
1310 nm TX / 1550 nm RX / 3 Gb/s Medium Power 1-Fibre SM Video Digital Diagnostic SFP Transceiver

FVD1-1TR-SM10

Features

- SMPTE 297-2006 Compatible
- 1-Fiber Bi-Directional SFP Optical Transceiver
- Speed from 50 Mbps to 3Gbps with up to 30 km
- Distance up to 10 km for 3G-SDI
- Support Video Pathological Patterns for SD-SDI, HD-SDI and 3G-SDI
- 1310 nm Transmitter
- 1550 nm Receiver
- SFF-8472 Digital Diagnostic Function
- Simplex LC Connector
- Single 3.3V power supply
- Operating case temperature : 0°C to 70°C
- ROHS Compliant
- Hot Pluggable
- Class 1 Laser International Safety Standard IEC-60825 Compliant



Applications

- SMPTE 297-2006 Compliant Electrical-to-Optical Interfaces
- High-density Video Routers

Description

The FVD1-1TR-SM10 is 1-fibre BIDI single mode transceiver module designed to transmit/receive optical serial digital signals as defined in SMPTE 297-2006. It supports from 50 Mbps to 3Gbps and is specifically designed for transmitted the SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M SDI pathological patterns. It is with the SFP 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C. It is with 1310 nm laser transmitters. The receiver section uses an integrated 1550 nm detector preamplifier mounted in an optical header and a limiting post-amplifier IC. The transmitter can transmit signal from 50 Mbps to 3Gbps with up to 10 km of single-mode fiber. A maximum distance of 10 km is achievable with 3Gbps pathological signals..

I. Absolute Maximum Ratings

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature	T_{stg}	-40	85	°C	
Operating Case Temperature	T_c	0	70	°C	
Power Supply Voltage	V_{cc}	0	4	V	
ESD Tolerance on all pins			1	KV HBM	
Relative Humidity		5	95	% RH	non-condensing

II. Recommended Operating Conditions

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V
Operating Case Temperature	T_c	0		70	°C
Baud Rate		50		3000	Mb/s
Power Supply Current	I_{cc}		130	180	mA

III. Optical and Electrical Characteristics

Transmitter Specifications ($0^{\circ}\text{C} < T_c < 70^{\circ}\text{C}$, $3.13\text{V} < V_{cc} < 3.47\text{V}$)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Optical						
Optical Transmit Power	P_o	-5	-2	0	dBm	1
Output Center Wavelength	λ	1260	1310	1360	nm	
Output Spectrum Width	$\Delta\lambda$		1.5	3	nm	RMS (σ)
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	t_r / t_f			135	ps	2, SMPTE 424M
				270	ps	2, SMPTE 292M
				800	ps	2, SMPTE 344M
				1.5	ns	2, SMPTE 259M

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Electrical						
Differential Input Voltage	$V_{IH} - V_{IL}$	200	-	1200	mVp-p	AC coupled input
Disable Input Voltage -- Low	$V_{TDIS,L}$	0	-	0.8	V	TX Output Enabled
Disable Input Voltage -- High	$V_{TDIS,H}$	2.0	-	$V_{CC}+0.3$	V	TX Output Disabled
Output TX_Fault -- Low	V_{OL}	0		0.5	V	
Output TX_Fault -- High	V_{OH}	2.5		$V_{CC}+0.3$	V	
SCL, SDA	V_{OH}	2.5	-	$V_{CC}+0.3$	V	
	V_{OL}	0		0.5	V	

