

## Description

### General

The SFP-1000WA35-D60 transceiver from APC is small form factor pluggable module for serial optical data Communications applications specify of Gigabit Ethernet IEEE802.3z/D5 and Fiber Channel. This module is designed for single mode fiber with cost effective and high performance by using 1310 nm transmitter and 1550 nm receiver. It is with the SFP 20-pin connector to allow hot plug capability



### Transmitter Section

The transmitter consists of a high-performance 1310 nm DFB laser in the bi-directional optical subassembly (BOSA), which is housed within a metal package. In addition, this component is also class 1 laser compliant with according to International Safety Standard IEC-825

### Receiver Section

The receiver contain of an integrated planar InGaAs PIN photodiode coupled to a high sensitivity transimpedance amplifier (TIA) in an BOSA. This BOSA combination is mated to a post amplifier IC that provides the post amplification and SD (Signal Detect) indication circuit, which provides LVTTTL logic low state output when an unusable input optical signal level is detected.

## Features

- Single + 3.3 V power Supply
- Small Form Factor Pluggable MSA Compliant.
- PECL Differential Inputs and Output
- TTL Signal Detect Indicator.
- For Single Mode Applications
- LC Simplex Connector
- EEPROM with serial ID functionality.
- Class 1 Laser International Safety Standard IEC 825 Compliant
- Bi-directional Linking Distance Up to 60 km
- Temperature Ranges: 0 °C to +70 °C
- RoHS Compliant

## Applications

- Bridges/Routers/intelligent hub and concentrators
- Gigabit Ethernet / Fiber Channel
- Storage Area Network

## Performance Specifications

| Absolute Maximum Ratings             |                   |     |      |        |        |
|--------------------------------------|-------------------|-----|------|--------|--------|
| Parameter                            | Symbol            | Min | Typ  | Max    | Unit   |
| Supply Voltage                       | V <sub>CC</sub>   | 0   | -    | 5      | V      |
| Storage Temperature                  | T <sub>S</sub>    | -40 | -    | 85     | °C     |
| Operating Temperature                | T <sub>OP</sub>   | 0   | -    | 70     | °C     |
| Lead Soldering Limits                | T <sub>SOLD</sub> | -   | -    | 260/10 | °C/sec |
| General Specifications               |                   |     |      |        |        |
| Parameter                            | Symbol            | Min | Typ  | Max    | Units  |
| Data Rate                            | B                 | -   | 1.25 | -      | Gbps   |
| Supported Link Length on 9/125μm MMF | L                 | -   | 60   | -      | Km     |

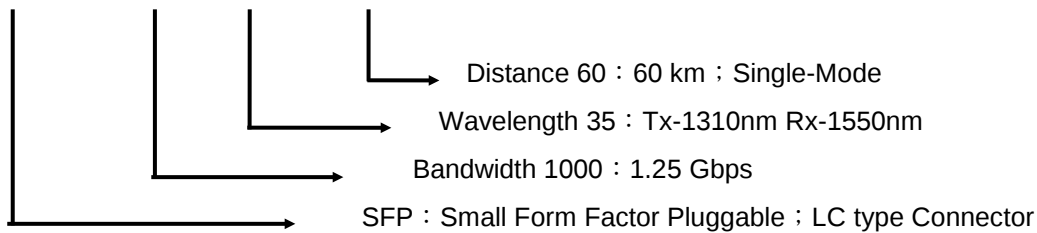
## Optical and Electrical Characteristics

| Transmitter Electrical Characteristics |                   |       |      |       |      |
|----------------------------------------|-------------------|-------|------|-------|------|
| Parameter                              | Symbol            | Min   | Typ  | Max   | Unit |
| Supply Voltage                         | $V_{CC}$          | 3.15  | 3.3  | 3.45  | V    |
| Supply Current                         | $I_{CC}$          | -     | -    | 160   | mA   |
| Data Differential Input Voltage        | $V_{in, pp}$      | 300   | -    | 1600  | mV   |
| Disable Input Voltage                  | $V_{IL} - V_{CC}$ | -1.81 | -    | -1.48 | V    |
| Enable Input Voltage                   | $V_{IH} - V_{CC}$ | -1.16 | -    | -0.88 | V    |
| Transmitter Optical Characteristics    |                   |       |      |       |      |
| Parameter                              | Symbol            | Min   | Typ  | Max   | Unit |
| Output Optical Power                   | $P_O$             | 0     | -    | +5    | dBm  |
| Center Wavelength                      | $\lambda_C$       | 1290  | 1310 | 1330  | nm   |
| Spectral Width (RMS)                   | $\Delta\lambda$   | -     | 1    | -     | nm   |
| Optical Rise Time (10%-90%)            | $t_r$             | -     | -    | 0.26  | ns   |
| Optical Fall Time (10%-90%)            | $t_f$             | -     | -    | 0.26  | ns   |
| Extinction Ratio                       | ER                | 8.2   |      | -     | dB   |

