VD15504-SFP-LC.S80

3Gbps Video SFP Optical Transceiver, 80km Reach

Features

- HD-SDI SFP Transceiver available
- SD-SDI SFP Transceiver available
- 3G-SDI SFP Transceiver available
- SMPTE 297-2006 Compatible.
- Metal enclosure for Lower EMI
- 1550nm DFB laser and APD photodetector
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic functions available through the I2C interface
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
  Standard : 0 to +70°C

Applications

- SMPTE 297-2006 Compatible Electrical-to-Optical Interfaces.
- HDTV/SDTV Service Interfaces.

Description

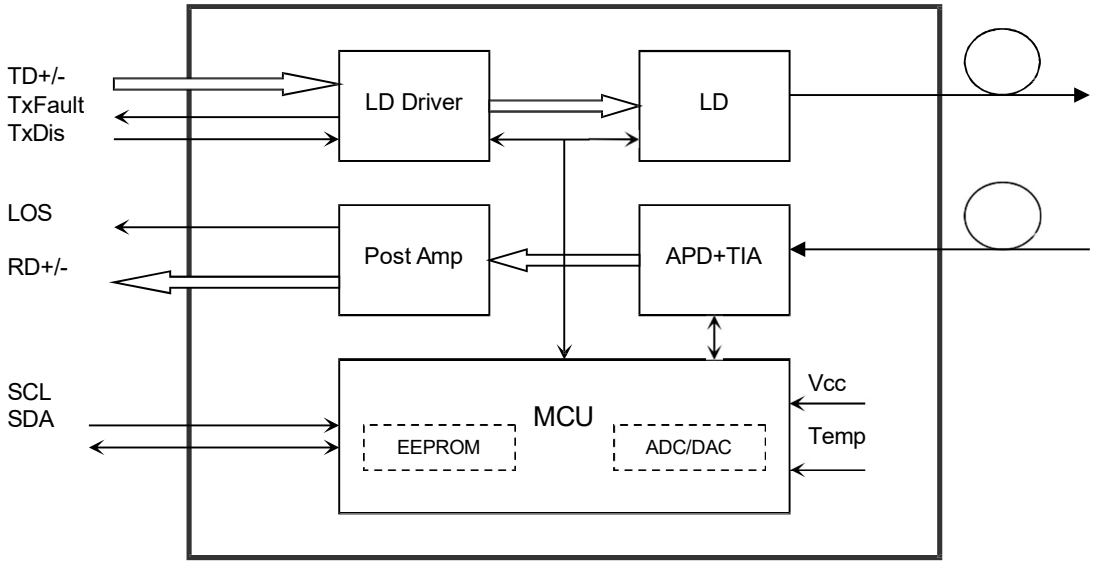
The video series transceivers are high performance, cost effective modules for duplex video transmission application over single mode fiber.

The transceiver is designed to transmit/receive data rates from 50Mbps to 2.97Gbps and 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. The module is fully compliant with SMPTE 297M-2006.

The transceiver consists of three sections: a DFB laser transmitter, an APD 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.



Absolute Maximum Ratings

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

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
						°C

Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Supply Current	Icc			400	mA
Data Rate			3		Gbps

Optical and Electrical Characteristics

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Centre Wavelength		λc	1540	1550	1560	nm	
Spectral Width (-20dB)		σ			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	-2	0	+3	dBm	1
Extinction Ratio		ER	5			dB	
Rise/Fall Time (20%~80%)	SD-SDI	tr/tf			1500	ps	2
	HD-SDI				270		
	3G-SDI				135		
Total Output Jitter	PRBS and colour bar SD-SDI			70	200	ps	
	PRBS and colour bar HD-SDI			50	135		
	PRBS and colour bar 3G-SDI			70	100		
	pathological SD-SDI			200	300		
	pathological HD-SDI			115			
	pathological 3G-SDI			120			
Data Input Swing Differential		V_{IN}	400		1800	mV	3
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	

Receiver							
Centre Wavelength		λc	1260		1580	nm	
Receiver Sensitivity （PRBS）	SD-SDI				-31	dBm	
	HD-SDI				-29	dBm	
	3G-SDI				-28	dBm	
Receiver Sensitivity （Pathological）	SD-SDI				-31	dBm	
	HD-SDI				-29	dBm	
	3G-SDI				-28	dBm	
Receiver Overload			-10			dBm	4
LOS De-Assert		LOS_D			-20	dBm	
LOS Assert		LOS_A	-30			dBm	
LOS Hysteresis			1		4	dB	
Data Output Swing Differential		Vout	650	800	1000	mV	3
LOS		High	2.0		Vcc	V	
		Low			0.8	V	

Notes:
1. The optical power is launched into SMF.
2. Rise and fall times, 20% to 80%, are measured following a fourth-order Bessel-Thompson filter with a bandwidth of 0.75 x clock frequency corresponding to the serial data rate
3. PECL input, internally AC-coupled and terminated.
4. Internally AC-coupled.

