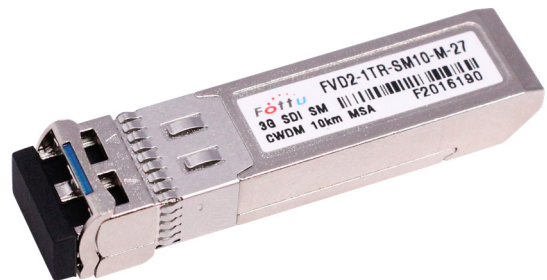

CWDM / 3 Gb/s Medium Power SM Video Digital Diagnostic SFP Transceiver

FVD2-1TR-SM10-M-XX

Features

- SMPTE 297-2006 Compatible
- Hot-Pluggable SFP Footprint LC Optical Transceiver
- Small Form-Factor Pluggable (SFP) MSA compatible
- Speed from 100kbps to 3Gbps
- Power Budget > 12 dB
- Support Video Pathological Patterns for SD-SDI, HD-SDI and 3G-SDI
- 16-CH CWDM : 1270 nm to 1610 nm
- SFF-8472 Digital Diagnostic Function
- 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 FVD2-1TR-SM10-M-XX is a single mode transceiver designed to transmit and receive optical signals as defined in SMPTE 297-2006. It supports from 100 kbps to 3 Gbps and is specifically designed for transmitted the SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M SDI pathological patterns. It completely complies with Multi-Source Agreement (MSA) SFP+. Each OSA is integrated with a digital diagnostic function via an I²C serial interface. This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelength. There are sixteen center wavelengths available from 1270 nm to 1610 nm with each step 20 nm, except 1370nm, 1390nm (water peak).

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	Mbps
Power Supply Current	I _{cc}		200	300	mA

III. Optical and Electrical Characteristics

Transmitter Specifications (0°C < T_c < 70°C, 3.13V < V_{cc} < 3.47V)

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Optical						
Optical Transmit Power	Po	-5	-2	0	dBm	1
Output Center Wavelength	λ	$\lambda_c-5.5$	λ_c	$\lambda_c+7.5$	nm	
Output Spectrum Width	$\Delta\lambda$			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	tr / tf			135	ps	3,SMPTE 424M
				270	ps	3, SMPTE 292M
				800	ps	3, SMPTE 344M
				1.5	ns	3, SMPTE 259M
Remark :						

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
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 a 9/125 μm single mode fiber.
2. ITU-T G.694.2 CWDM wavelength from 1270nm to 1610nm, (except 1370nm, 1390nm)
3. 20% to 80%, unfiltered.

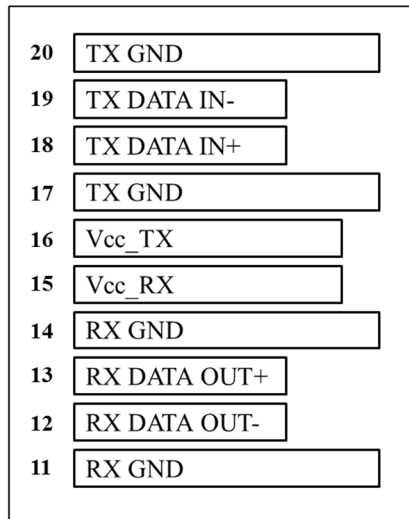
Receiver Specifications ($0^{\circ}\text{C} < T_c < 70^{\circ}\text{C}$, $3.13\text{V} < V_{CC} < 3.47\text{V}$)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Optical						
Wavelength of Operation		1260	-	1620	nm	
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	
Electrical						
CML Output (Differential)		550	660	850	mVp-p	AC coupled output
Optical Rise Time / Fall Time	t_r / t_f			135	ps	1, SMPTE 424M
				270	ps	1, SMPTE 424M
				800	ps	1, SMPTE 424M
				1.5	ns	1, SMPTE 424M
Output LOS Voltage -- Low	V_{OL}	0		0.5	V	$I_{OL}=-1.6\text{mA}$, 1 TTL unit load
Output LOS Voltage -- High	V_{OH}	2.5		$V_{CC}+0.3$	V	$I_{OL}=-1.6\mu\text{A}$, 1 TTL unit load
SCL, SDA	V_{OH}	2.5		$V_{CC}+0.3$	V	
	V_{OH}	0		0.5	V	

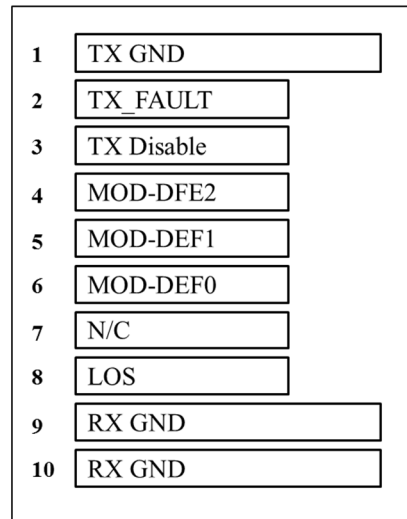
Notes

1. 20% to 80%, unfiltered.

