

SPS-7110VWG

(RoHS Compliant)

1310 nm / 1.5 Gb/s Medium Power SM Video Digital Diagnostic SFP Transceiver

FEATURES

- | SMPTE 292M/297M/259M Compatible
- | Hot-Pluggable SFP Footprint LC Optical Transceiver
- | Small Form-Factor Pluggable (SFP) MSA compatible
- | Speed from 50 Mbps to 1.5 Gbps
- | Distance up to 21 km for 1.5G-SDI
- | **Support Video Pathological Patterns for SD-SDI and HD-SDI**
- | SFF-8472 Digital Diagnostic Function
- | Single +3.3 V Power Supply
- | RoHS-6 Compliant
- | 0 to 70°C Operation
- | Hot Pluggable
- | Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- | SMPTE 292M/297M/259M Compliant Electrical-to-Optical Interfaces
- | High-density Video Routers

DESCRIPTION

The SPS-7110VWG is a single mode transceiver module designed to transmit/receive optical serial digital signals as defined in SMPTE 292M/297M/259M. It supports from 50 Mbps to 1.5 Gbps and is specifically designed for transmitted the SMPTE 292M, SMPTE 297M and SMPTE 259M 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 transmitter can transmit signal from 50 Mbps to 1.5 Gbps with up to 30 km of single-mode fiber. A maximum distance of 21 km is achievable with 1.5 Gbps pathological signals.

LASER SAFETY

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

ORDER INFORMATION

P/No.	Type	Bit Rate (Mb/s)	TX		RX		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Power (dBm)	λ (nm)	Sen. (dBm)			
SPS-7110VWG	TRX	50 to 1500	1310	0 to -7	1260/1620	0 to -20	LC SFP with DMI	0 to 70	Yes

LINK DISTANCE

SDI	Bit Rate	Max. Link Distance (km)
HD-SDI	1.485Gbps	21
SD-SDI	270Mb/s	30

ABSOLUTE MAXIMUM RATINGS

Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
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

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	V _{cc}	3.135	3.3	3.465	V
Operating Case Temperature	T _c	0		70	°C
Baud Rate		50	1485	1500	Mb/s
Power Supply Current	I _{cc}		200	280	mA

Transmitter Specifications (0°C < T _c < 70°C, 3.13V < V _{cc} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	P _o	-7		0	dBm	1
Output Center Wavelength	λ	1290	1310	1330	nm	At 25°C
Output Spectrum Width	Δλ	---		3	nm	RMS (σ)
Extinction Ratio	ER	5	7.5		dB	
Relative Intensity Noise	RIN			-120	dB/Hz	
Optical Rise Time / Fall Time	tr / tf			270	ps	2, SMPTE 292M
				800	ps	2, SMPTE 344M
				1.5	ns	2, SMPTE 259M
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	

- Output power is power coupled into a 9/125 μm single mode fiber.
- 20% to 80%, unfiltered.

Receiver Specifications (0°C < T _c < 70°C, 3.13V < V _{cc} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Wavelength of Operation		1260	---	1620	nm	
Sensitivity for SMPTE 292M 1.485 Gb/s	Sen	0	---	-18	dBm	Pathological
		0	---	-20	dBm	PRBS 2 ²³ -1, BER=1E-12
Signal Detect -- Asserted	Pa	---	---	-21	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-31	---	---	dBm	Transition: high to low
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	tr / tf			270	ps	3, SMPTE 292M
				800	ps	3, SMPTE 344M
				1.5	ns	3, SMPTE 259M

Output LOS Voltage -- Low	V_{OL}	0		0.5	V	$I_{OL}=-1.6mA$, 1 TTL unit load
Output LOS Voltage -- High	V_{OH}	2.5		$V_{CC}+0.3$	V	$I_{OH}=40\mu A$, 1 TTL unit load
SCL, SDA	V_{OH}	2.5		$V_{CC}+0.3$	V	
	V_{OL}	0		0.5	V	

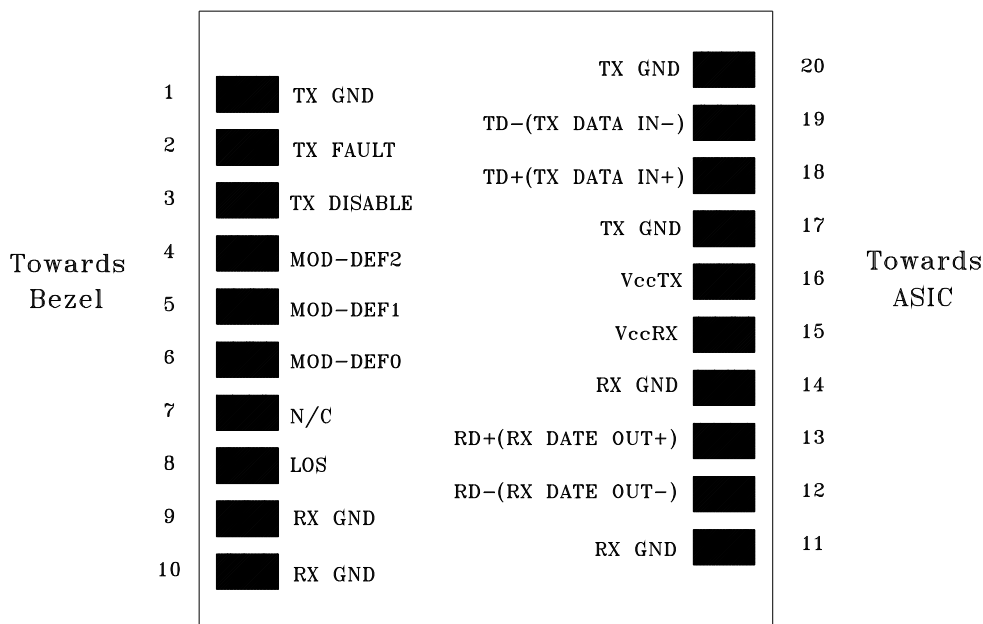
3. 20% to 80%, unfiltered.