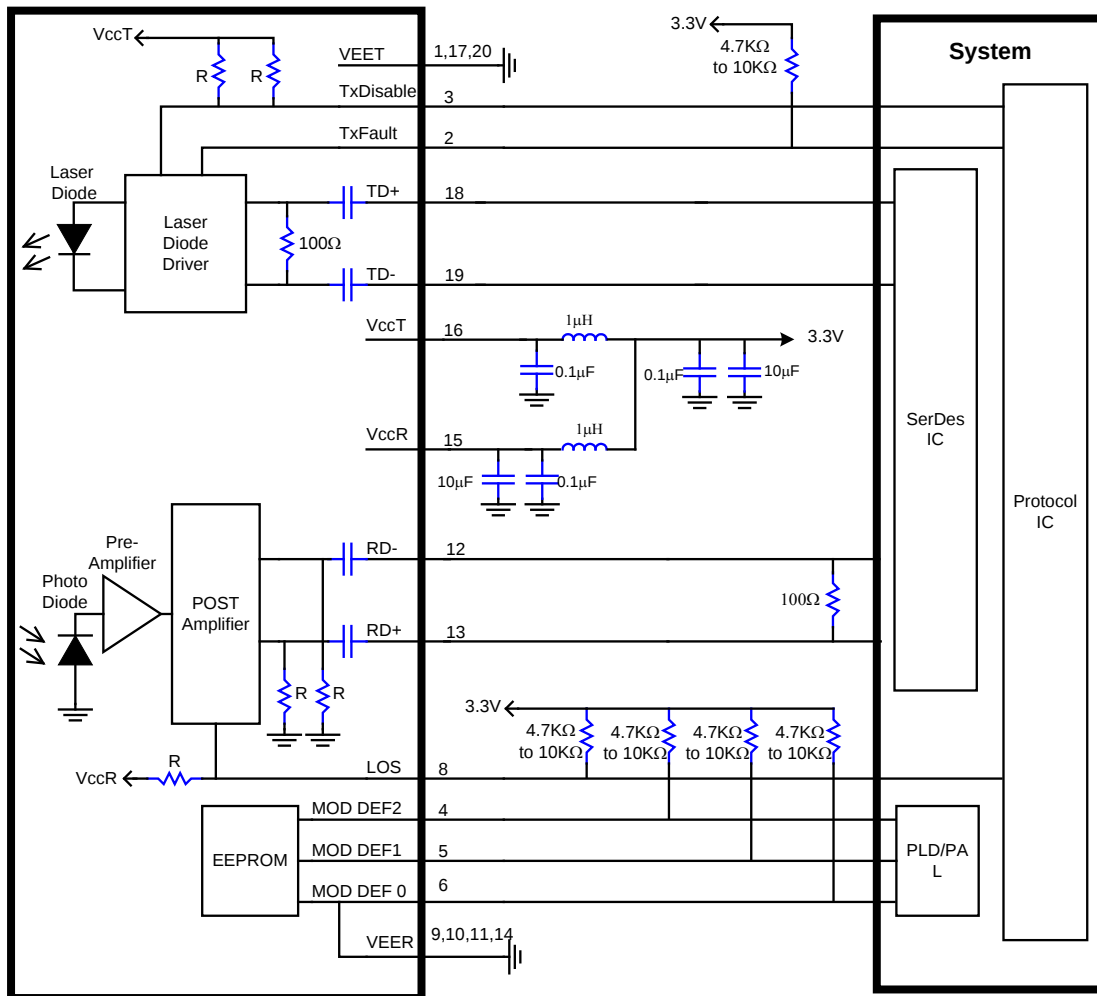
| Receiver Electrical Characteristics |               |      |     |      |          |
|-------------------------------------|---------------|------|-----|------|----------|
| Parameter                           | Symbol        | Min  | Typ | Max  | Unit     |
| Supply Voltage                      | $V_{CC}$      | 3.15 | 3.3 | 3.45 | V        |
| Supply Current                      | $I_{CC}$      | -    | -   | 100  | mA       |
| Data Differential Output Voltage    | $V_{out, pp}$ | 300  | -   | 1000 | mV       |
| Data Output Rise Time (10%-90%)     | $t_r$         | -    | -   | 0.35 | ns       |
| Data Output Fall Time (10%-90%)     | $t_f$         | -    | -   | 0.35 | ns       |
| Receiver Optical Characteristics    |               |      |     |      |          |
| Parameter                           | Symbol        | Min  | Typ | Max  | Unit     |
| Maximum Receiver Power              | $P_{in}$      | -3   | -   | -    | dBm      |
| Receiver Sensitivity                | $P_S$         | -    | -24 | -    | dBm      |
| Optical Center Wavelength           | $\lambda_C$   | 1480 | -   | 1600 | nm       |
| Signal Detect-Asserted              | $P_A$         | -    | -   | -24  | dBm avg. |
| Signal Detect-Deasserted            | $P_D$         | -36  | -   | -    | dBm avg. |
| Signal Detect-Hysteresis            | $P_A - P_D$   | 0.5  | -   | -    | dB       |