IV. Pin Information



Top of Board

Bottom of Board
(as viewed thru top of board)

Pin	Name	Description	Pin	Name	Description
1	TX GND	Transmitter Ground	11	RX GND	Receiver Ground
2	TX Fault ¹	Transmitter Fault Indication	12	RX DATA OUT-	Inverse Received Data Out
3	TX Disable	Transmitter Disable (Module disables on high or open)	13	RX DATA OUT+	Received Data Out
4	MOD-DFE2	Modulation Definition 2 – Two wires serial ID Interface	14	RX GND	Receiver Ground
5	MOD-DEF1	Modulation Definition 1 – Two wires serial ID Interface	15	Vcc RX	Receiver Power – 3.3V±5%
6	MOD-DEF0	Modulation Definition 0 – Ground in Module	16	Vcc TX	Transmitter Power – 3.3V±5%
7	N/C	Not Connected	17	TX GND	Transmitter Ground
8	LOS	Loss of Signal.	18	TX DATA IN+	Transmitter Data In
9	RX GND	Receiver Ground	19	TX DATA IN-	Inverse Transmitter Data In
10	RX GND	Receiver Ground	20	TX GND	Transmitter Ground

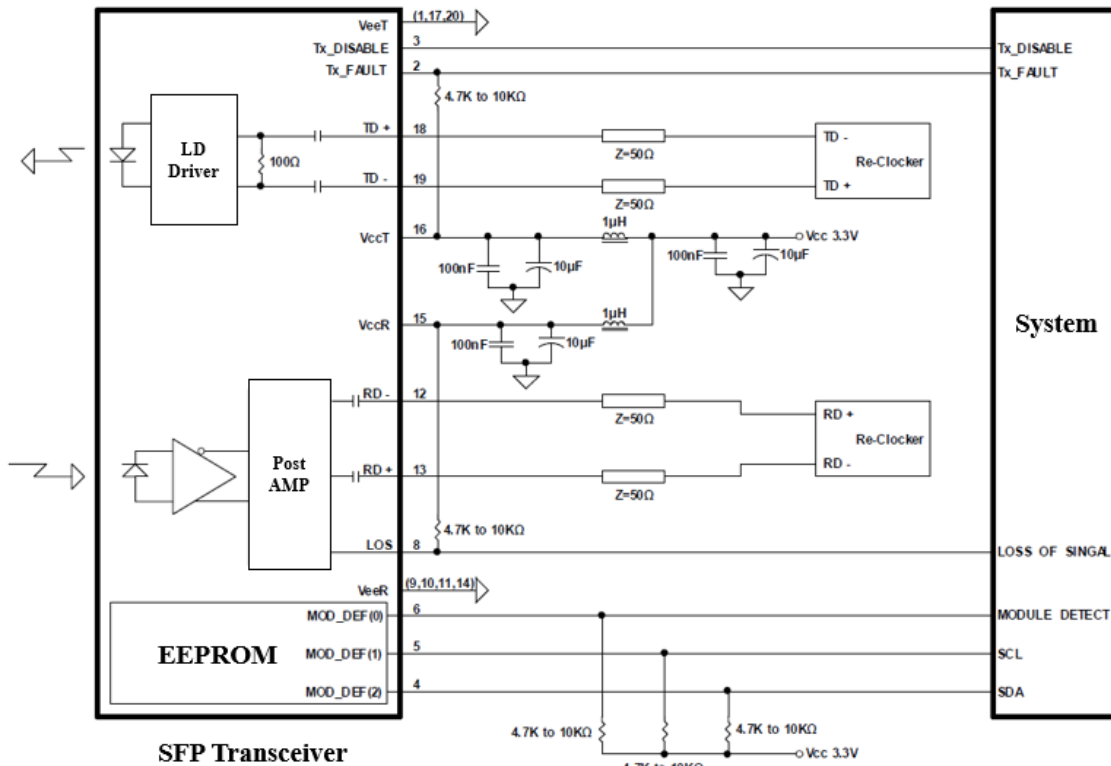
V. Module Definition

Module Definition	MOD-DEF2 PIN 4	MOD-DEF1 PIN 5	MOD-DEF0 PIN 6	Interpretation by Host
4	SDA	SCL	LV-TTL Low	Serial module definition protocol

Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, MOD-DEF(1:2) appear as no connector(NC) and MOD-DEF(0) is TTL LOW.

