

SPS-4371RW-CXX0G

(RoHS Compliant)

6.144 Gbps / CWDM / 70 km Digital Diagnostic Multi-Rate CPRI SM SFP+

FEATURES

- CPRI / OBSAI Compatible Optical Interface
- 1G to 6.25G Multi-rate Specification
- Complaint to SFP+ MSA
- 8 Wavelength (λ): 1470 nm to 1610 nm CWDM EML LD Transmitter
- High Sensitivity APD Receiver
- Distance up to 70km
- SFF-8472 Digital Diagnostic Function
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operating
- Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- Radio Base Station
- OBSAI rates 6.144 Gb/s, 3.072 Gb/s, and 1.563 Gb/s
- CPRI rates 6.144Gb/s 4.9152 Gb/s, 2.4576 Gb/s, and 1.2288 Gb/s

DESCRIPTION

The SPS-4371RW-CXX0G series is a 1 to 6.25 Gb/s single-mode transceiver module for serial optical communications applications for a radio base station system. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C. This module is designed for single mode fiber and operates at a nominal wavelength of CWDM wavelengths. There are eighteen center wavelengths available from 1470 nm to 1610 nm, with each step 20 nm. A guaranteed minimum optical link budget of 23 dB is offered. The transmitter section uses a CWDM multiple quantum well EML laser. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

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.	Bit Rate (Gb/s)	Power Budget (dB)	Wavelength (nm)	Package	Temp. (°C)	RoHS Compliant
SPS-4371RW-CXX0G	1 to 6.25	>23	CWDM*	SFP+ with DMI	0 to 70	Yes

CWDM* Wavelength (0 to 70°C)

Central Wavelength	Min. (nm)	Typ. (nm)	Max. (nm)	Label	Central Wavelength	Min. (nm)	Typ. (nm)	Max. (nm)	Label
-C470	1464.5	1470	1477.5	C47	-C550	1544.5	1550	1557.5	C55
-C490	1484.5	1490	1497.5	C49	-C570	1564.5	1570	1577.5	C57
-C510	1504.5	1510	1517.5	C51	-C590	1584.5	1590	1597.5	C59
-C530	1524.5	1530	1537.5	C53	-C610	1604.5	1610	1617.5	C61

CWDM*: 8 Wavelengths from 1470 nm to 1610 nm, each step 20 nm.

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0	70	°C	
Power Supply Voltage	Vcc	-0.5	3.6	V	
Receiver Input for Damage	Mip	-3		dBm	Average Power

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Storage Temperature	Tstg	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0		70	°C
Power Supply Current	ICC (TX+RX)		350	450	mA
Data Rate		1		6.25	Gb/s

Transmitter Optical Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average Launch Power	PO, Avg	-0.5		4	dBm	1
Output Center Wavelength	λ	λc -5.5	λc	λc +7.5	nm	2
Output Spectrum Width	Δλ	---		1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3	dB	With 70 km SMF
Average Launch Power of OFF Transmitter				-30	dBm	

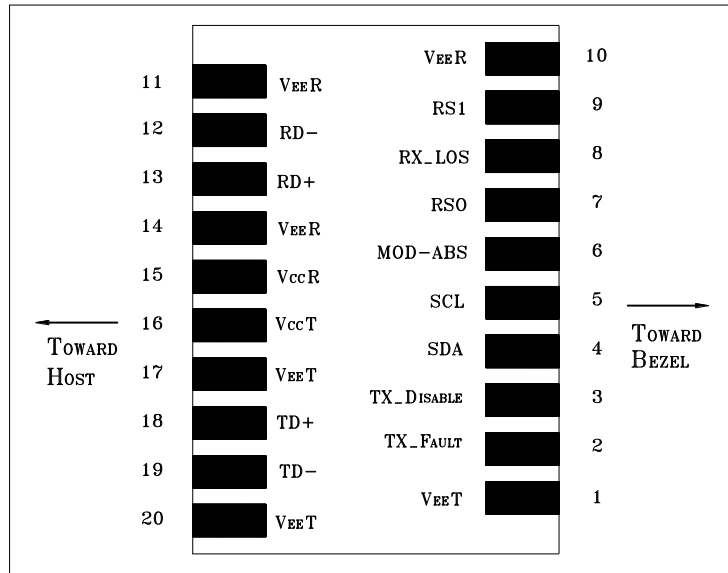
1. Output power is power coupled into a 9/125 μm single-mode fiber.
2. ITU-T G.694.2 CWDM wavelength from 1470 nm to 1610 nm, each step 20 nm.

Receiver Optical Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Sensitivity	Sens			-23.5	dBm	3
Receiver Overload	P _{MAX}	-7	---		dBm	
LOS -- Deasserted	LOS _D	---	---	-24	dBm	Transition: low to high
LOS -- Asserted	LOS _A	-35	---	---	dBm	Transition: high to low
Wavelength of Operation	λc	1260		1620	nm	

3. Measured with average power; BER < 10⁻¹² and PRBS 2⁷-1.

Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Units	Notes
High-Speed Signal (CML) Interface Specification						
Input Data Rate		1	6.144	6.25	Gb/s	
Differential Input Impedance	Rin		100		Ω	
Differential Data Input Amplitude		150		1200	mVpp	Internally AC coupled
Output Data Rate		1	6.144	6.25	Gb/s	
Differential Output Impedance	Rout		100		Ω	
Differential Data Output Amplitude		350	600	700	mVpp	Internally AC coupled
Low-Speed Signal (LVTTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