Notes

1. Output power is power coupled into 9/125 μ m single mode fiber.
2. 20% to 80%, unfiltered.

Receiver Specifications (0oC < Tc < 70oC, 3.13V < Vcc < 3.47V)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Optical						
Wavelength of Operation		1480		1580	nm	1
Sensitivity for SMPTE 424M 2.97 Gb/s	Sen	0		-18	dBm	Pathological
		0		-20	dBm	PRBS 2 ²³ -1, ER=1E-12
Sensitivity for SMPTE 292M 1.485 Gb/s	Sen	0		-20	dBm	Pathological
		0		-21	dBm	PRBS 2 ²³ -1, ER=1E-12
Signal Detect -- Asserted	Pa			-20	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-29			dBm	Transition: low to high
Signal detect -- Hysteresis		1		6	dB	
Optical Return Loss			-27		dB	
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Electrical						
CML Output (Differential)		550	660-	850	mVp-p	AC coupled output
Optical Rise Time / Fall Time	tr / tf			135	ps	2, SMPTE 424M
				270	ps	2, SMPTE 292M
				800	ps	2, SMPTE 344M
				1.5	ps	2, SMPTE 259M
Output LOS Voltage -- Low	V_{OL}	0	-	0.5	V	IOL=-1.6mA, 1 TTL unit load
Output LOS Voltage -- High	V_{OH}	2.5		$V_{CC}+0.3$	V	IOL=-1.6 μ A, 1 TTL unit load

SCL, SDA	V _{OH}	2.5	-	V _{cc} +0.3	V	
	V _{OL}	0		0.5	V	

Notes

1. At least 30 dB optical isolation for the wavelength 1260 to 1360 nm.
2. 20% to 80%, unfiltered..

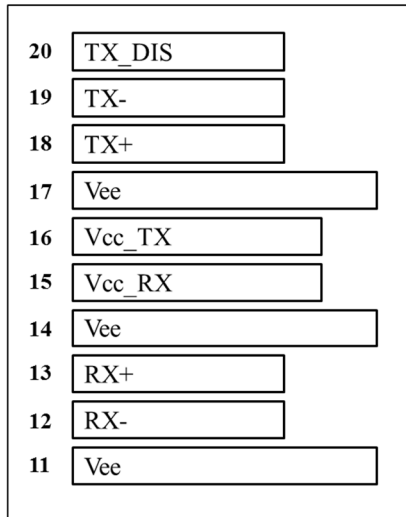
IV. Module Definition

Module Definition	PIN 5	PIN 6	Interpretation by Host
4	SCL	SDA	Serial module definition protocol

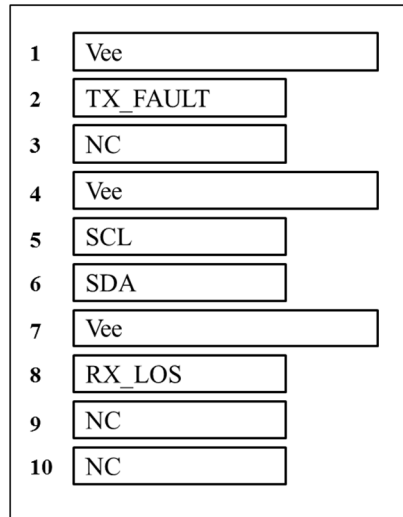
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SCL and SDA appear as no connector(NC).

When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E^2 PROM protocol of the ATMEL AT24C01A/02/04 family of components.

