



# **AON120 Fiber Mini Node**

**Quick Reference  
Guide**

**Revision D**

## ACT AON120 Fiber Mini Node (Optical Receiver)

### Quick Reference Guide

ACT Document Number: ACT AON120 QRG Revision D

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This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

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#### Revision Distortory

| Revision | Date       | Reason for Change      |
|----------|------------|------------------------|
| A        | 12/01/2013 | Initial release        |
| B        | 1/16/2015  | Updated specifications |
| C        | 12/15/2018 | Updated precautions    |

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## 1 Precautions



### Warning

Exposure to class 1M laser radiation is possible. Access should be restricted to trained personnel only. Do not view exposed fiber or connector ends when handling optical equipment.



- Ensure adequate cooling and ventilation as specified.
- The installation and operation manual should be read and understood before units are put into use.
- **Always replace protective caps on optical connectors when not in use.**
- The typical connectors fitted are SC/APC 8°. **Note:** 8° angle polished connectors must be used.

### Cleaning

Use only a damp cloth for cleaning the front panel. Use a soft dry cloth to clean the top of the unit.

Do not use spray cleaner of any kind.

### Overloading

Overloading wall outlets and extension cords can result in a risk of fire or electric shock.

Use approved electrical cords.

### Damage requiring service

Unplug unit and refer servicing only to Ascent Communication Technology qualified service personnel.

### Servicing

Do not attempt to service this unit yourself. Refer all servicing only to Ascent Communication Technology qualified service personnel.

### General Reminders and Warnings

Review these reminders and warnings before you inspect and clean your fiber-optic connections.

#### Reminders



- **Always turn off any laser sources before you inspect fiber connectors, optical components, or bulkheads.**
- Always make sure that the cable is disconnected at both ends and that the card or pluggable receiver is removed from the chassis.
- **Always wear the appropriate safety glasses when required in your area. Be sure that any laser safety glasses meet federal and state regulations and are matched to the lasers used within your environment.**
- Always inspect the connectors or adapters before you clean.
- Always inspect and clean the connectors before you make a connection.
- Always use the connector housing to plug or unplug a fiber.
- **Always keep a protective cap on unplugged fiber connectors.**

- Always store unused protective caps in a resealable container in order to prevent the possibility of the transfer of dust to the fiber. Locate the containers near the connectors for easy access.
- Always discard used tissues and swabs properly.

## Warnings



- Never use alcohol or wet cleaning without a way to ensure that it does not leave residue on the endface. It can cause damage to the equipment.
- **Never look into a fiber while the system lasers are on.**
- Never clean bulkheads or receptacle devices without a way to inspect them.
- Never touch products without being properly grounded.
- **Never use unfiltered handheld magnifiers or focusing optics to inspect fiber connectors.**
- **Never connect a fiber to a fiberscope while the system lasers are on.**
- Never touch the end face of the fiber connectors.
- Never twist or pull forcefully on the fiber cable.
- Never reuse any tissue, swab, or cleaning cassette reel.
- Never touch the clean area of a tissue, swab, or cleaning fabric.
- Never touch any portion of a tissue or swab where alcohol was applied.
- Never touch the dispensing tip of an alcohol bottle.
- Never use alcohol around an open flame or spark; alcohol is very flammable.

