

**SPS-2312VMW-DXXDYYG / SPS-2312AVMW-DXXDYYG****(RoHS Compliant)****12 Gb/s / 10 km / DWDM Medium Power Dual Optical SM Digital Diagnostic Transmitter****FEATURES**

- SMPTE 2082, SMPTE 424M, SMPTE 292M, SMPTE 259M, and DVB-ASI Compatible
- Speed up to 12 Gb/s
- Distance up to 10 km for 12G-SDI
- Support Video Pathological Patterns for HD-SDI, 3G-SDI, 6G-SDI, and 12G-SDI
- Dual Transmitter with Duplex LC
- Based on Industry Standard SFP +
- SFF-8472 Digital Diagnostic Function
- Temperature-stabilized DWDM DML Transmitter
- 100 GHz ITU Grid, C Band
- Two Independent TTL Laser Disable Input
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operation: SPS-2312VMW-DXXDYYG
- -40 to 85°C Operation: SPS-2312AVMW-DXXDYYG
- Hot-Pluggable
- Class 1 Laser International Safety Standard IEC-60825 Compliant

**APPLICATIONS**

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

**DESCRIPTION**

The SPS-2312VMW-DXXDYYG series is a dual channel single mode transmitter module designed to transmit 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 I<sup>2</sup>C. It uses two independent C Band DWDM lasers and is a class 1 laser compliant according to International Safety Standard IEC-60825. 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) | TX1    |             | TX2    |             | Package          | Temp (°C) | RoHS Compliant |
|----------------------|------|-----------------|--------|-------------|--------|-------------|------------------|-----------|----------------|
|                      |      |                 | λ (nm) | Power (dBm) | λ (nm) | Power (dBm) |                  |           |                |
| SPS-2312VMW-DXXDYYG  | 2-TX | Up to 12        | XX*    | 5 to 0      | YY*    | 5 to 0      | LC SFP+ with DMI | 0 to 70   | Yes            |
| SPS-2312AVMW-DXXDYYG | 2-TX | Up to 12        | XX*    | 5 to 0      | YY*    | 5 to 0      | 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-2312VMW-D20DYYG | 192.0           | 1561.42                | D20     |
| 21        | SPS-2312VMW-D21DYYG | 192.1           | 1560.61                | D21     |
| 22        | SPS-2312VMW-D22DYYG | 192.2           | 1559.79                | D22     |
| 23        | SPS-2312VMW-D23DYYG | 192.3           | 1558.98                | D23     |
| 24        | SPS-2312VMW-D24DYYG | 192.4           | 1558.17                | D24     |
| 25        | SPS-2312VMW-D25DYYG | 192.5           | 1557.36                | D25     |
| 26        | SPS-2312VMW-D26DYYG | 192.6           | 1556.55                | D26     |
| 27        | SPS-2312VMW-D27DYYG | 192.7           | 1555.75                | D27     |
| 28        | SPS-2312VMW-D28DYYG | 192.8           | 1554.94                | D28     |
| 29        | SPS-2312VMW-D29DYYG | 192.9           | 1554.13                | D29     |
| 30        | SPS-2312VMW-D30DYYG | 193.0           | 1553.33                | D30     |
| 31        | SPS-2312VMW-D31DYYG | 193.1           | 1552.52                | D31     |
| 32        | SPS-2312VMW-D32DYYG | 193.2           | 1551.72                | D32     |
| 33        | SPS-2312VMW-D33DYYG | 193.3           | 1550.92                | D33     |
| 34        | SPS-2312VMW-D34DYYG | 193.4           | 1550.12                | D34     |
| 35        | SPS-2312VMW-D35DYYG | 193.5           | 1549.32                | D35     |
| 36        | SPS-2312VMW-D36DYYG | 193.6           | 1548.51                | D36     |
| 37        | SPS-2312VMW-D37DYYG | 193.7           | 1547.72                | D37     |
| 38        | SPS-2312VMW-D38DYYG | 193.8           | 1546.92                | D38     |
| 39        | SPS-2312VMW-D39DYYG | 193.9           | 1546.12                | D39     |
| 40        | SPS-2312VMW-D40DYYG | 194.0           | 1545.32                | D40     |
| 41        | SPS-2312VMW-D41DYYG | 194.1           | 1544.53                | D41     |
| 42        | SPS-2312VMW-D42DYYG | 194.2           | 1543.73                | D42     |
| 43        | SPS-2312VMW-D43DYYG | 194.3           | 1542.94                | D43     |
| 44        | SPS-2312VMW-D44DYYG | 194.4           | 1542.14                | D44     |
| 45        | SPS-2312VMW-D45DYYG | 194.5           | 1541.35                | D45     |
| 46        | SPS-2312VMW-D46DYYG | 194.6           | 1540.56                | D46     |
| 47        | SPS-2312VMW-D47DYYG | 194.7           | 1539.77                | D47     |
| 48        | SPS-2312VMW-D48DYYG | 194.8           | 1538.98                | D48     |
| 49        | SPS-2312VMW-D49DYYG | 194.9           | 1538.19                | D49     |
| 50        | SPS-2312VMW-D50DYYG | 195.0           | 1537.40                | D50     |
| 51        | SPS-2312VMW-D51DYYG | 195.1           | 1536.61                | D51     |
| 52        | SPS-2312VMW-D52DYYG | 195.2           | 1535.82                | D52     |
| 53        | SPS-2312VMW-D53DYYG | 195.3           | 1535.04                | D53     |
| 54        | SPS-2312VMW-D54DYYG | 195.4           | 1534.25                | D54     |
| 55        | SPS-2312VMW-D55DYYG | 195.5           | 1533.47                | D55     |
| 56        | SPS-2312VMW-D56DYYG | 195.6           | 1532.68                | D56     |
| 57        | SPS-2312VMW-D57DYYG | 195.7           | 1531.90                | D57     |
| 58        | SPS-2312VMW-D58DYYG | 195.8           | 1531.12                | D58     |
| 59        | SPS-2312VMW-D59DYYG | 195.9           | 1530.33                | D59     |
| 60        | SPS-2312VMW-D60DYYG | 196.0           | 1529.55                | D60     |