CONNECTION DIAGRAM



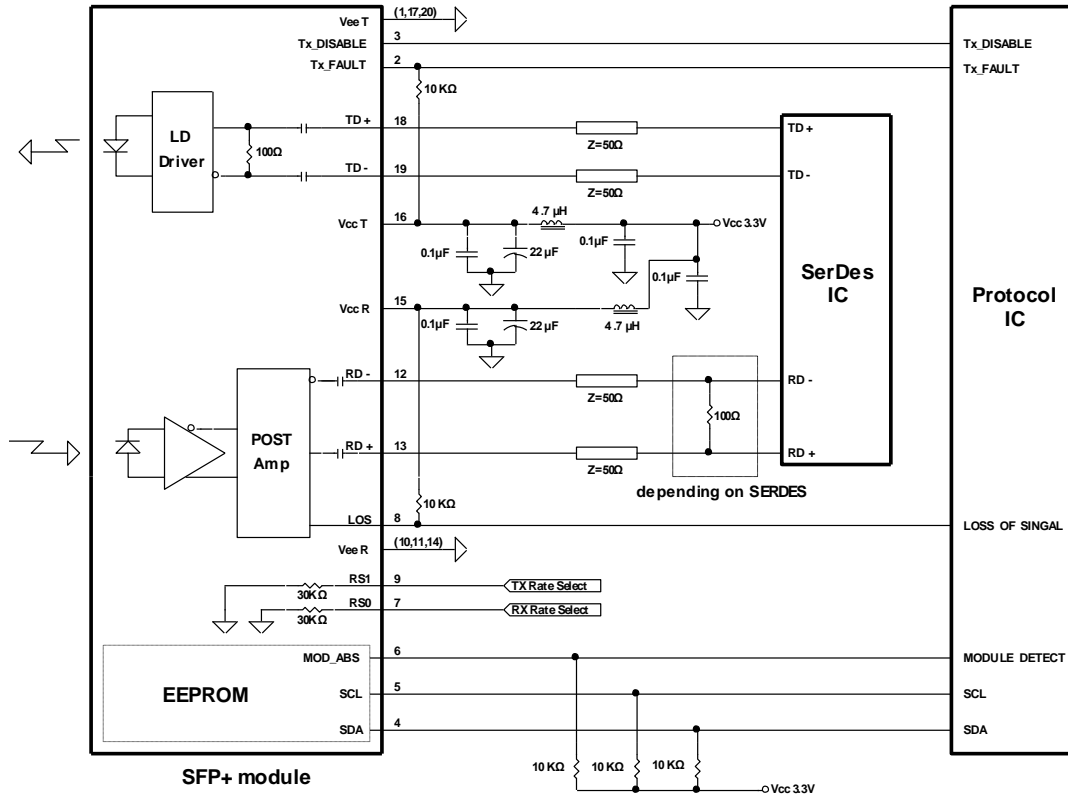
PIN	Signal Name	Description	PIN	Signal Name	Description
1	VEET	Transmitter Signal Ground	11	VEER	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic “1” Output = Laser Fault. Logic “0” Output = Normal Operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic “1” Input (or no connection) = Laser off, Logic “0” = Laser on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	VEER	Receiver Signal Ground
5	SCL	Modulation Definition 1 – Two wires serial ID Interface	15	VccR	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	VccT	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	VEET	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	VEER	Receiver Signal Ground	20	VEET	Transmitter Signal Ground

Module Definition

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

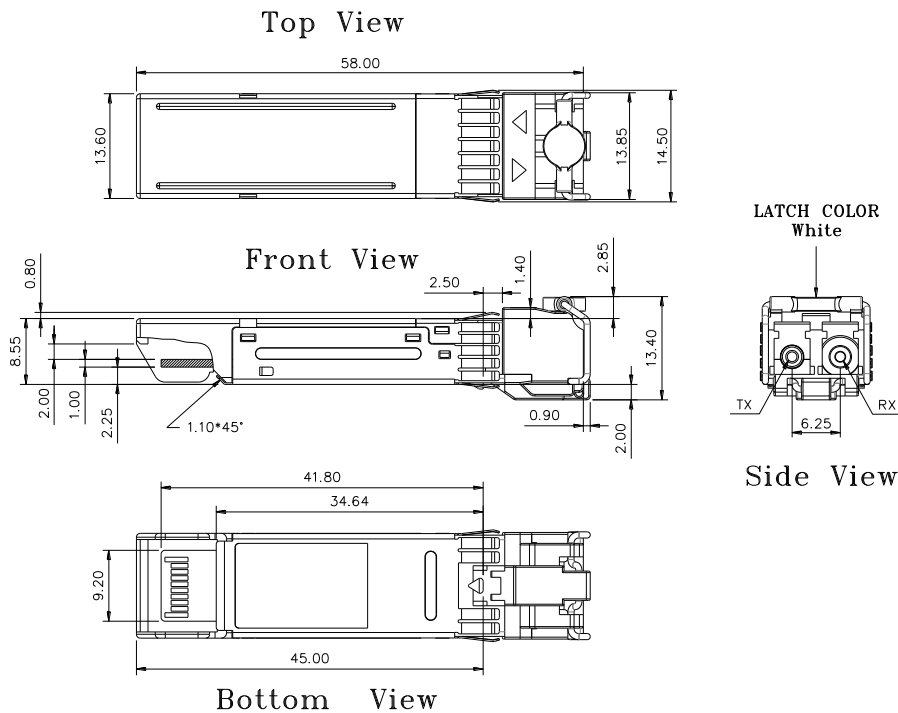
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SDA and SCL appear as no connector (NC) and MOD-ABS is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

RECOMMENDED CIRCUIT SCHEMATIC



PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.

REVISION HISTORY

Version	Subject	Release Date
1.0	Initial datasheet	2018/4/30