## 2 Introduction

### 2.1 Overview

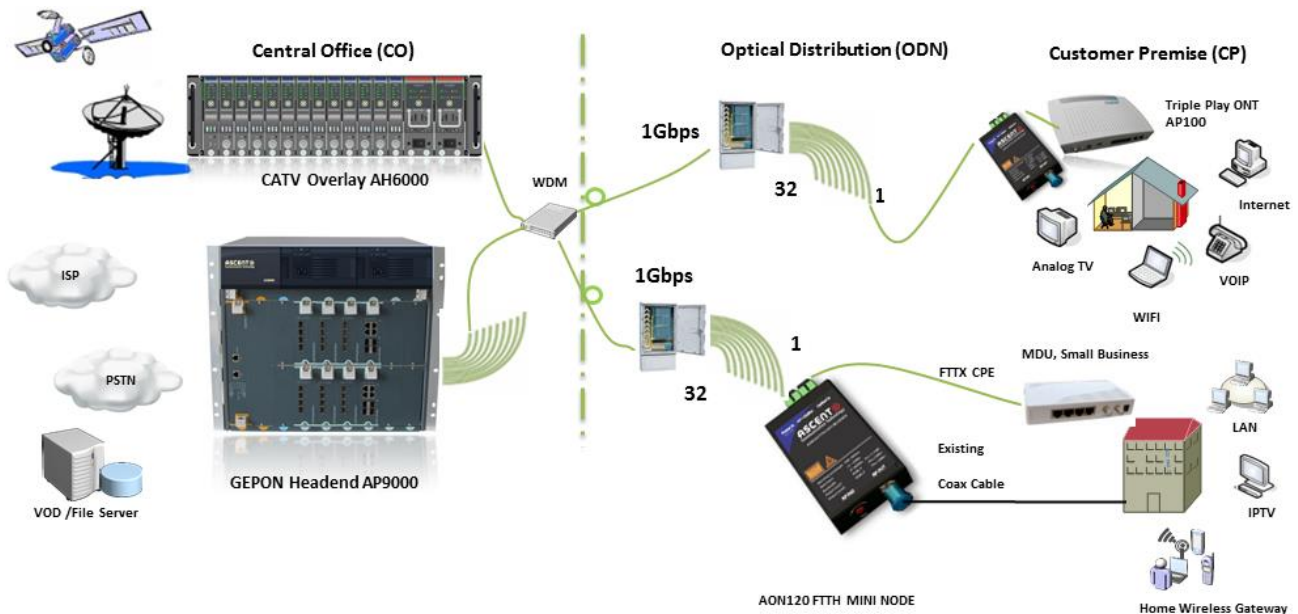
AON120 Series FTTH mini node supports Video Overlay application over FTTH optical fiber access network. It operates on 1002MHz RF bandwidth, with high output power up to 82 dBμV (AGC). AON120 has low power consumption and optional built-in WDM to support PON signal pass-through. It is part of ACT Deep Fiber and FTTH solution, which helps operators provide superior video services in a FTTH PON network architecture.

The AON120 Mini Node adopts high sensitivity optical receiver and specially designed low noise matching circuit. The mini node provides high output and is installed at the subscriber premises, suitable for advanced FTTx, high density MDU, SMB, or hospitality market applications. The AON120 mini node is designed with built in WDM optical passive, which will pass the 1310/1490nm data wavelength to the ONU/ONT CPE device.

With the extremely compact housing, modular design, AON120 mini node provides the flexible configuration for MSOs to deliver advanced video services to their customer. This fiber deep product series improve overall network performance, and offer sufficient bandwidth for new application demand.

## 2.2 Features

- 1002 MHz RF Spectrum for superior video services
- Small form factor and low power consumption
- Low noise circuit (3.8% modulate, -10 dBm receive, CNR  $\geq$  45 dB)
- High output power up to 82 dB $\mu$ V for MDU application
- Excellent linearity at wider optical receiving range +3 dBm to -12 dBm
- Flatness less than  $\pm 0.75$  dB In the range of 47 MHz to 862 MHz
- Metal shell, supply safeguards to opto-electrical sensing device
- Optional built-in WDM provides PON pass-through capability in a FTTH optical passive network
- Powered directly using the power adaptor
- The compact enclosure fits easily in CPE, ONU housing or network termination boxes