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.

VI. Application Schematics

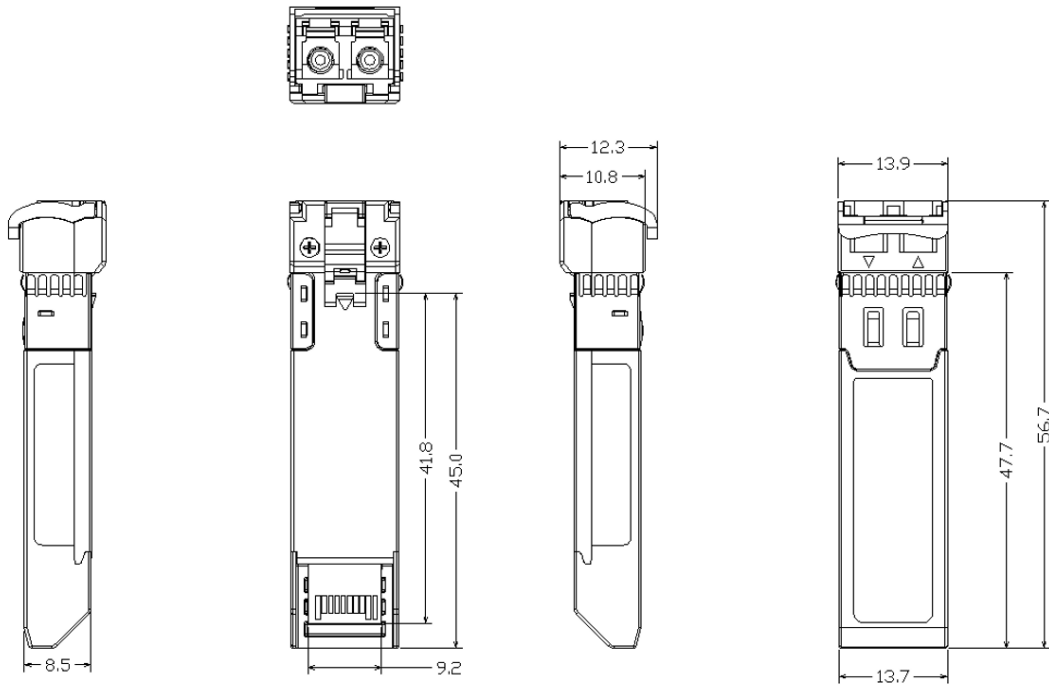


VII. Outline Diagrams

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	-	MSA	CWDM wavelength
FOTTU	2 : 2core		2T : 2Tx	-	MM: Multimode	03 : 300m	-	M: MSA	27 : 1270
Video SFP	1: 1core		1T : 1Tx		SM: Single mode	10 : 10km			~
For SDI			2R : 2Rx			30 : 30km			61 : 1610
			1R : 1Rx			50 : 50km			See below Table
			1T1R : 1TR			80 : 80km			
			1B : 1BOSA						
			2B : 2BOSA						

CWDM Wavelength (0 ~ 70°C)

Code	Min (nm)	Typical (nm)	Max (nm)	Latch Color	Code	Min (nm)	Typical (nm)	Max (nm)	Latch Color
27	1264.5	1270	1277.5	Light purple	47	1464.5	1470	1477.5	Gray
29	1284.5	1290	1297.5	Sky blue	49	1484.5	1490	1497.5	Violet
31	1304.5	1310	1317.5	Yellow Green	51	1504.5	1510	1517.5	Blue
33	1324.5	1330	1337.5	Yellow Ocher	53	1524.5	1530	1537.5	Green
35	1344.5	1350	1357.5	Pink	55	1545.5	1550	1557.5	Yellow
41	1404.5	1410	1417.5	Silver	57	1564.5	1570	1577.5	Orange
43	1424.5	1430	1437.5	Black	59	1584.5	1590	1597.5	Red
45	1444.5	1450	1457.5	Yellow Orange	61	1604.5	1610	1617.5	Brown

CWDM : 16 Wavelengths from 1270 nm to 1610 nm, each step 20 nm, except 1370nm, 1390nm,

IX. More information

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