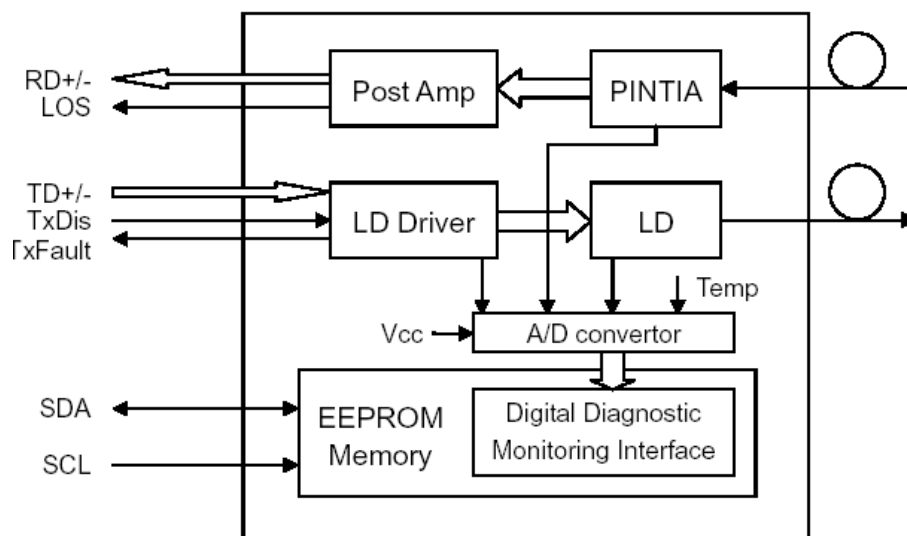- SMPTE 297-2006 compatible optical-to-electrical interfaces

Descriptions

The CSP15A6-11-SDI is a single channel optical transceiver module designed to transmit and receive optical serial digital signals as defined in SMPTE 297-2006. The CSP15A6-11-SDI is specifically designed for robust performance in the presence of SDI pathological patterns for SMPTE 259M, SMPTE 344M,SMPTE 292M and SMPTE 424M serial rates.
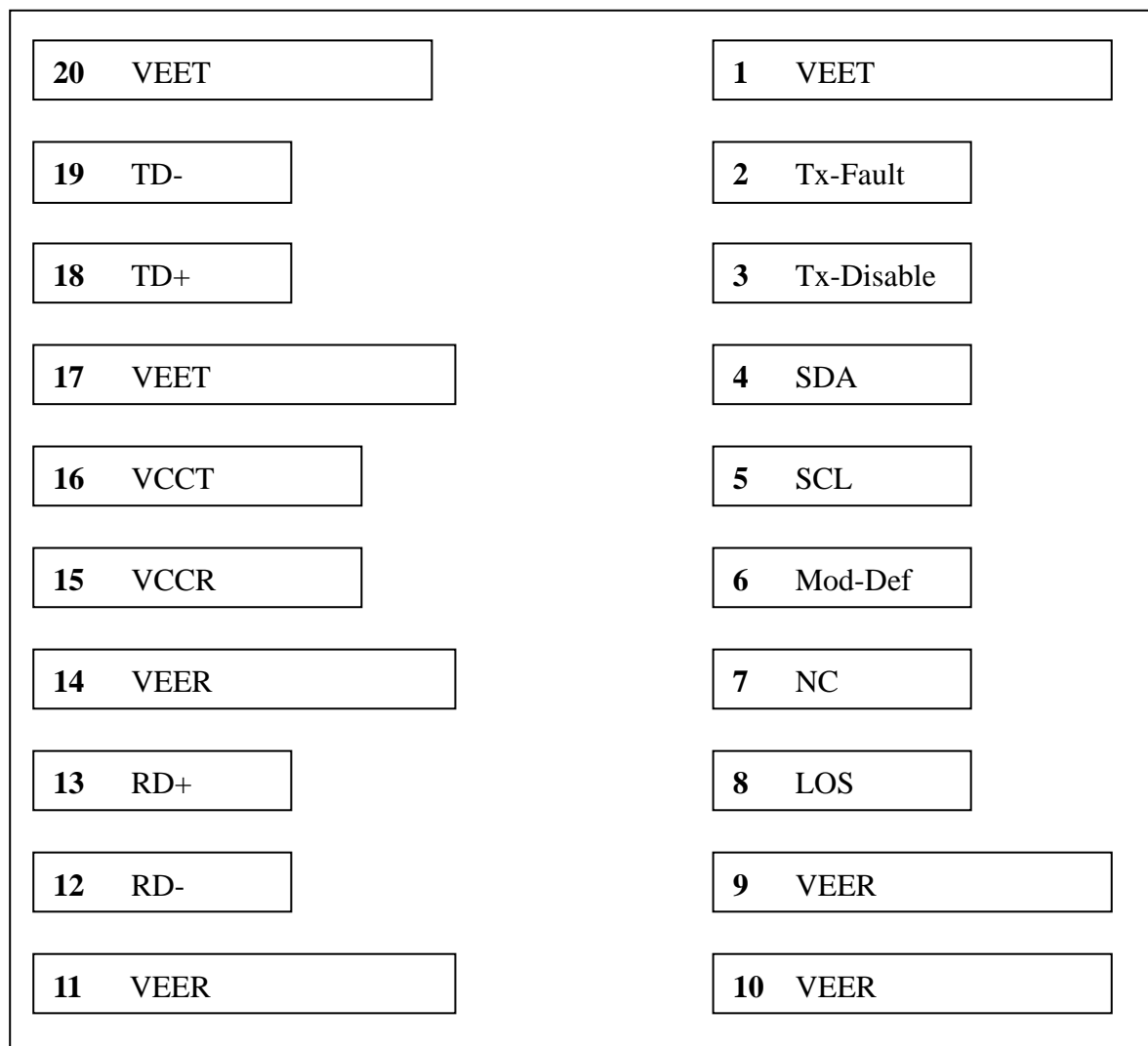
Ordering Information