Timing and Electrical

Parameter	Symbol	Min	Typical	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			400	KHz
MOD_DEF (0:2)-High	V_H	2		Vcc	V
MOD_DEF (0:2)-Low	V_L			0.8	V

Diagnostics Specification

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-2 to +3	dBm	±3dB	Internal / External
RX Power	-28 to -6	dBm	±3dB	Internal / External

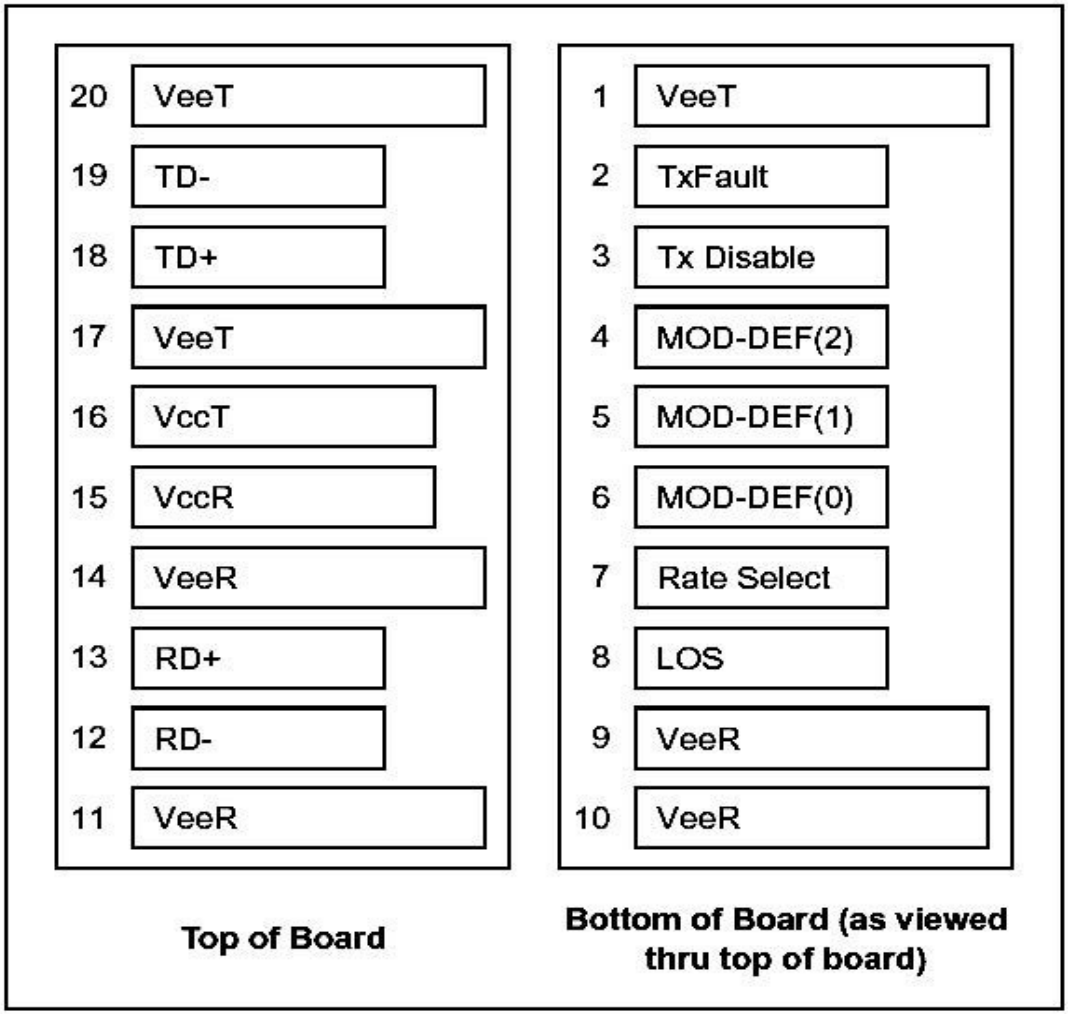
I2C Bus Interface

The I2C bus interface uses the 2-wire serial CMOS E2PROM protocol. The serial interface meets the following specifications:

