

## SPS-9350VW-CXXCYYG

(RoHS Compliant)

### CWDM / 3 Gb/s Medium Power Dual Optical SM Digital Diagnostic Transmitter

#### FEATURES

- | SMPTE 297-2006 Compatible
- | Speed from 50 Mbps to 3 Gbps
- | Support Video Pathological Patterns for SD-SDI, HD-SDI and 3G-SDI
- | Dual CWDM Transmitter: 1270 nm to 1610 nm
- | Based on Industry Standard SFP
- | SFF-8472 Digital Diagnostic Function
- | Two Independent TTL Laser Disable Input
- | 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 297-2006 Compliant Electrical-to-Optical Interfaces
- | High-density Video Routers

#### DESCRIPTION

The SPS-9350VW-CXXCYYG is a dual channel optical single mode transmitter module designed to transmit optical serial digital signals as defined in SMPTE 297-2006. It supports from 50 Mbps to 3 Gbps and is specifically designed for transmitted the SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M SDI pathological patterns. 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 is with two independent CWDM DFB laser transmitters. There are eighteen center wavelengths available from 1470 nm to 1610 nm, with each step 20 nm.

#### 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) | TX1    |             | TX2    |             | Package         | Temp (°C) | RoHS Compliant |
|--------------------|------|-----------------|--------|-------------|--------|-------------|-----------------|-----------|----------------|
|                    |      |                 | λ (nm) | Power (dBm) | λ (nm) | Power (dBm) |                 |           |                |
| SPS-9350VW-CXXCYYG | 2-TX | 50 to 3000      | XX *   | 4 to 0      | YY*    | 4 to 0      | LC SFP with DMI | 0 to 70   | Yes            |

\*: XX is for Channel 1 and YY is for Channel 2 CWDM Wavelength (0 to 70°C)

| Central Wavelength | Min. (nm) | Typ. (nm) | Max. (nm) | Clasp Color Code | Central Wavelength | Min. (nm) | Typ. (nm) | Max. (nm) | Clasp Color Code |
|--------------------|-----------|-----------|-----------|------------------|--------------------|-----------|-----------|-----------|------------------|
| -C270              | 1264.5    | 1270      | 1277.5    | Light Purple     | -C450              | 1444.5    | 1450      | 1457.5    | Yellow Orange    |
| -C290              | 1284.5    | 1290      | 1297.5    | Sky Blue         | -C470              | 1464.5    | 1470      | 1477.5    | Gray             |
| -C310              | 1304.5    | 1310      | 1317.5    | Yellow Green     | -C490              | 1484.5    | 1490      | 1497.5    | Violet           |
| -C330              | 1324.5    | 1330      | 1337.5    | Yellow Ocher     | -C510              | 1504.5    | 1510      | 1517.5    | Blue             |
| -C350              | 1344.5    | 1350      | 1357.5    | Pink             | -C530              | 1524.5    | 1530      | 1537.5    | Green            |
| -C370              | 1364.5    | 1370      | 1377.5    | Beige            | -C550              | 1544.5    | 1550      | 1557.5    | Yellow           |
| -C390              | 1384.5    | 1390      | 1397.5    | White            | -C570              | 1564.5    | 1570      | 1577.5    | Orange           |
| -C410              | 1404.5    | 1410      | 1417.5    | Silver           | -C590              | 1584.5    | 1590      | 1597.5    | Red              |
| -C430              | 1424.5    | 1430      | 1437.5    | Black            | -C610              | 1604.5    | 1610      | 1617.5    | Brown            |

CWDM\*: 18 Wavelengths from 1270 nm to 1610 nm, each step 20 nm.

Clasp Color Code\*\*: Clasp Color Code is for Channel 1 CWDM Wavelength

#### RELATED PRODUCTS

| P/No.          | Type | Bit Rate (Mb/s) | RX1       |             | RX2       |            | Package         | Temp (°C) | RoHS Compliant |
|----------------|------|-----------------|-----------|-------------|-----------|------------|-----------------|-----------|----------------|
|                |      |                 | λ (nm)    | Power (dBm) | λ (nm)    | Sen. (dBm) |                 |           |                |
| SPS-9110VW-2RG | 2-RX | 50 to 3000      | 1260/1620 | 0 to -20    | 1260/1620 | 0 to -20   | LC SFP with DMI | 0 to 70   | Yes            |
| SPS-9380VW-2RG | 2-RX | 50 to 3000      | 1260/1620 | -9 to -28   | 1260/1620 | -9 to -28  | LC SFP with DMI | 0 to 70   | Yes            |