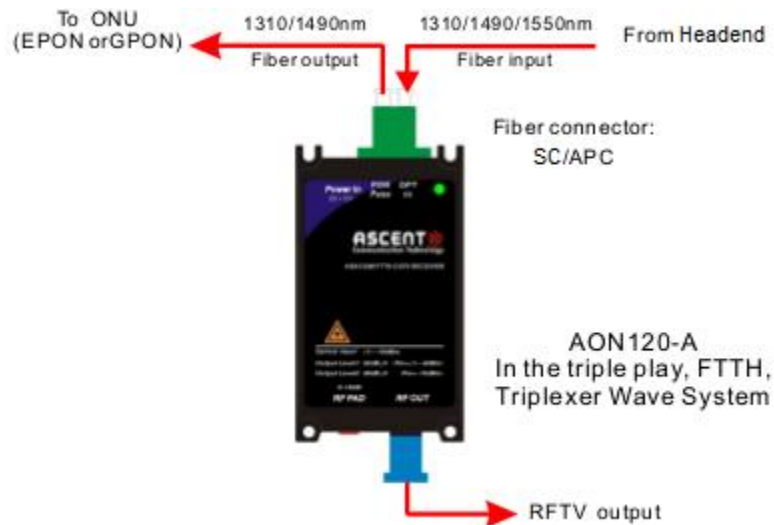
## 2.3 Specifications

### AON120 FTTH Deep Fibre Mini Node

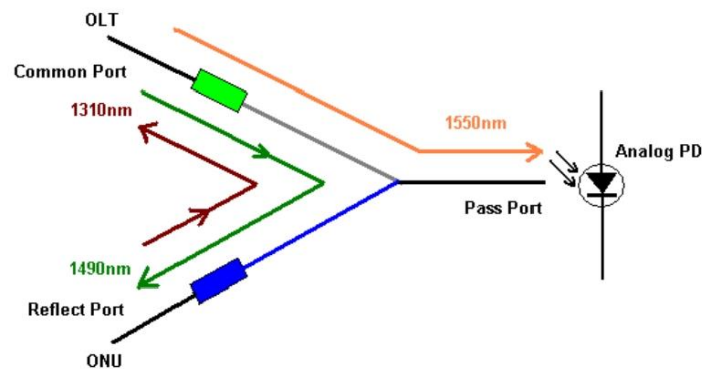
#### Downstream Specifications (Receiver)

|                             |  |
|-----------------------------|--|
| Wavelength                  | 1200 nm to 1600 nm or 1540 nm to 1560 nm   |
| Optical Input Power         | -17 dBm to +3 dBm (-7 dBm to +3 dBm for analog TV signal)<br>-14 dBm to 2 dBm (1550 nm LED Green)<br>-16 dBm to -14 dBm (1550 nm LED Orange)<br>≤-16 dBm or ≥2 dBm (1550 nm LED Red) |
| Optical Return Loss         | -55 dB   |
| WDM IL (optional)           | ≤1 dB  |
| Channel Isolation           | ≥40 dB   |
| Responsivity                | ≥0.9 A/W @ 1550 nm   |
| Channel Isolation           | ≥40dB  |
| RF Bandwidth:               | 47 MHz to 1002 MHz   |
| Output Level                | 92 dBμV @ +3 dBm, 82 dBμV @ -2 dBm, adjustable (MGC)<br>82 dBμV @ -7 dBm to +3 dBm (AGC)   |
| Output Level Adjustment     | 0 to 20dB  |
| RF Flatness                 | ±0.75 dB   |
| RF Return Loss              | ≥14 dB   |
| RF Input Impedance          | 75 Ω   |
| RF Connector                | F-Female   |
| Link Performance            |  |
| CNR                         | 48.0 dB (60 PAL-D, -8 dBm receive, 3.8% OMI )  |
| CTB                         | -65 dBc  |
| CSO                         | -65 dBc  |
| HUM                         | -60 dB   |
| General Specifications      |  |
| Optical Connector           | SC/APC, SC/UPC, LC/PC  |
| Operating Temp              | -20 °C to 50 °C  |
| Storage Temp                | -40 °C to 85 °C  |
| Power Supply                | +12 V DC   |
| Operating Relative Humidity | 5 % to 95 %  |
| Power Consumption           | ≤3 W   |
| Dimensions (W × D × H)      | 48 mm × 88 mm × 22 mm  |
| Weight                      | 0.4 kg   |
| Ship Weight                 | 5 kg (Packed in carton boxes of ten units)   |