## Ordering Information

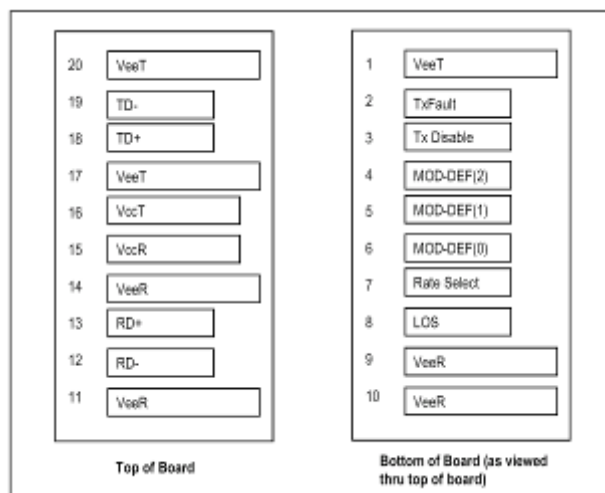
### SFP – 1000WA35 – D60



## Recommended Circuit Schematic



## SFP Transceiver Electrical Pad Layout



## Pinout Table

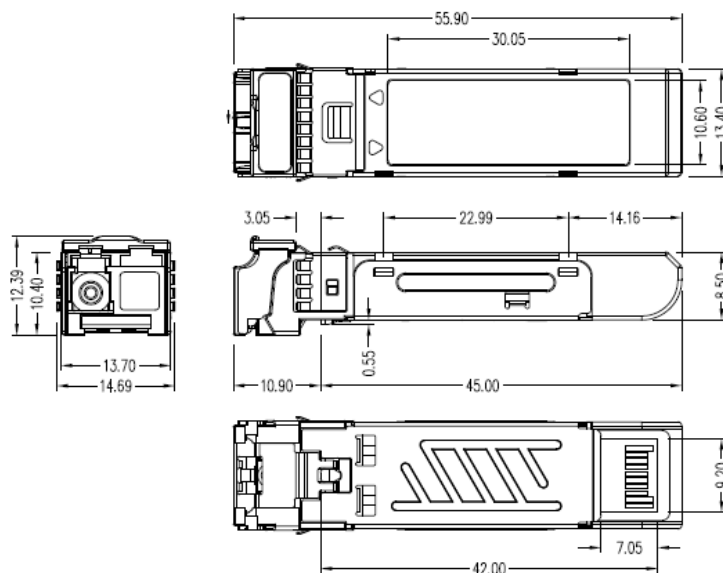
| Pin | Symbol             | Name/Description                                                                                  | Ref. |
|-----|--------------------|---------------------------------------------------------------------------------------------------|------|
| 1   | V <sub>EET</sub>   | Transmitter Ground                                                                                | 1    |
| 2   | T <sub>FAULT</sub> | Transmitter Fault.                                                                                | 4    |
| 3   | T <sub>DIS</sub>   | Transmitter Disable. Laser output disabled on high or open.                                       | 2    |
| 4   | MOD_DEF (2)        | Module Definition 2. Data line for Serial ID.                                                     | 3    |
| 5   | MOD_DEF (1)        | Module Definition 1. Clock line for Serial ID.                                                    | 3    |
| 6   | MOD_DEF (0)        | Module Definition 0. Grounded within the module.                                                  | 3    |
| 7   | Rate Select        | No connection required                                                                            |      |
| 8   | LOS                | Loss of Signal indication. Logic 0 indicates normal operation.                                    | 5    |
| 9   | V <sub>EER</sub>   | Receiver Ground                                                                                   | 1    |
| 10  | V <sub>EER</sub>   | Receiver Ground                                                                                   | 1    |
| 11  | V <sub>EER</sub>   | Receiver Ground                                                                                   | 1    |
| 12  | RD-                | Receiver Inverted DATA out. AC Coupled                                                            |      |
| 13  | RD+                | Receiver Non-inverted DATA out. AC Coupled                                                        |      |
| 14  | V <sub>EER</sub>   | Receiver Ground                                                                                   | 1    |
| 15  | V <sub>CCR</sub>   | Receiver Power Supply                                                                             |      |
| 16  | V <sub>CCT</sub>   | Transmitter Power Supply                                                                          |      |
| 17  | V <sub>EET</sub>   | Transmitter Ground                                                                                | 1    |
| 18  | TD+                | Transmitter Non-Inverted DATA in. 100 ohm termination between TD+ and TD-, AC Coupled thereafter. |      |
| 19  | TD-                | Transmitter Inverted DATA in. See TD+                                                             |      |
| 20  | V <sub>EET</sub>   | Transmitter Ground                                                                                | 1    |