Part Number	Package	Temperature Range
CSP15A6-11-SDI	SFP	0°C to 70°C

Functional Block Diagram

Pin Description

Pin Out Diagram

20	VEET		1	VEET
19	TD-		**2**	Tx-Fault
18	TD+		**3**	Tx-Disable
17	VEET		**4**	SDA
16	VCCT		**5**	SCL
15	VCCR		**6**	Mod-Def
14	VEER		**7**	NC
13	RD+		**8**	LOS
12	RD-		**9**	VEER
11	VEER		**10**	VEER

Pin Function Definitions

Pin#	Name	Description	Notes
1	VEET	Transmitter Ground	-
2	TX-Fault	Transmitter Fault Indication	Note 1
3	TX-Disable	Transmitter Disable	Note 2, Module disables on high or open
4	SDA	I²C Data	Note 3
5	SCL	I²C Clock	Note 3
6	Mod-Def	Module present indicate	Note 3, Grounded in Module
7	NC	No Connection	-
8	LOS	Los of signal	Note 4
9	VEER	Receiver Ground	-

10	VEER	Receiver Ground	-
11	VEER	Receiver Ground	-
12	RD-	Inv. Received Data Out	Note 5
13	RD+	Receiver Data out	Note 5
14	VEER	Receiver Ground	-
15	VCCR	Receiver Power	Note 6, 3.3V$\pm$ 5%
16	VCCT	Transmitter Power	Note 6, 3.3V$\pm$ 5%
17	VEET	Transmitter Ground	-
18	TD+	Transmit Data In	Note 7
19	TD-	Inv. Transmit Data In	Note 7
20	VEET	Transmitter Ground	-

Note:

1. **TX-Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K Ω resistor on the host board. Pull up voltage between 2.0V and VCC+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.**

2. **TX-disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7–10 KΩ resistor. Its states are:**

    Low (0 – 0.8V): Transmitter on

    (>0.8, < 2.0V): Undefined

    High (2.0 – 3.465V): Transmitter Disabled

    Open: Transmitter Disabled

3. **These pins should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be VCCT or VCCR. Mod-Def is grounded by the module to indicate that the module is present .**

4. **LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity(as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.**

5. **RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.**

6. **VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at**

the SFP input pin with3.3V supply voltage. When the recommended supply filtering network is used, hotplugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.

7. **TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.**
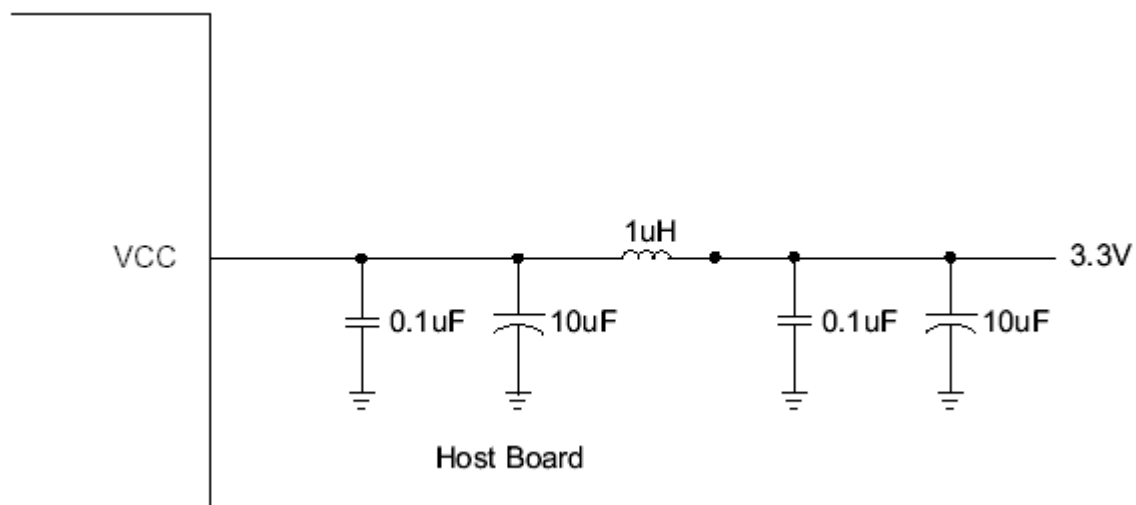
Recommended Host Board Supply Filtering

