

SPS-2340BW-CXX0G / SPS-2340AW-CXX0G

(RoHS Compliant)

10.3 Gbps / 40 km / CWDM Digital Diagnostic LC SFP+ SINGLE-MODE TRANSCEIVER

FEATURES

- Up to 10.5 Gb/s Bi-directional Data Links
- Compliant to SFP+ MSA
- Compliant to IEEE 802.3ae 10GBASE
- Maximum Link Length of 40 km at 10.3125Gb/s
- 6-Wavelength CWDM DFB LD: from 1270 nm to 1370 nm
- Power Budget > 16 dB
- SFF-8472 Digital Diagnostic Function
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- RoHS Compliant
- -10 to 85°C Operating: SPS-2340BW-CXX0G
- -40 to 85°C Operating: SPS-2340AW-CXX0G
- Class 1 Laser International Safety Standard IEC-60825 Compliant

APPLICATIONS

- High-speed Storage Area Network
- Computer Cluster Cross-connect
- Custom High-speed Data Pipes

DESCRIPTION

The SPS-2340AW-CXX0G series single mode transceiver is a small form factor pluggable module for bi-directional serial optical data communications such as IEEE 802.3ae 10GBASE-LR/LW. 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. There are eighteen center wavelengths available from 1270 nm to 1370 nm, with each step 20 nm. A guaranteed minimum optical link budget of 11 dB is offered. The transmitter section uses a CWDM multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier 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) | 10GBASE | Power Budget (dB) | Wavelength (nm) | Package | Temp. (°C) | RoHS Compliant |
|------------------|-----------------|---------|-------------------|-----------------|---------------|------------|----------------|
| SPS-2340BW-CXX0G | 10.3 | | >16 | CWDM* | SFP+ with DMI | -10 to 85 | Yes |
| SPS-2340AW-CXX0G | 10.3 | | >16 | CWDM* | SFP+ with DMI | -40 to 85 | Yes |

CWDM* Wavelength (-40 to 85°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 | -C330 | 1324.5 | 1330 | 1337.5 | Yellow Ocher |
| -C290 | 1284.5 | 1290 | 1297.5 | Sky Blue | -C350 | 1344.5 | 1350 | 1357.5 | Pink |
| -C310 | 1304.5 | 1310 | 1317.5 | Yellow Green | -C370 | 1364.5 | 1370 | 1377.5 | Beige |

CWDM*: 18 wavelengths from 1270 nm to 1370 nm, each step 20 nm.

| Absolute Maximum Ratings | | | | | |
|----------------------------|--------|------------|----------|-------|--------------------------------------|
| Parameter | Symbol | Min | Max | Units | Notes |
| Storage Temperature | Tstg | -40 | 85 | °C | |
| Operating Case Temperature | Topr | -10 -40 | 85 85 | °C | SPS-2340BW-CXX0G SPS-2340AW-CXX0G |
| 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 | -10 -40 | | 85 85 | °C / SPS-2340BW-CXX0G °C / SPS-2340AW-CXX0G |
| Power Supply Current | I _{CC(TX+RX)} | | 300 | 450 | mA |
| Data Rate | | | 10.3125 | 10.5 | Gb/s |

| Transmitter Optical Specifications (-40°C < Topr < 85°C, 3.13V < Vcc < 3.47V) | | | | | | |
|---|---------------------|----------------------|----------------|----------------------|-------|--------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Average Launch Power | P _{O, AVG} | 1 | | 5 | dBm | 1 |
| Output Center Wavelength | λ | λ _c - 5.5 | λ _c | λ _c + 7.5 | nm | 2 |
| Output Spectrum Width | Δλ | --- | | 1 | nm | -20 dB width |
| Extinction Ratio | ER | 3.5 | | | dB | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| Average Launch Power of OFF Transmitter | | | | -30 | dBm | |

- Output power is power coupled into a 9/125 μm single-mode fiber.
- ITU-T G.694.2 CWDM wavelength from 1270 nm to 1370 nm, each step 20 nm.

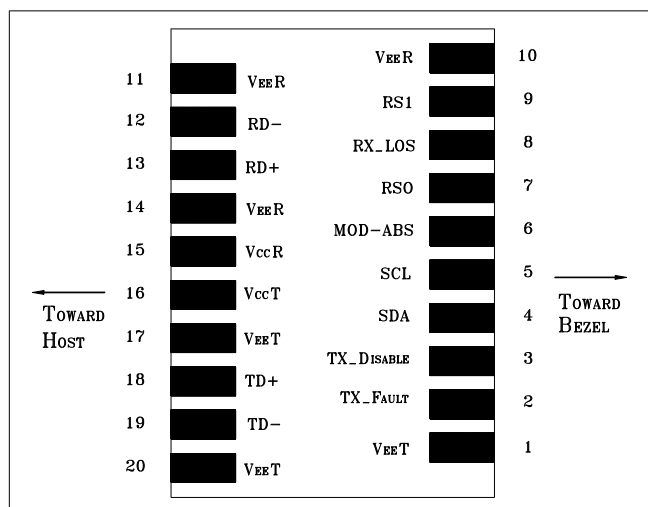
| Receiver Optical Specifications (-40°C < Topr < 85°C, 3.13V < Vcc < 3.47V) | | | | | | |
|--|------------------|------|-----|------|-------|-------------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Sensitivity | | | | -15 | dBm | 3 |
| Receiver Overload | P _{MAX} | 0.5 | --- | | dBm | |
| LOS -- Deasserted | LOS _D | --- | --- | -15 | dBm | Transition: low to high |
| LOS -- Asserted | LOS _A | -28 | --- | --- | dBm | Transition: high to low |
| Wavelength of Operation | λ _c | 1260 | | 1620 | nm | |