V. Pin Information

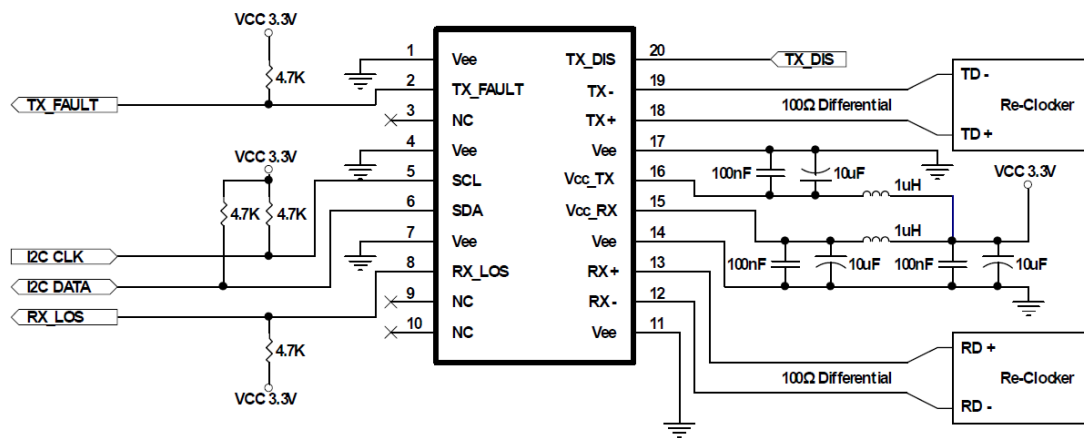


Top of Board

Bottom of Board
(as viewed thru top of board)

Pin	Name	Function	NOTE
1	Vee	Signal Ground	
2	TX_Fault	Transmitter Fault Indicator (Active high, open-drain)	
3	NC	No Connection	
4	Vee	Signal Ground	
5	SCL	Serial I2C Clock	
6	SDA	Serial I2C Data	
7	Vee	Signal Ground	
8	RX_LOS	Receiver Loss of Signal Indicator (Activehigh, open-drain)	
9	NC	No Connection	
10	NC	No Connection	
11	Vee	Signal Ground	
12	RX-	Negative Differential Output	
13	RX+	Positive Differential Output	
14	Vee	Signal Ground	
15	Vcc RX	Power Supply	+3.3V±5%
16	Vcc TX	Power Supply	+3.3V±5%
17	Vee	Signal Ground	
18	TX+	Positive Transmitter Data In	AC coupled differential lines with 100 ohm differential termination inside the module
19	TX-	Negative Transmitter Data In	
20	TX_DIS	Transmitter Disable	Internal 4.7 kΩ pull-up. The bias current and modulation current are turned off if TX1_DIS =HIGH

VI. Application Schematics

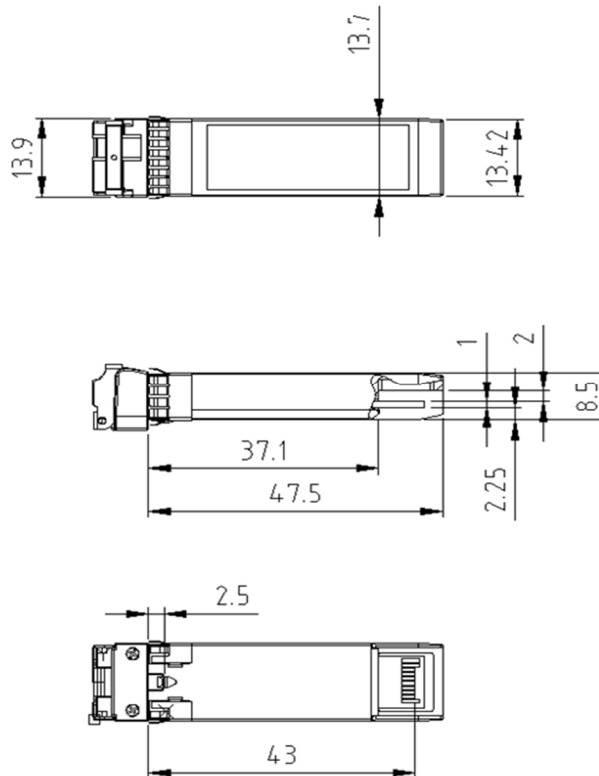


VII. Outline Diagrams

Package Outline

Dimensions are in millimeters

Tolerances are $\pm 0.2\text{mm}$, unless otherwise specified



VIII. Ordering Information

FVD	Core	-	Tx/Rx	-	Mode	Distance
FOTTU	2 : 2core		2T : 2Tx	-	MM : Multimode	03 : 300m
Video SFP	1: 1core		1T : 1Tx		SM : Single mode	10 : 10km
For SDI			2R : 2Rx			30 : 30km
			1R : 1Rx			50 : 50km
			1TR:1Tx+1Rx			80 : 80km
			1B : 1BOSA			
			2B : 2BOSA			

IX. More information

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