Figure 2: Recommended Host Board Supply Filtering

Optical Connector Requirements

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

Performance Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	℃
Operating case Temperature	T_{case}	-20	+85	℃
Input Voltage	-	GND	VCC	V
Power Supply Voltage	VCC-VEE	-0.5	+3.6	V

Operating Environment

Parameter	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	+3.1	+3.5	V
Operating Temperature	To	0	+70	℃

Transmitter E-O characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Bit Rate	BR	50	-	3000	Mbps	-
Center Wavelength	λ	1540	1550	1560	nm	-
Spectral Width (RMS)	Δλ	-	-	1	nm	-
Average Optical Output Power	Po	0			dBm	-
Extinction Ratio	ER	5	-	-	dB	-
Power Supply Current	ICC	-	70	180	mA	-
Transmitter Enable Voltage	Ven	0	-	0.8	-	-
Transmitter disable Voltage	VD	2.0	-	VCC	V	-
Dispersion penalty				1	dB	
Data Inputs Voltage	VPP	300	800	1600	mV	-
Optical Rise Time (20%~80%)	Tr	-	105	165	ps	SMPTE 424M 2.97Gbps
		-	170	270	ps	SMPTE 292M 1.485Gbps
		-	300	800	ps	SMPTE 259M 270Mbps
Optical Fall Time (80%~20%)	Tf	-	120	180	ps	SMPTE 424M 2.97Gbps
		-	170	270	ps	SMPTE 292M 1.485Gbps
		-	300	800	ps	SMPTE 259M 270Mbps

			-	45	70	ps	SMPTE 424M 2.97Gbps
Optical Signal Intrinsic Jitter	**-**		-	60	100	ps	SMPTE 292M 1.485Gbps
			-	110	180	ps	SMPTE 259M 270Mbps

Receiver O-E characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Bit Rate	BR	50	-	3000	Mbps	-
Wavelength	λ	1260	-	1620	nm	-
Saturation	Ps	-9	-	-	dBm	-
LOS Asserted	-	-35	-	-	dBm	-
LOS De-Assert	-	-	-	-28	dBm	-
LOS Hysteresis	-	-	3	-	dB	-
LOS LOW voltage	VLout	-	-	0.8	V	-
LOS HIGH voltage	VHout	2.0	-	-	V	-
Sensitivity for SMPTE 259M 270Mbps	-	-	-32	-30	dBm	Pathological
		-	-34	-32	dBm	PRBS
Sensitivity for SMPTE 292M 1.485Gbps	-	-	-30	-29	dBm	Pathological
		-	-32	-30	dBm	PRBS
Sensitivity for SMPTE 424M 2.97Gbps	**-**	-	-28	-27	dBm	Pathological
		-	-29	-28	dBm	PRBS
Data Outputs Voltage	Vpp	400	600	1000	mV	**-**
Input Power Monitoring Accuracy		-3		+3	dB	**-**