- Measured with average power; BER < 10⁻¹² and PRBS 2³¹-1.

| Electrical Characteristics | | | | | | |
|--|------------------|-----|---------|----------------------|------------------|-----------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| High-Speed Signal (CML) Interface Specification | | | | | | |
| Input Data Rate | | | 10.3125 | | Gb/s | |
| TX Clock Tolerance | | | | ±100 | ppm | 4 |
| Differential Input Impedance | R _{in} | | 100 | | Ω | |
| Differential Data Input Amplitude | | 150 | | 1200 | mV _{pp} | Internally AC coupled |
| Output Data Rate | | | 10.3125 | | Gb/s | |
| RX Clock Tolerance | | | | ±100 | ppm | 4 |
| Differential Output Impedance | R _{out} | | 100 | | Ω | |
| Differential Data Output Amplitude | | 350 | 600 | 700 | mV _{pp} | Internally AC coupled |
| 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 | |

- Clock tolerance for 9.95Gb/s, 10.3125Gb/s and 10.5187Gb/s.

CONNECTION DIAGRAM



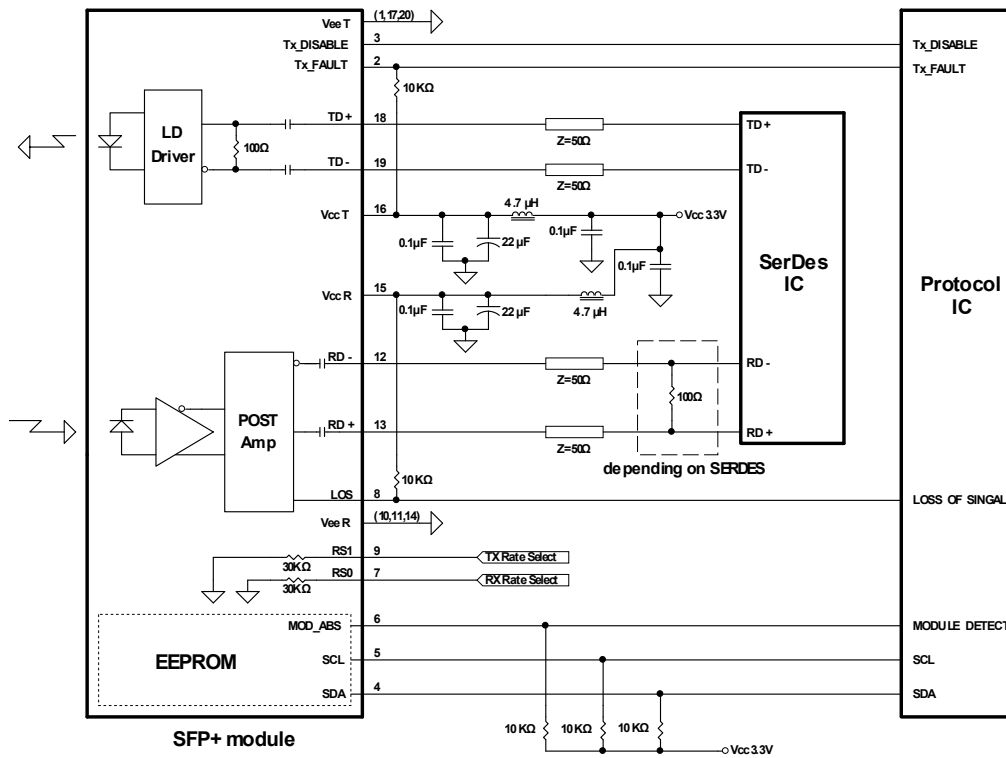
| PIN | Signal Name | Description | PIN | Signal Name | Description |
|-----|-------------|---|-----|-------------|-----------------------------|
| 1 | VEET | Transmitter Signal Ground | 11 | VEER | Receiver Signal Ground |
| 2 | TX_Fault | Transmitter Fault Indication. Logic “1” Output = Laser Fault. 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 (LVTTL). 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 (LVTTL). 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.

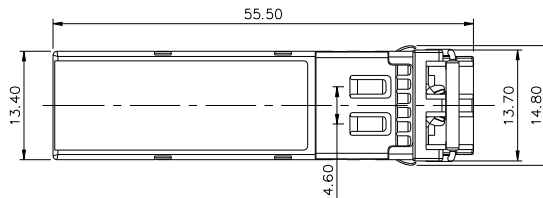
RECOMMENDED CIRCUIT SCHEMATIC



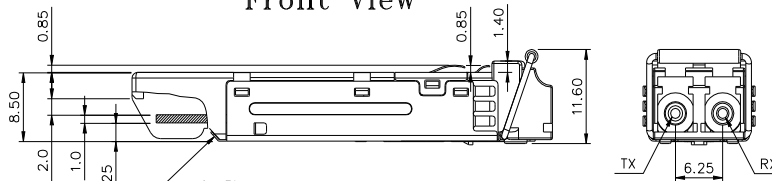
PACKAGE DIAGRAM

Units in mm

Top View

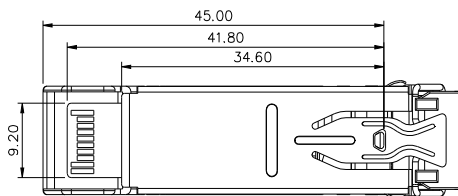


Front View



Side View

Bottom View



Note: Specifications subject to change without notice.

REVISION HISTORY

| Version | Subject | Release Date |
|---------|-------------------|--------------|
| 1.0 | Initial datasheet | 2019/1/8 |
| | | |
| | | |