## 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 <sub>stg</sub> | -40 | 85  | °C     |                |
| Operating Case Temperature | T <sub>c</sub>   | 0   | 70  | °C     |                |
| Power Supply Voltage       | V <sub>cc</sub>  | 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 <sub>cc</sub> | 3.13 | 3.3 | 3.47 | V             |
| Operating Case Temperature       | T <sub>c</sub>  | 0    |     | 70   | °C            |
| Baud Rate                        |                 | 50   |     | 3000 | Mb/s          |
| Power Supply Current             | I <sub>cc</sub> |      | 200 | 320  | mA            |

| Transmitter Specifications (0°C < T <sub>c</sub> < 70°C, 3.13V < V <sub>cc</sub> < 3.47V) |                                   |                     |                |                      |       |                    |
|---|-----------------------------------|---------------------|----------------|----------------------|-------|--------------------|
| Parameter   | Symbol                            | Min                 | Typ            | Max                  | Units | Notes              |
| <b>Optical</b>  |                                   |                     |                |                      |       |                    |
| Optical Transmit Power  | P <sub>o</sub>                    | 0                   |                | 4                    | dBm   | 1                  |
| Output Center Wavelength  | λ                                 | λ <sub>c</sub> -5.5 | λ <sub>c</sub> | λ <sub>c</sub> +7.5  | nm    | 2                  |
| Output Spectrum Width   | Δλ                                | ---                 |                | 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      |
| <b>Electrical</b>   |                                   |                     |                |                      |       |                    |
| Differential Input Voltage  | V <sub>IH</sub> - V <sub>IL</sub> | 200                 |                | 1200                 | mVp-p | AC coupled input   |
| Disable Input Voltage -- Low  | V <sub>TDIS,L</sub>               | 0                   |                | 0.8                  | V     | TX Output Enabled  |
| Disable Input Voltage -- High   | V <sub>TDIS,H</sub>               | 2.0                 |                | V <sub>cc</sub> +0.3 | V     | TX Output Disabled |
| SCL, SDA  | V <sub>OH</sub>                   | 2.5                 |                | V <sub>cc</sub> +0.3 | V     |                    |
|   | V <sub>OL</sub>                   | 0                   |                | 0.5                  | V     |                    |

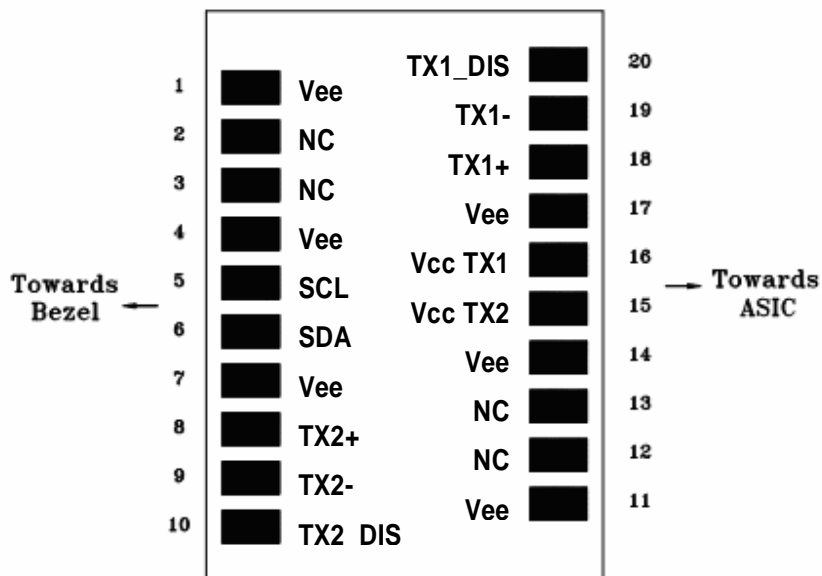
1. Output power is power coupled into a 9/125 μm single mode fiber.
2. ITU-T G.694.2 CWDM wavelength from 1470 nm to 1610 nm, each step 20 nm.
3. 20% to 80%, unfiltered.