Note: The sensitivity specification refers to the input power levels for BER = 1E-12 against PRBS $2^{23}-1$.
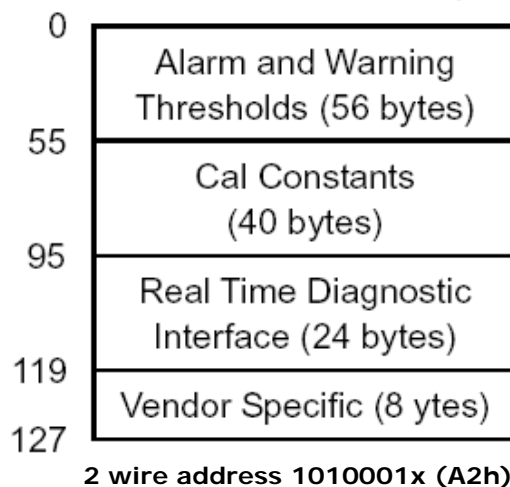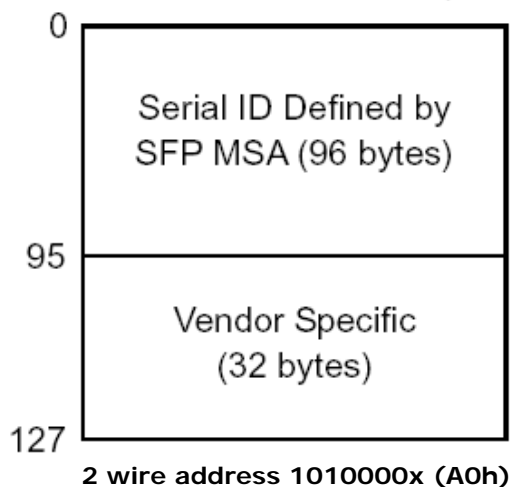
Alarm and Warning thresholds

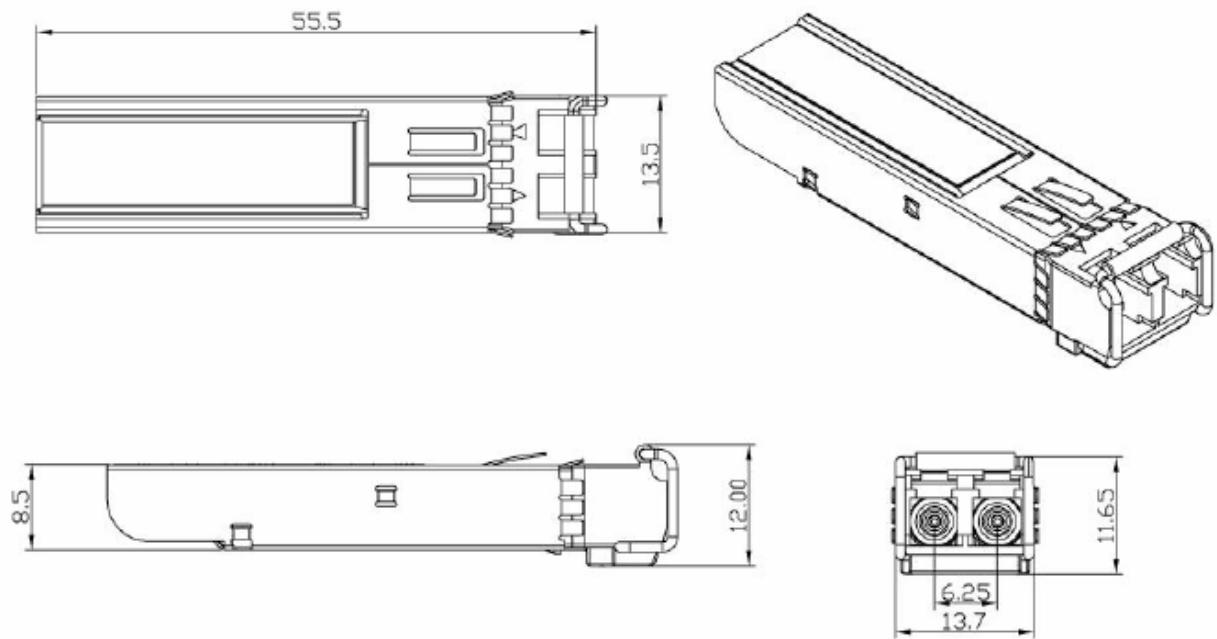|	H-alarm	H-warning	L-warning	L-alarm
Teamp(℃)	70	65	5	0
Vcc（V）	3.5	3.45	3.15	3.1
Bias current（mA）	70	65	0	0
TX power（dBm）	5	4	1	0
TX power（dBm）	-9	-12	-27	-30

EEPROM Section

The optical transceiver contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C01A/02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) 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.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2h. The digital diagnostic memory map specific data field define as following.

Memory Map:

2 wire address 1010000x (A0h)   2 wire address 1010001x (A2h)

Recommended Circuit

Note: 4.7K ohms < RES < 10K ohms

Figure 3: Recommended Circuit

Package information

Unit: mm

For More Information

Shenzhen Transwan Optoelectronic Technology co., Ltd
Add: 5F B Building, Zhi Xuan Han YuanLing Industrial Park, Shi Yan, Bao'an, Shenzhen, P.R.C
Tel: +86-755-29003393, 29003397   Fax: +86-755-29003396, 22630311
E-mail: sales@transwan.com.cn   website: www.transwan.com.cn