

### SPB-9110VW-R3R5G

(RoHS Compliant)

**1310 nm RX / 1550 nm RX / 3 Gb/s Medium Power 1-Fibre BIDI SM Digital Diagnostic Dual Receiver**

#### FEATURES

- SMPTE 297-2006 Compliant
- 1-Fibre BIDI Dual Receiver with Simplex LC
- Speed from 50 Mbps to 3Gbps
- Support Video Pathological Patterns for SD-SDI, HD-SDI and 3G-SDI
- Based on Industry Standard SFP
- SFF-8472 Digital Diagnostic Function
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operation
- Hot Pluggable

#### APPLICATIONS

- SMPTE 297-2006 Compliant Electrical-to-Optical Interfaces
- High-density Video Routers

#### DESCRIPTION

The SPB-9110VW-R3R5G is a 1-fibre dual channel optical single mode receiver module designed to receive optical serial digital signals as defined in SMPTE 297-2006. It supports from 50 Mbps to 3 Gbps and is specifically designed for received 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. Each receiver can receive signal from 50 Mbps to 3 Gbps with up to 30 km of single-mode fiber when using the SPB-9110VW-T3T5G as the transmitter. A maximum distance of 10 km is achievable with 3Gbps pathological signals.

#### ORDER INFORMATION

| P/No.            | Type | Bit Rate (Mb/s) | RX1            |            | RX2            |            | Package         | Temp (°C) | RoHS Compliant |
|------------------|------|-----------------|----------------|------------|----------------|------------|-----------------|-----------|----------------|
|                  |      |                 | $\lambda$ (nm) | Sen. (dBm) | $\lambda$ (nm) | Sen. (dBm) |                 |           |                |
| SPB-9110VW-R3R5G | 2-RX | 50 to 3000      | 1310           | 0 to -20   | 1550           | 0 to -20   | LC SFP with DMI | 0 to 70   | Yes            |

#### RELATED PRODUCTS

| P/No.            | Type | Bit Rate (Mb/s) | TX1            |             | TX2            |             | Package         | Temp (°C) | RoHS Compliant |
|------------------|------|-----------------|----------------|-------------|----------------|-------------|-----------------|-----------|----------------|
|                  |      |                 | $\lambda$ (nm) | Power (dBm) | $\lambda$ (nm) | Power (dBm) |                 |           |                |
| SPB-9110VW-T3T5G | 2-TX | 50 to 3000      | 1310           | 0 to -5     | 1550 DFB       | -3 to -8    | LC SFP with DMI | 0 to 70   | Yes            |

#### LINK DISTANCE

| Transmitter      | Receiver         | SDI    | Bit Rate  | Max. Link Distance (km) |
|------------------|------------------|--------|-----------|-------------------------|
| SPB-9110VW-T3T5G | SPB-9110VW-R3R5G | 3G-SDI | 2.97Gbps  | 10                      |
|                  |                  | HD-SDI | 1.485Gbps | 21                      |
|                  |                  | SD-SDI | 270Mbps   | 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        | Tstg   | -40 | 85  | °C     |                |
| Operating Case Temperature | Tc     | 0   | 70  | °C     |                |
| Power Supply Voltage       | Vcc    | 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             | Vcc    | 3.13 | 3.3 | 3.47 | V             |
| Operating Case Temperature       | Tc     | 0    |     | 70   | °C            |
| Baud Rate                        |        | 50   |     | 3000 | Mb/s          |
| Power Supply Current             | Icc    |      | 150 | 200  | mA            |