## MODULE DEFINITION

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

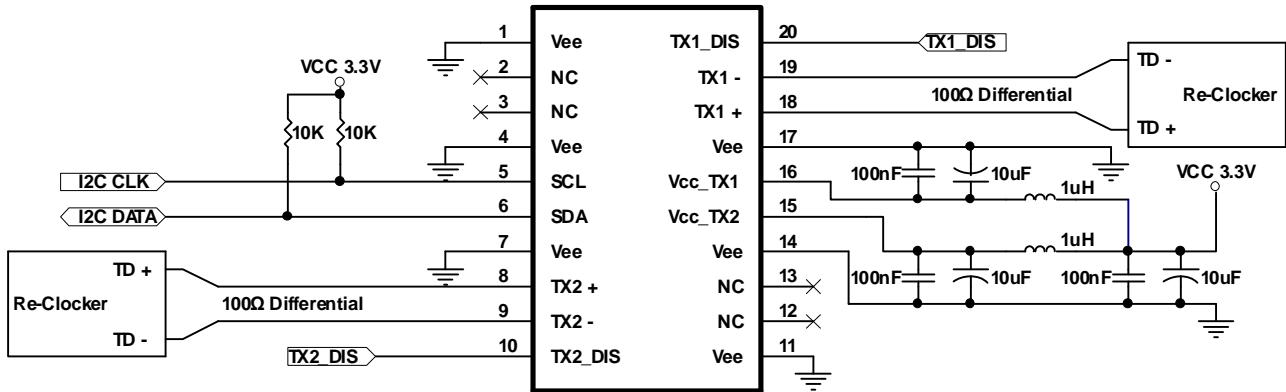
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SCL and SDA appear as no connector (NC). When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E<sup>2</sup>PROM protocol of the ATMEL AT24C01A/02/04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

CONNECTION DIAGRAM



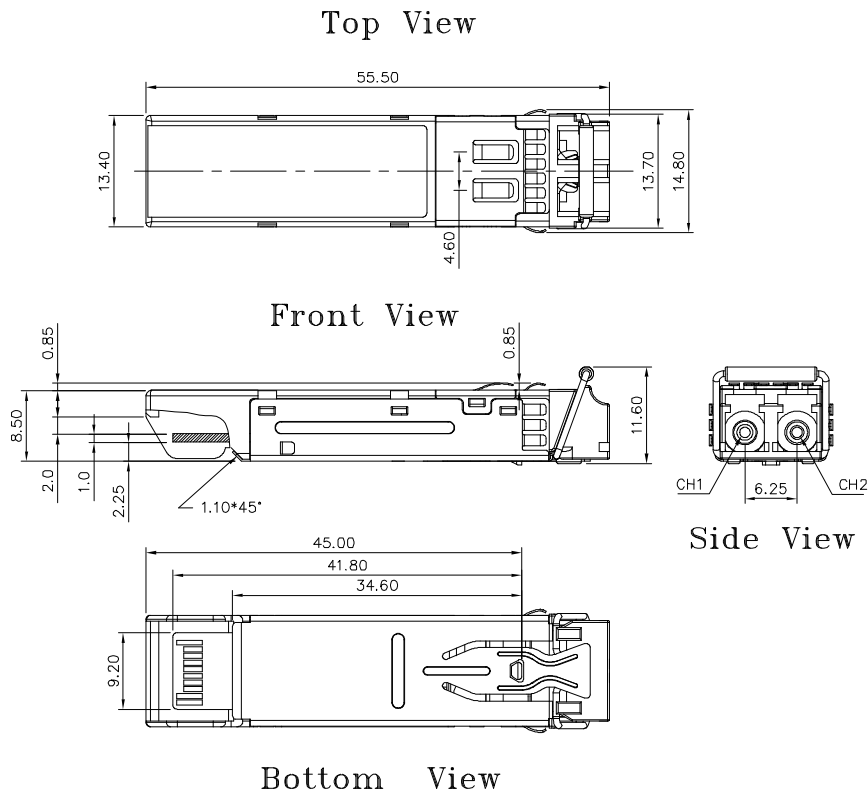
| PIN | Name    | Function                         | Notes  |
|-----|---------|----------------------------------|--|
| 1   | Vee     | Signal Ground                    |  |
| 2   | NC      | No Connection                    |  |
| 3   | NC      | No Connection                    |  |
| 4   | Vee     | 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   | TX2+    | Positive Transmitter Data In (2) | AC coupled differential lines with 100 ohm differential termination inside the module              |
| 9   | TX2-    | 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  | Vcc TX2 | Power Supply (2)                 | +3.3V±5%, Internal connected   |
| 16  | Vcc TX1 | Power Supply (1)                 |  |
| 17  | Vee     | Signal Ground                    |  |
| 18  | TX1+    | Positive Transmitter Data In (1) | AC coupled differential lines with 100 ohm differential termination inside the module              |
| 19  | TX1-    | 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. |

## 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.

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## REVISION HISTORY

| Version | Subject            | Release Date |
|---------|--------------------|--------------|
| 1.0     | Initial datasheet  | 2009/3/1     |
| 2.0     | Provide 18-CH CWDM | 2009/8/1     |
|         |                    |              |
|         |                    |              |

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