\*\* : Clasp Color Code is for Channel 1 100GHz ITU Grid wavelength

### RELATED PRODUCTS

| P/No.           | Type | Bit Rate (Gb/s) | RX1       |            | RX2       |            | Package          | Temp (°C) | RoHS Compliant |
|-----------------|------|-----------------|-----------|------------|-----------|------------|------------------|-----------|----------------|
|                 |      |                 | λ (nm)    | Sen. (dBm) | λ (nm)    | Sen. (dBm) |                  |           |                |
| SPS-2116VMW-2RG | 2-RX | Up to 12        | 1260/1620 | -1 to -11  | 1260/1620 | -1 to -11  | LC SFP+ with DMI | 0 to 70   | Yes            |

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| Absolute Maximum Ratings   |        |          |          |       |   |
|----------------------------|--------|----------|----------|-------|---|
| Parameter                  | Symbol | Min      | Max      | Units | Notes                                       |
| Storage Temperature        | Tstg   | -40      | 85       | °C    |   |
| Operating Case Temperature | Topr   | 0<br>-40 | 70<br>85 | °C    | SPS-2312VMW-DXXDYYG<br>SPS-2312AVMW-DXXDYYG |
| 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<br>-40 |            | 70<br>85   | °C / SPS-2312VMW-DXXDYYG<br>°C / SPS-2312AVMW-DXXDYYG |
| Power Supply Current             | Icc    |          | 450<br>600 | 500<br>650 | mA / SPS-2312VMW-DXXDYYG<br>mA / SPS-2312AVMW-DXXDYYG |
| Data Rate                        |        |          | 11.88      |            | Gb/s  |