### Notes:

- Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
- TX-Fault is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.
- LOS is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## Package Outline Drawing

Dimension (unit:mm)



比例:2:1 公差:±0.2mm

## RoHS Reference

| Material Classify            | Substance                           | Reference  | Standard   | Analysis                  | Equipment |
|------------------------------|-------------------------------------|------------|------------|---------------------------|-----------|
| Heavy Metals                 | Lead (Pb)/ Lead Compounds           | 2002/95/EC | < 1000 ppm | US EPA 3050B              | ICP-AES   |
|                              | Cadmium (Cd)/ Cadmium Compounds     | 2002/95/EC | < 100 ppm  | EN1122-2001<br>91/338/EEC | ICP-AES   |
|                              | Mercury ( Hg ) / Mercury Compounds  | 2002/95/EC | < 1000 ppm | US EPA 3052               | ICP-AES   |
|                              | Hexavalent-Chromium( Cr6+)Compounds | 2002/95/EC | < 1000 ppm | US EPA 3060A<br>& 7196A   | UV-VIS    |
| Brominated Organic Compounds | PolyBrominated Biphenyls (PBB)      | 2002/95/EC | < 1000 ppm | US EPA 3540 &<br>3550     | GC/MS     |
|                              | PolyBromo Diphenyl Ethers(PBDE)     | 2002/95/EC | < 1000 ppm | US EPA 3540 &<br>3550     | GC/MS     |

### Qualification Information

| Heading               | Test                       | Conditions                                      | Sample Size | Reference                    |
|-----------------------|----------------------------|-------------------------------------------------|-------------|------------------------------|
| Mechanical & Physical | Mechanical Shock           | 5 times/axis<br>500G , 1.0ms                    | 11          | MIL-STD-883<br>Method 2002   |
|                       | Vibration                  | 20G , 20Hz - 2000HZ<br>4min/cycle ,4cycles/axis | 11          | MIL-STD-883<br>Method 2007   |
|                       | Thermal Shock              | Delta T=100°C                                   | 11          | MIL-STD-883<br>Method 2003   |
|                       | Solderability              | -                                               | 11          | MIL-STD-883<br>Method 2007   |
|                       | Fiber Pull                 | 1Kg ; 3times ; 5sec                             | 11          | Bellcore 983                 |
| Endurance             | Accelerated Aging          | 85°C , 5000hrs                                  | 25          | Bellcore 983<br>Section 5.18 |
|                       | High Temperature Storage   | 85°C , 2000hrs                                  | 11          | Bellcore 983                 |
|                       | Low Temperature Storage    | -40°C , 2000hrs                                 | 11          | Bellcore 983                 |
|                       | Temperature Cycling        | 500 cycles.                                     | 11          | Bellcore 983<br>Section 5.20 |
|                       | Cyclic Moisture Resistance | 10 cycles                                       | 11          | Bellcore 983<br>Section 5.23 |
|                       | Damp Heat                  | 40°C , 95%<br>RH , 1344hrs                      | 11          | MIL-STD-202<br>Method 103    |
| Special Test          | Internal Moisture          | <5000ppm water vapor                            | 11          | MIL-STD-883<br>Method 1018   |
|                       | Flammability               | -                                               | -           | TR357<br>Sec.4.4.2.5         |
|                       | ESD Threshold              | -                                               | 6           | Bellcore 983<br>Section 5.22 |