| Receiver Specifications (0°C < Tc < 70°C, 3.13V < Vcc < 3.47V) |                 |      |      |         |       |                                    |
|----------------------------------------------------------------|-----------------|------|------|---------|-------|------------------------------------|
| Parameter                                                      | Symbol          | Min  | Typ  | Max     | Units | Notes                              |
| <b>Optical</b>                                                 |                 |      |      |         |       |                                    |
| Received Wavelength                                            | $\lambda_{RX1}$ | 1260 | 1310 | 1360    | nm    | 1                                  |
|                                                                | $\lambda_{RX2}$ | 1480 | 1550 | 1580    | nm    | 2                                  |
| Sensitivity for SMPTE 424M                                     | Sen             | 0    | ---  | -18     | dBm   | Pathological                       |
| 2.97 Gb/s                                                      |                 | 0    |      | -20     | dBm   | PRBS 2 <sup>23</sup> -1, BER=1E-12 |
| Sensitivity for SMPTE 292M                                     | Sen             | 0    | ---  | -20     | dBm   | Pathological                       |
| 1.485 Gb/s                                                     |                 | 0    |      | -21     | dBm   | PRBS 2 <sup>23</sup> -1, BER=1E-12 |
| Signal Detect -- Asserted                                      | Pa              | ---  | ---  | -20     | dBm   | Transition: low to high            |
| Signal Detect -- Deasserted                                    | Pd              | -29  | ---  | ---     | dBm   | Transition: high to low            |
| Signal detect -- Hysteresis                                    |                 | 1    |      | 6       | dB    |                                    |
| Optical Return Loss                                            |                 |      | -27  |         | dB    |                                    |
| <b>Electrical</b>                                              |                 |      |      |         |       |                                    |
| CML Output (Differential)                                      |                 | 550  | 660  | 850     | mVp-p | AC coupled output                  |
| 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                      |
| Output LOS Voltage -- Low                                      | VOL             | 0    |      | 0.5     | V     | IOL=-1.6mA, 1 TTL unit load        |
| Output LOS Voltage -- High                                     | VOH             | 2.5  |      | Vcc+0.3 | V     | IOH=40μA, 1 TTL unit load          |
| SCL, SDA                                                       | VOH             | 2.5  |      | Vcc+0.3 | V     |                                    |
|                                                                | VOL             | 0    |      | 0.5     | V     |                                    |

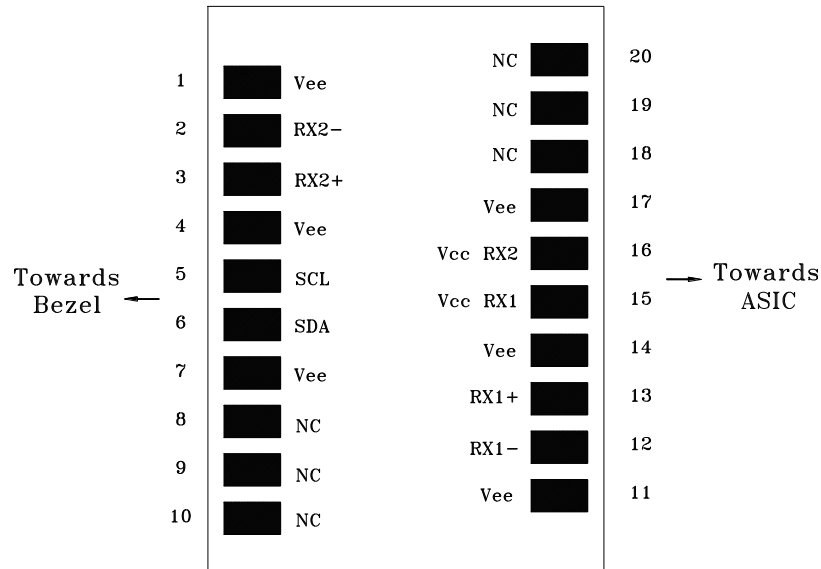
- At least 30 dB optical isolation for the wavelength 1480 to 1580 nm.
- At least 30 dB optical isolation for the wavelength 1260 to 1360 nm.
- 20% to 80%, unfiltered.