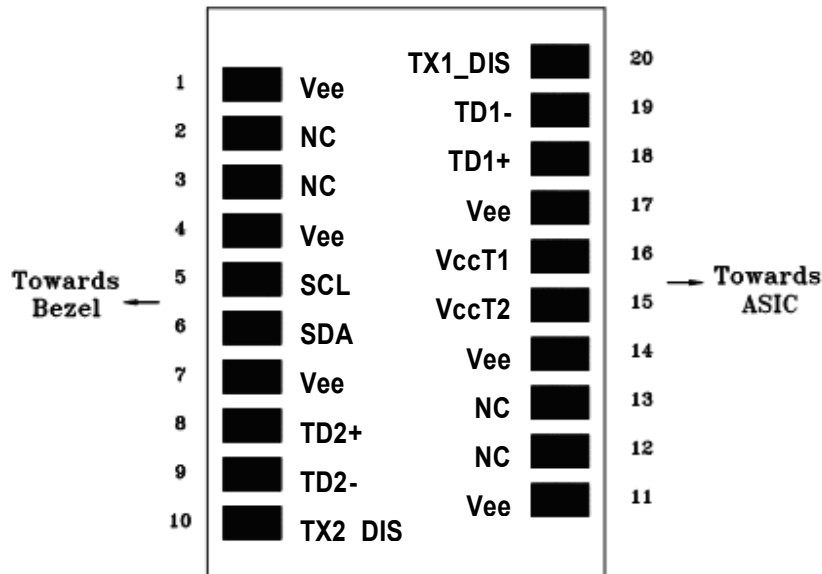
| Transmitter Optical Specifications (3.13V < Vcc < 3.47V) |                     |       |     |       |       |              |
|--|---------------------|-------|-----|-------|-------|--------------|
| Parameter  | Symbol              | Min   | Typ | Max   | Units | Notes        |
| Average Launch Power                                     | P <sub>O, Avg</sub> | 0     |     | 5     | dBm   | 1            |
| Center Wavelength Spacing                                |                     |       | 100 |       | GHz   | 2            |
| Transmitter Center Wavelength<br>-- over life time       | λ <sub>c</sub>      | X-100 | X   | X+100 | pm    | 3            |
| Output Spectrum Width                                    | σ <sub>λ</sub>      |       |     | 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

| Electrical Characteristics                               |                 |     |       |                      |       |       |
|--|-----------------|-----|-------|----------------------|-------|-------|
| Parameter  | Symbol          | Min | Typ   | Max                  | Units | Notes |
| <b>High-Speed Signal (CML) Interface Specification</b>   |                 |     |       |                      |       |       |
| Input Data Rate  |                 |     | 11.88 |                      | Gb/s  |       |
| Differential Input Impedance                             | R <sub>in</sub> |     | 100   |                      | Ω     |       |
| <b>Low-Speed Signal (LVTTTL) Interface Specification</b> |                 |     |       |                      |       |       |
| Input High Voltage                                       |                 | 2.0 |       | V <sub>cc</sub> +0.3 | V     |       |
| Input Low Voltage  |                 | GND |       | 0.8                  | V     |       |

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**CONNECTION DIAGRAM**



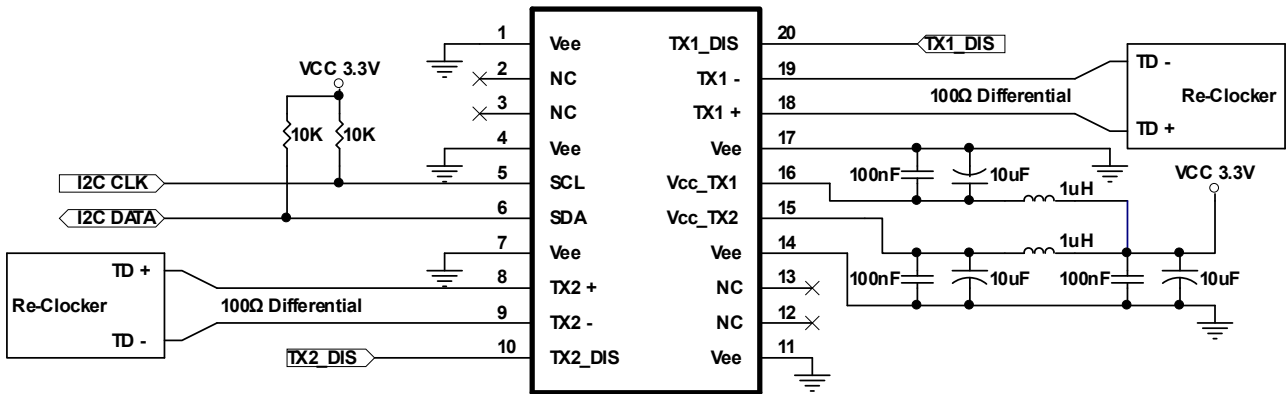
| PIN | Name    | Function                         | Notes  |
|-----|---------|----------------------------------|--|
| 1   | Vee     | Signal Ground                    |  |
| 2   | NC      | No Connection                    |  |
| 3   | NC      | No Connection                    |  |
| 4   | Vee     | Signal Ground                    |  |
| 5   | SCL     | Serial I <sup>2</sup> C Clock    |  |
| 6   | SDA     | Serial I <sup>2</sup> C Data     |  |
| 7   | Vee     | Signal Ground                    |  |
| 8   | TD2+    | Positive Transmitter Data In (2) | AC coupled differential lines with 100 ohm differential termination inside the module              |
| 9   | TD2-    | Negative Transmitter Data In (2) |  |
| 10  | TX2_DIS | Transmitter Disable (2)          | Internal 4.7 kΩ pull-up. The bias current and modulation current are turned off if TX2_DIS = HIGH. |
| 11  | Vee     | Signal Ground                    |  |
| 12  | NC      | No Connection                    |  |
| 13  | NC      | No Connection                    |  |
| 14  | Vee     | Signal Ground                    |  |
| 15  | VccT2   | Power Supply (2)                 | +3.3V±5%   |
| 16  | VccT1   | Power Supply (1)                 | +3.3V±5%   |
| 17  | Vee     | Signal Ground                    |  |
| 18  | TD1+    | Positive Transmitter Data In (1) | AC coupled differential lines with 100 ohm differential termination inside the module              |
| 19  | TD1-    | Negative Transmitter Data In (1) |  |
| 20  | TX1_DIS | Transmitter Disable (1)          | 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 E<sup>2</sup>PROM protocol of the ATMEL AT24C01A/02/04 family of components.

