

SPS-2316VMW-DXX1RG / SPS-2316AVMW-DXX1RG

(RoHS Compliant)

12 Gb/s / 10 km / DWDM Medium Power Optical SM Digital Diagnostic SFP+ Transmitter/Receiver

FEATURES

- SMPTE 2082, SMPTE 424M, SMPTE 292M, SMPTE 259M, and DVB-ASI Compatible
- Hot-Pluggable SFP Footprint LC Optical Transceiver
- Speed up to 12 Gb/s
- Distance up to 10 km for 12G-SDI
- Tx & Rx Reclocker built-in
- Support Full Video Pathological Patterns for HD-SDI, 3G-SDI, 6G-SDI, and 12G-SDI
- Temperature-stabilized DWDM DML Transmitter
- 100 GHz ITU Grid, C Band
- Single Transmitter with Simplex LC
- Single Receiver with Simplex LC
- Based on Industry Standard SFP +
- SFF-8472 Digital Diagnostic Function
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operation: SPS-2316VMW-DXX1RG
- -40 to 85°C Operation: SPS-2316AVMW-DXX1RG
- Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- SMPTE 2082 Compliant Electrical-to-Optical Interfaces
- High-density Video Routers

DESCRIPTION

The SPS-2316VMW-DXX1RG series is a single mode transceiver module designed to transmit/receive optical serial digital signals as defined in SMPTE 2082, SMPTE 424M, SMPTE 292M, SMPTE 259M, and DVB-ASI. It supports up to 12Gbps and is specifically designed to transmit the pathological patterns for HD-SDI, 3G-SDI, 6G-SDI, and 12G-SDI. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C. The transmitter section uses a C Band DWDM laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A maximum distance of 10 km is achievable with 12Gbps 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 (Gb/s)	TX		RX		Package	Temp (°C)	RoHS Compliant
			λ (nm)	Power (dBm)	λ (nm)	Sen. (dBm)			
SPS-2316VMW-DXX1RG	Transceiver	Up to 12	DWDM*	5 to 0	1260/1620	-1 to -11	LC SFP+ with DMI	0 to 70	Yes
SPS-2316AVMW-DXX1RG	Transceiver	Up to 12	DWDM*	5 to 0	1260/1620	-1 to -11	LC SFP+ with DMI	-40 to 85	Yes

*: XX is for Channel 1 and YY is for Channel 2 100GHz ITU Grid wavelength (Please see below)

Channel #	Product code	Frequency (THz)	Center Wavelength (nm)	Label**
20	SPS-2316VMW-D201RG	192.0	1561.42	D20
21	SPS-2316VMW-D211RG	192.1	1560.61	D21
22	SPS-2316VMW-D221RG	192.2	1559.79	D22
23	SPS-2316VMW-D231RG	192.3	1558.98	D23
24	SPS-2316VMW-D241RG	192.4	1558.17	D24
25	SPS-2316VMW-D251RG	192.5	1557.36	D25
26	SPS-2316VMW-D261RG	192.6	1556.55	D26
27	SPS-2316VMW-D271RG	192.7	1555.75	D27
28	SPS-2316VMW-D281RG	192.8	1554.94	D28
29	SPS-2316VMW-D291RG	192.9	1554.13	D29
30	SPS-2316VMW-D301RG	193.0	1553.33	D30
31	SPS-2316VMW-D311RG	193.1	1552.52	D31
32	SPS-2316VMW-D321RG	193.2	1551.72	D32
33	SPS-2316VMW-D331RG	193.3	1550.92	D33
34	SPS-2316VMW-D341RG	193.4	1550.12	D34
35	SPS-2316VMW-D351RG	193.5	1549.32	D35
36	SPS-2316VMW-D361RG	193.6	1548.51	D36
37	SPS-2316VMW-D371RG	193.7	1547.72	D37
38	SPS-2316VMW-D381RG	193.8	1546.92	D38
39	SPS-2316VMW-D391RG	193.9	1546.12	D39
40	SPS-2316VMW-D401RG	194.0	1545.32	D40
41	SPS-2316VMW-D411RG	194.1	1544.53	D41
42	SPS-2316VMW-D421RG	194.2	1543.73	D42
43	SPS-2316VMW-D431RG	194.3	1542.94	D43
44	SPS-2316VMW-D441RG	194.4	1542.14	D44
45	SPS-2316VMW-D451RG	194.5	1541.35	D45
46	SPS-2316VMW-D461RG	194.6	1540.56	D46
47	SPS-2316VMW-D471RG	194.7	1539.77	D47
48	SPS-2316VMW-D481RG	194.8	1538.98	D48
49	SPS-2316VMW-D491RG	194.9	1538.19	D49
50	SPS-2316VMW-D501RG	195.0	1537.40	D50
51	SPS-2316VMW-D511RG	195.1	1536.61	D51
52	SPS-2316VMW-D521RG	195.2	1535.82	D52
53	SPS-2316VMW-D531RG	195.3	1535.04	D53
54	SPS-2316VMW-D541RG	195.4	1534.25	D54
55	SPS-2316VMW-D551RG	195.5	1533.47	D55
56	SPS-2316VMW-D561RG	195.6	1532.68	D56
57	SPS-2316VMW-D571RG	195.7	1531.90	D57
58	SPS-2316VMW-D581RG	195.8	1531.12	D58
59	SPS-2316VMW-D591RG	195.9	1530.33	D59
60	SPS-2316VMW-D601RG	196.0	1529.55	D60