### MODULE DEFINITION

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

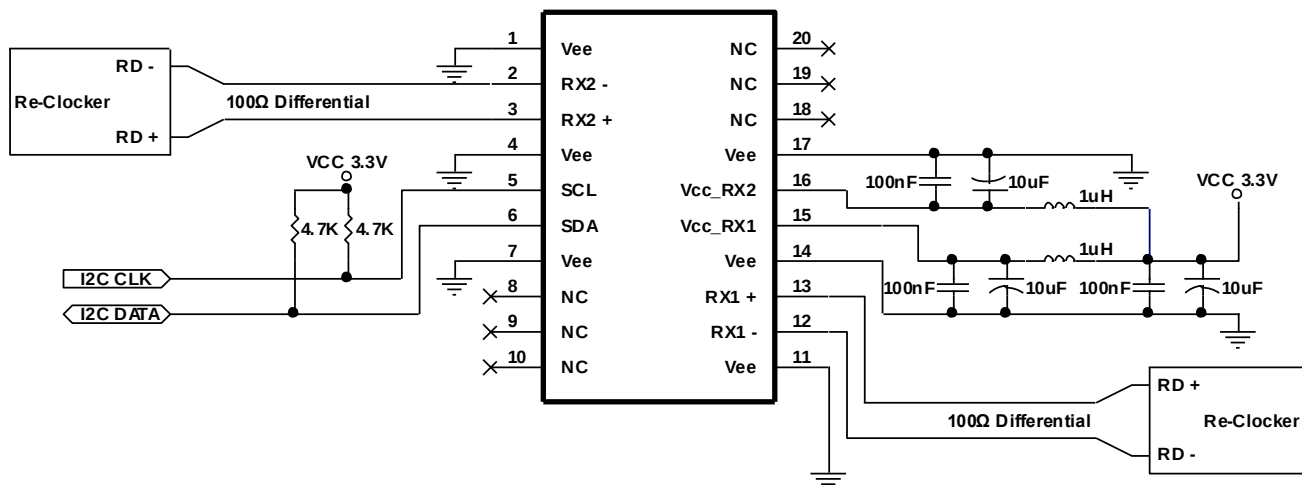
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SCL and SDA appear as no connector (NC). When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E<sup>2</sup>PROM protocol of the ATMEL AT24C01A/02/04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

### CONNECTION DIAGRAM



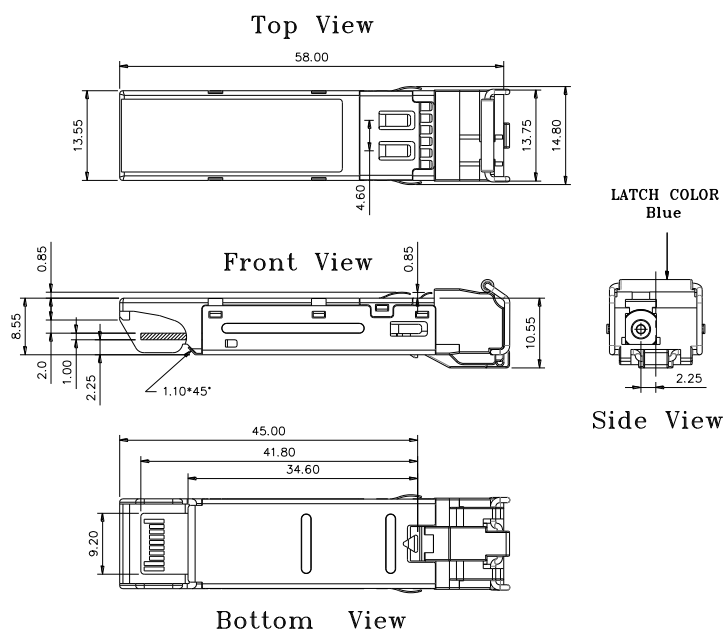
| PIN | Name    | Function                         | Notes    |
|-----|---------|----------------------------------|----------|
| 1   | Vee     | Signal Ground                    |          |
| 2   | RX2-    | Negative Differential Output (2) |          |
| 3   | RX2+    | Positive Differential Output (2) |          |
| 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   | NC      | No Connection                    |          |
| 9   | NC      | No Connection                    |          |
| 10  | NC      | No Connection                    |          |
| 11  | Vee     | Signal Ground                    |          |
| 12  | RX1-    | Negative Differential Output (1) |          |
| 13  | RX1+    | Positive Differential Output (1) |          |
| 14  | Vee     | Signal Ground                    |          |
| 15  | Vcc RX1 | Power Supply (1)                 | +3.3V±5% |
| 16  | Vcc RX2 | Power Supply (2)                 | +3.3V±5% |
| 17  | Vee     | Signal Ground                    |          |
| 18  | NC      | No Connection                    |          |
| 19  | NC      | No Connection                    |          |
| 20  | NC      | No Connection                    |          |

### RECOMMENDED CIRCUIT SCHEMATIC



1. Consult Chipset manufacturer's data sheet and application data for appropriate receiver input biasing network.

### 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      | 2009/8/1     |
| 2.0     | Change package diagram | 2015/12/1    |
|         |                        |              |
|         |                        |              |