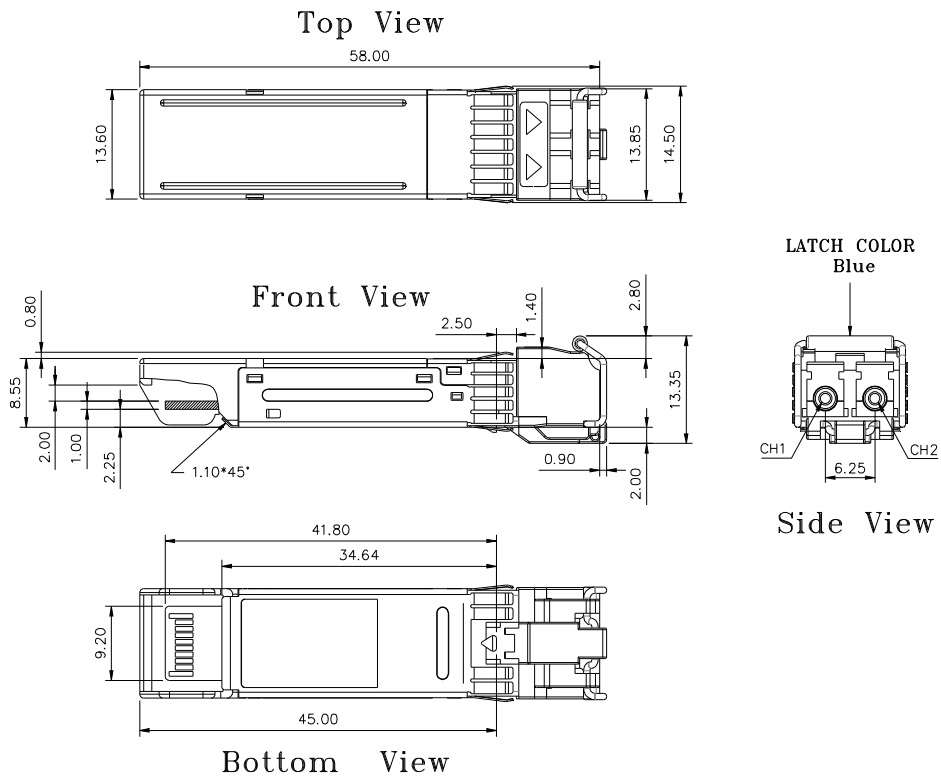
### RECOMMENDED CIRCUIT SCHEMATIC



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   |
|         |                                   |              |
|         |                                   |              |