** : CLASP COLOR CODE IS FOR CHANNEL 1 100GHZ ITU GRID WAVELENGTH

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0 -40	70 85	°C	SPS-2316VMW-DXX1RG SPS-2316AVMW-DXX1RG
Power Supply Voltage	Vcc	-0.5	3.6	V	

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0 -40		70 85	°C / SPS-2316VMW-DXX1RG °C / SPS-2316AVMW-DXX1RG
Power Supply Current	I _{CC(TX+RX)}		580	700	mA / SPS-2316VMW-DXX1RG
			580	770	mA / SPS-2316AVMW-DXX1RG
Data Rate			11.88		Gb/s

Transmitter Optical Specifications (3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Average Launch Power	P _{O, Avg}	0		5	dBm	1
Center Wavelength Spacing			100		GHz	2
Transmitter Center Wavelength -- over life time	λ _c	X-100	X	X+100	pm	3
Output Spectrum Width	σ _λ			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5				
Relative Intensity Noise	RIN			-128	dB/Hz	
Average Launch Power of OFF Transmitter				-30	dBm	

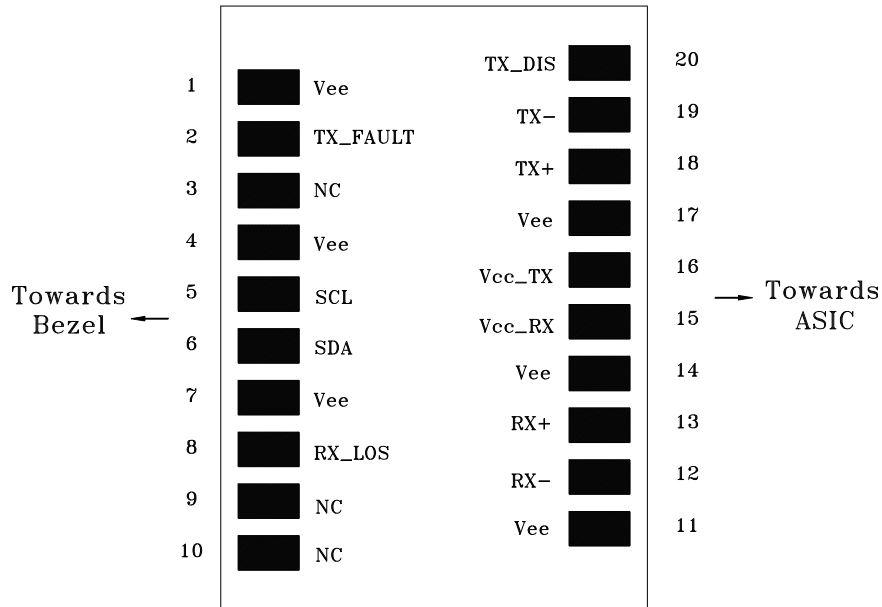
1. Output power is power coupled into a 9/125 μm single mode fiber.
2. Corresponds to approximately 0.8 nm.
3. X = specified ITU Grid wavelength

Receiver Optical Specifications (3.13V < Vcc < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Sensitivity@11.88Gb/s	Sen			-11	dBm	4
Sensitivity@6Gb/s	Sen			-12	dBm	4
Sensitivity@2.97Gb/s	Sen			-12	dBm	4
Sensitivity@1.485Gb/s	Sen			-12	dBm	4
Receiver Overload	P _{MAX}	-1	---		dBm	
LOS -- Deasserted	LOS _D	---	---	-12	dBm	Transition: low to high
LOS -- Asserted	LOS _A	-30	---	---	dBm	Transition: high to low
LOS Hysteresis	Hys	0.5	2		dB	
Wavelength of Operation	λ _c	1260		1620	nm	

4. Measured with pathological pattern; BER < 10⁻¹².

Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Units	Notes
High-Speed Signal (CML) Interface Specification						
Input Data Rate			11.88		Gb/s	
Differential Input Impedance	R _{in}		100		Ω	
Output Data Rate			11.88		Gb/s	
Differential Output Impedance	R _{out}		100		Ω	
Low-Speed Signal (LVTTTL) Interface Specification						
Input High Voltage		2.0		V _{cc} +0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		V _{cc}	V	
Output Low Voltage		GND		0.5	V	