## 2.4 System Connection

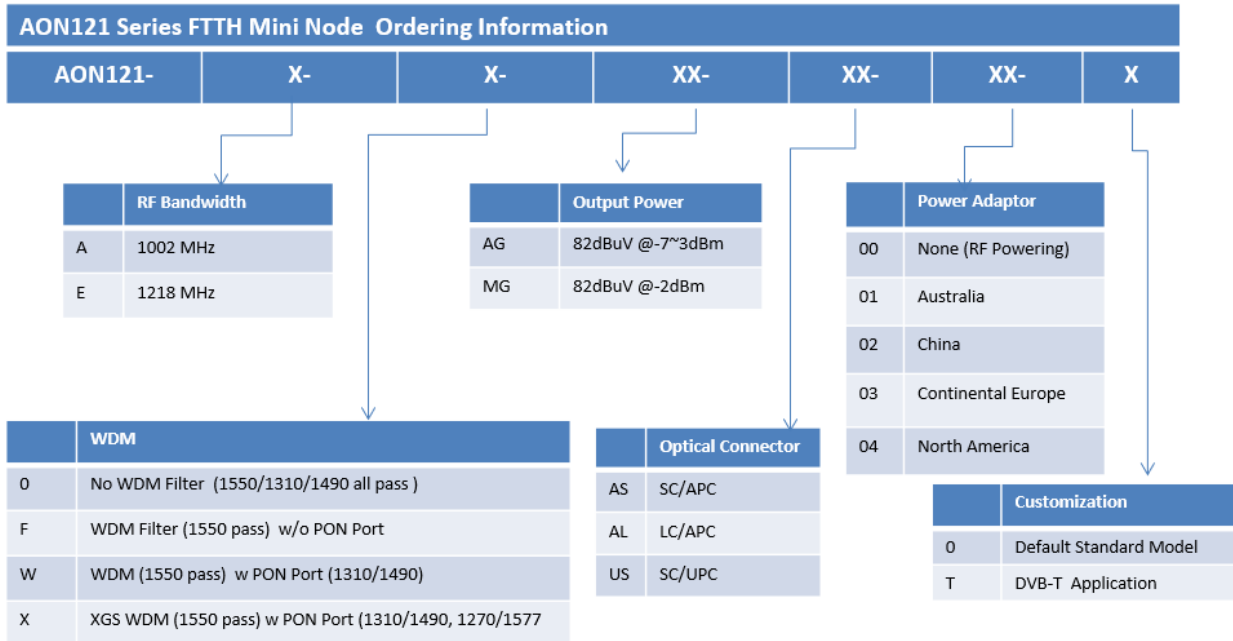


AON120 Block Diagram



AON120 PON Signal Bypassing Diagram

## 2.5 Models and Options



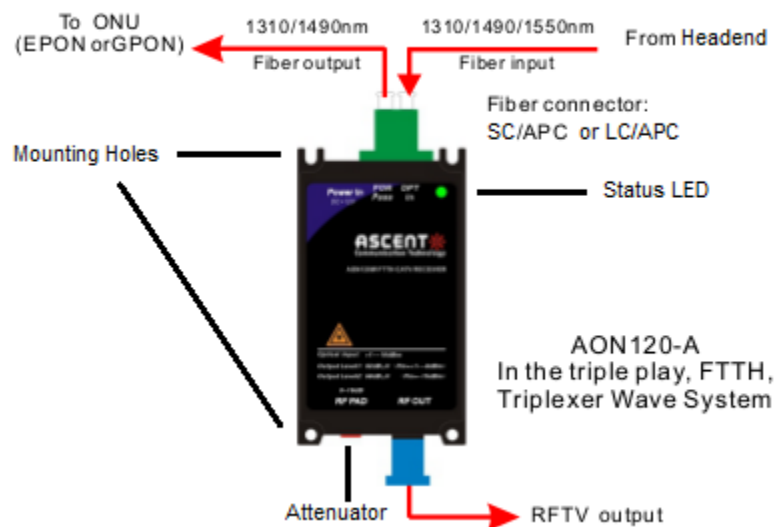
## 3 Configuration and Installation

This chapter introduces AON120 setup and installation. Before installing the equipment, please read this chapter thoroughly.

### 3.1 Housing

The AON120 is packaged in one-piece sheet metal housing. The top housing contains the Optical connection ports and the bottom housing contains the RF connection port.

Four Cabinet Mount Holes are equipped which allow the optical node to be pedestal mounted.