1. Support a maximum clock rate of 280Khz.
2. Input/Output levels comply with LVCMOS/LVTTL or compatible logics.
   Low: 0 – 0.8 V
   High: 2.0 – 3.3 V
   Undefined: 0.8 – 2.0 V

Pin Definitions

Pin Diagram



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3

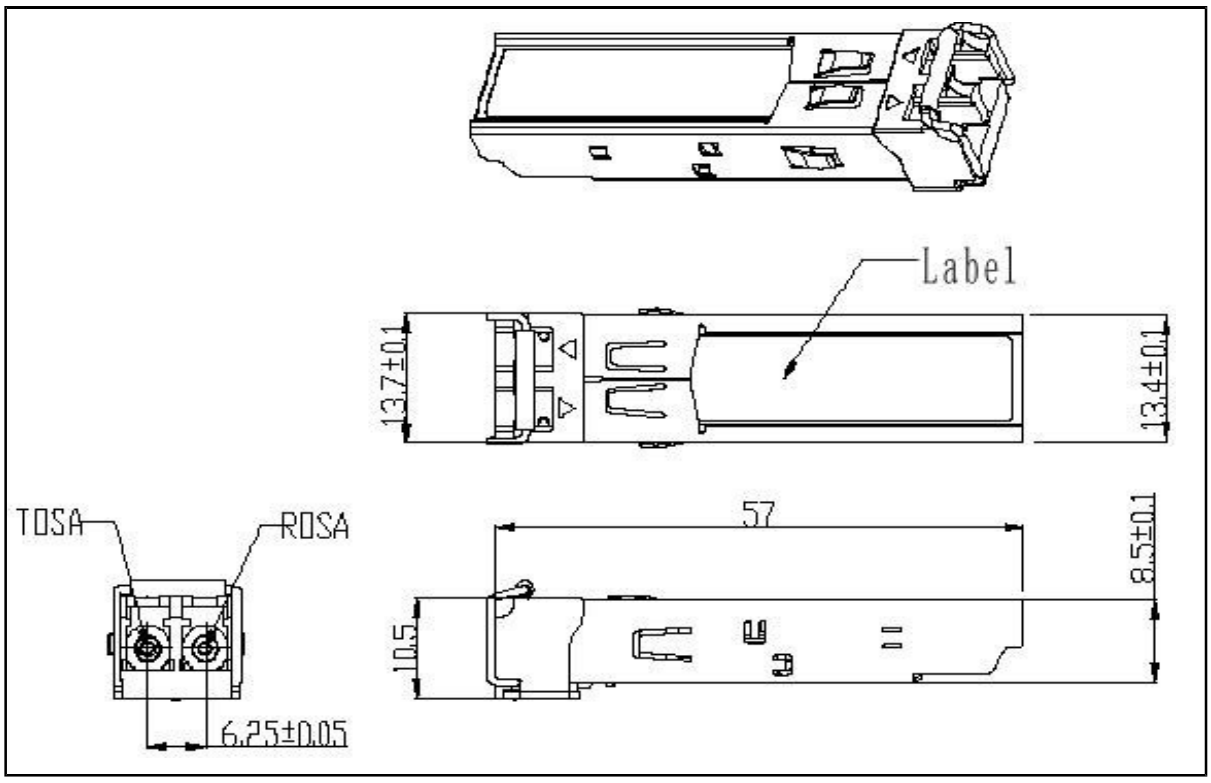
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	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) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
   Low (0 to 0.8V): Transmitter on
   (>0.8V, < 2.0V): Undefined
   High (2.0 to 3.465V): Transmitter Disabled
   Open: Transmitter Disabled
3) Mod-Def 0,1,2. These are the module definition pins. They 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 0 is grounded by the module to indicate that the module is present
   Mod-Def 1 is the clock line of two wire serial interface for serial ID
   Mod-Def 2 is the data line of two wire serial interface for serial ID
4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5) 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.
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Mechanical Dimensions



Ordering information

Part Number	Product Description
VD15504-SFP-LC.S80	1550nm, 3Gbps, 80km, 0ºC ~ +70ºC, With Digital Diagnostic Monitoring

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by DCI before they become applicable to any particular order or contract. In accordance with the DCI policy of continuous improvement specifications may change without notice.
The publication of information in this data sheet does not imply freedom from patent or other protective rights of DCI or others. Further details are available from any DCI sales representative.

Email: sales@dci.jp
Web: http://www.dci.jp