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 E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

CONNECTION DIAGRAM



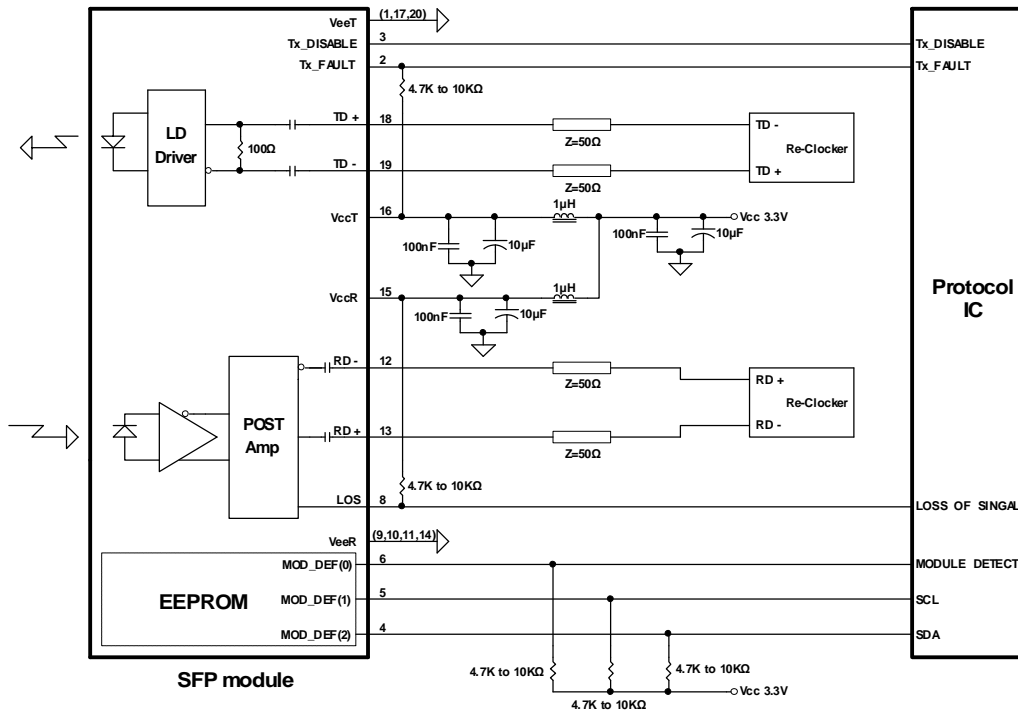
PIN	Signal Name	Description	PIN	Signal Name	Description
1	TX GND	Transmitter Ground	11	RX GND	Receiver Ground
2	TX Fault	Transmitter Fault Indication	12	RX DATA OUT-	Inverse Receiver Data Out
3	TX Disable	Transmitter Disable (Module disables on high or open)	13	RX DATA OUT+	Receiver Data Out
4	MOD-DFE2	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

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 E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

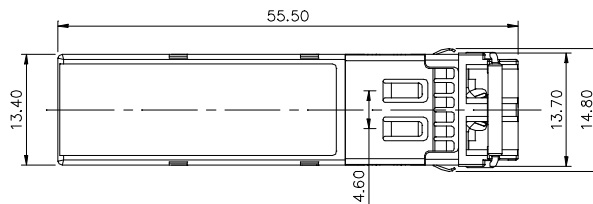
RECOMMENDED CIRCUIT SCHEMATIC



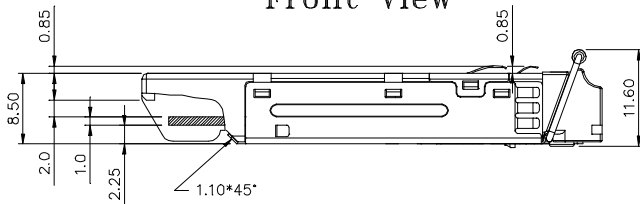
PACKAGE DIAGRAM

Units in mm

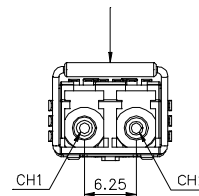
Top View



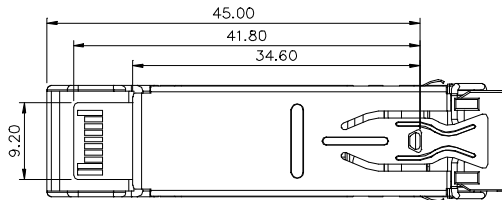
Front View



LATCH COLOR
BLUE



Side View



Bottom View

Note: Specifications subject to change without notice.

REVISION HISTORY

Version	Subject	Release Date
1.0	Initial datasheet	2008/10/1