## 3.2 Equipment Inventory

On receiving your new AON120 unit, you should carefully unpack and examine the contents for loss or damage that may have occurred during shipping. Refer to warranty registration if loss or damage has occurred. The AON120 should consist of the following:

| Qty | Description  |
|-----|--|
| 1   | AON120 Mini Node                                       |
| 1   | Optional Quick Reference Guide ( Ref: Online version ) |
| 1   | Universal 12 VDC power supply plug-pack                |

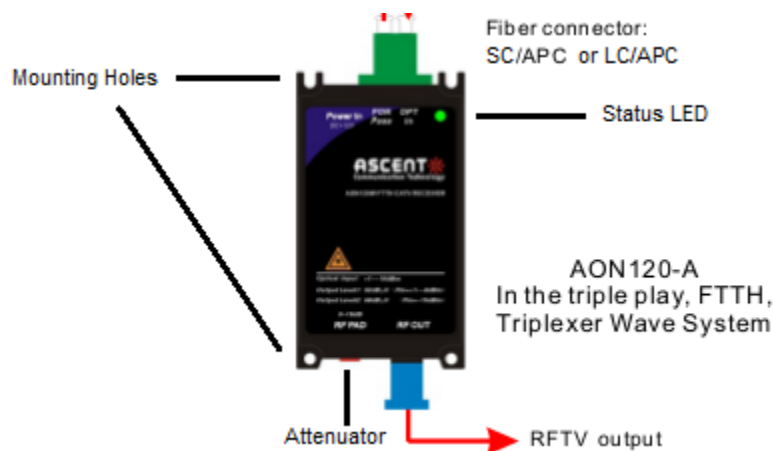
## 3.3 Power and Cooling Requirements

The AON120 requires an external supply of 11 V DC to 16 V DC. The maximum power consumption of the unit is 3 W. A universal 12 V DC power supply plug-pack is supplied with the unit, and is suitable for 95 V AC to 265 V AC 50/60 Hz with selectable mains pins for Australia, Continental Europe, United Kingdom and United States.

The AON120 is specified for operation between -20 °C to +50 °C. Ensure that the unit is mounted in such a way as to permit airflow around the front and sides at all times.

## 3.4 Mounting

The AON120 has four mounting holes to fix the unit to the inside of a wiring closet or meter box. The AON120 is designed to be a flexible and environmentally-friendly unit and as such can be mounted in a number of ways to suit individual setup scenarios; however it is important to permit free air flow across the front and sides of the unit.



## 3.5 Setting up the AON120



### Warning

Exposure to class 1M laser radiation is possible. Access should be restricted to trained personnel only.

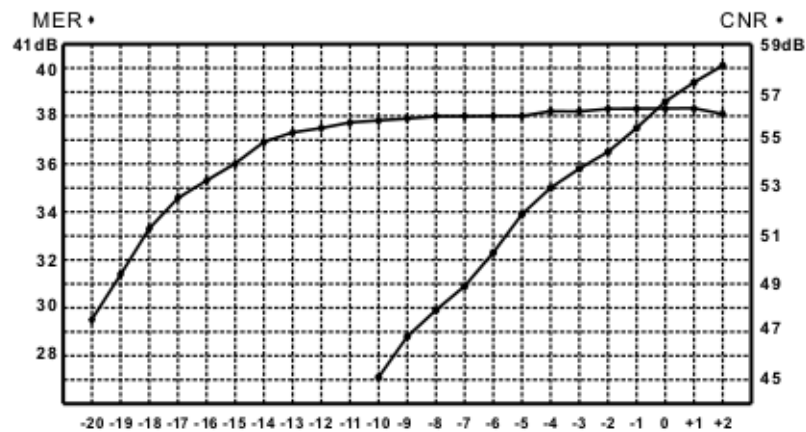
1. Ensure that the unit is complete with all expected equipment
2. If you are mounting the unit in a wiring closet or meter box, do this **before** connecting the optical and coaxial cables. Keep in mind appropriate clearances for these cables, air flow etc.
3. Connect the RF OUT port to the RF signal output.
4. Optical Input Port: Connect to forward fiber with SC/APC connector
5. PON Pass Port: Connect to PON signal fiber with SC/APC connector.
6. Connect CATV+PON and PON Pass to the CATV Coaxial network and the ONU.
7. Connect power to the unit via the power port
8. Check that the Status LEDs is on. -7 dBm to 0 dBm (1550 nm LED Green), -10 dBm to -7 dBm (1550 nm LED Orange),  $\leq -10$  dBm or  $\geq 0$  dBm (1550 nm LED Red)
9. Ensure that the Status Alarm LED is green. Orange or Red indicates that the received optical level is too low or too high, and is at risk of damaging the unit.
10. User can adjust the RF Output power by the adjustable attenuator: Output level adjustment range of 0 to 20 dB.