CONNECTION DIAGRAM



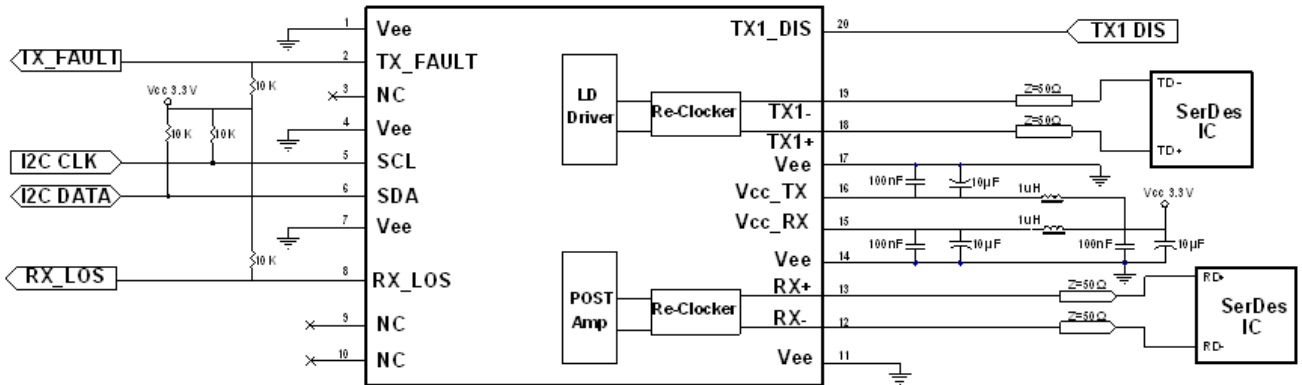
PIN	Name	Function	Notes
1	Vee	Signal Ground	
2	NC	No Connection	
3	NC	No Connection	
4	Vee	Signal Ground	
5	SCL	Serial I ² C Clock	
6	SDA	Serial I ² C Data	
7	Vee	Signal Ground	
8	NC	No Connection	
9	NC	No Connection	
10	NC	No Connection	
11	Vee	Signal Ground	
12	RX-	Negative Differential Output	AC coupled differential lines with 100 ohm differential termination inside the module
13	RX+	Positive Differential Output	
14	Vee	Signal Ground	
15	Vcc RX	Power Supply	+3.3V±5%, Internal connected
16	Vcc TX	Power Supply	
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.

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.

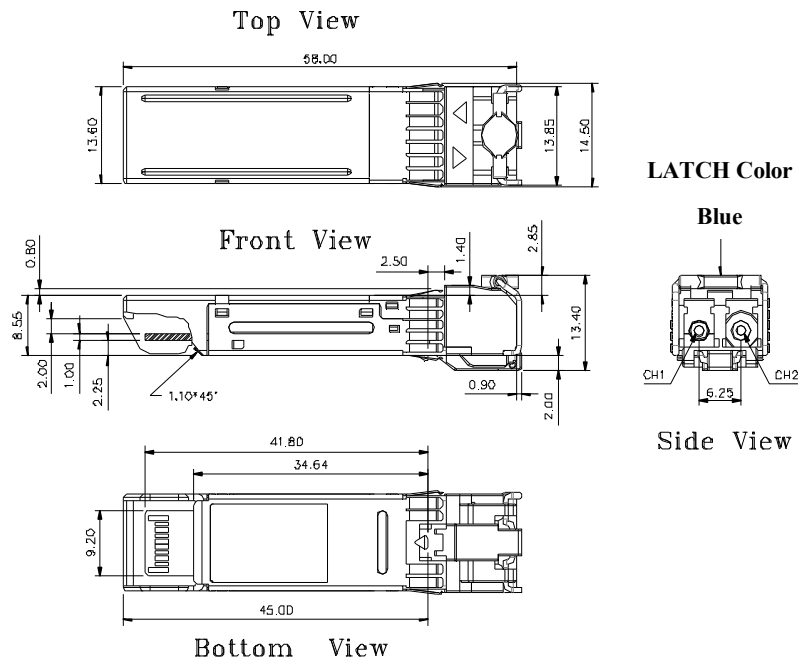
RECOMMENDED CIRCUIT SCHEMATIC



1. Consult the Chipset manufacturer's applications information for biasing required for TX outputs. Some chipset outputs are internally biased and may not need external bias resistor.

PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.

REVISION HISTORY

Version	Subject	Release Date
1.0	Initial datasheet	2023/9/14
1.1	Update the Product code on page 2	2023/10/16
2.0	Update Max Power Supply Current	2024/1/12