## 4 Distortion performance

| PIN (DBM) | VO (DBμV) | MER  | BER<br>POST | PER     | PIN (DBM) | VO (DBμV) | MER  | BER<br>POST | PER     |
|-----------|-----------|------|-------------|---------|-----------|-----------|------|-------------|---------|
| +2.0      | 70.9      | 38.8 | <1.0E-9     | <1.0E-9 | -8.0      | 81.6      | 38.7 | <1.0E-9     | <1.0E-9 |
| +1.0      | 82.1      | 38.8 | <1.0E-9     | <1.0E-9 | -9.0      | 80.0      | 38.6 | <1.0E-9     | <1.0E-9 |
| 0.0       | 80.8      | 38.8 | <1.0E-9     | <1.0E-9 | -10.0     | 78.3      | 38.5 | <1.0E-9     | <1.0E-9 |
| -1.0      | 81.7      | 38.8 | <1.0E-9     | <1.0E-9 | -11.0     | 76.0      | 38.4 | <1.0E-9     | <1.0E-9 |
| -2.0      | 81.7      | 38.8 | <1.0E-9     | <1.0E-9 | -12.0     | 74.3      | 38.2 | <1.0E-9     | <1.0E-9 |
| -3.0      | 81.9      | 38.8 | <1.0E-9     | <1.0E-9 | -13.0     | 72.5      | 37.8 | <1.0E-9     | <1.0E-9 |
| -4.0      | 81.8      | 38.8 | <1.0E-9     | <1.0E-9 | -14.0     | 70.4      | 37.5 | <1.0E-9     | <1.0E-9 |
| -5.0      | 81.7      | 38.8 | <1.0E-9     | <1.0E-9 | -15.0     | 68.6      | 36.9 | <1.0E-9     | <1.0E-9 |
| -6.0      | 81.7      | 38.8 | <1.0E-9     | <1.0E-9 | -16.0     | 66.7      | 36.2 | <1.0E-9     | <1.0E-9 |
| -7.0      | 81.9      | 38.7 | <1.0E-9     | <1.0E-9 | -17.0     | 64.9      | 35.2 | <1.0E-9     | <1.0E-9 |

- Notes: 1. Pin = +2.0 dBm to -20 dBm  
 2. Test Signal: KAB3000 MER: 38.8 (dB), BER <1.0E-9  
 3. Channel Load: 4CH QAM64  
 4. Test Equipment: JDSU SDA4040D

CNR, MER Degradation Table



- Notes: 1. CNR test conditions: 59CH PAL-D, OMI = 3.8%  
 2. Digital TV test signal: The original signal MER = 38.8 dB. BER < 1.0E-9 TV  
 Input Level: 87 dBμV

## 5 Three-Wavelengths WDM Module

### 5.1 Features

- Low insertion loss
- Low return loss
- High channel separation
- High stability and reliability
- No plastic optical path

### 5.2 Applications

- Light circuit terminal, optical network unit
- FTTH
- Optical transceiver
- Cable TV systems
- WDM systems

### 5.3 WDM Specifications

#### Absolute Maximum Ratings (Tc = 25 °C)

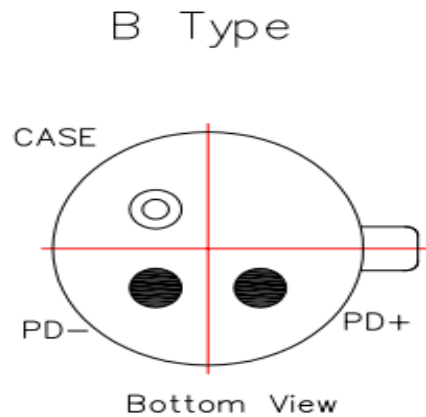
| Parameter             | Symbol | Value             |
|-----------------------|--------|-------------------|
| Saturation power      | Ps     | 2.0 mW            |
| Forward current       | If     | 2.0 mA            |
| Reverse voltage       | Vr     | 15 V              |
| Operating temperature | Top    | -40 °C to +85 °C  |
| Storage temperature   | Tstg   | -40 °C to +125 °C |

#### Optical and Electrical Characteristics (Tc = 25 °C)

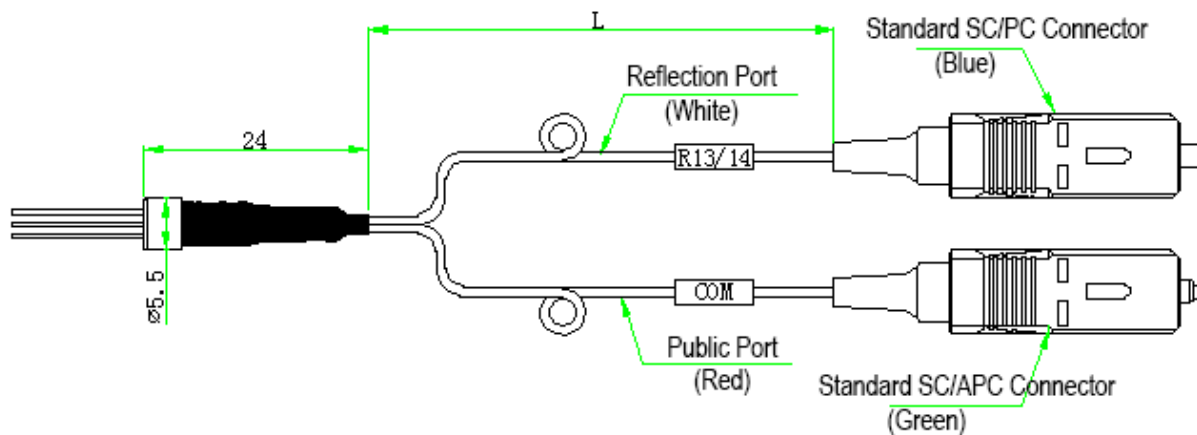
| Parameter                     | Symbol    | Min. | Typ. | Max. | Unit | Remarks                                       |
|-------------------------------|-----------|------|------|------|------|---|
| Pass Channel Wavelength Range | $\lambda$ |      | 1550 |      | nm   |   |
| Reflect Channel Wavelength    | $\lambda$ |      | 1310 |      | nm   |   |
|                               | $\lambda$ |      | 1490 |      | nm   |   |
| Responsibility                | R         | 0.93 |      |      | A/W  | $\lambda = 1550 \text{ nm}, P_o = 0\text{dB}$ |
| Isolation                     |           |      |      |      |      |   |
| Pass Channel                  | Iso       | 30   |      |      | dB   |   |
| Reflect Channel               | Iso       | 22   |      |      | dB   |   |
| Polarization Dependent Loss   |           |      |      |      |      |   |
| Pass Channel                  | PDL       |      |      | 0.05 | dB   |   |
| Reflect Channel               | PDL       |      |      | 0.05 | dB   |   |
| Directivity                   |           | 50   |      |      | dB   |   |

|                       |    |     |    |
|-----------------------|----|-----|----|
| Return loss           | RL | 45  | dB |
| <b>Insertion Loss</b> |    |     |    |
| Pass Channel          | IL | 0.8 | dB |
| Reflect Channel       | IL | 0.7 | dB |

## 5.4 PD Pin Assignment



## 5.5 Mechanical Dimensions



## 6 Troubleshooting

### **POWER LED off**

Ensure that the unit is connected to a suitable power source. The power adapter for this equipment has an input of 220 V and an output of 12 V DC. If the STATUS LED is still off, the unit is likely to be faulty and should be returned to Ascent Communication Technology for repair.

### **OPT. IN LED showing red**

The optical level entering the unit is too low or too high and must be adjusted externally to the unit, for optimal performance.

If the optical level entering the unit is too high, it could cause permanent damage to the unit. The signal should be disconnected and attenuated to an appropriate level, before reconnection to the AON120. If the unit does not function as specified it is possible that the unit has been damaged and should be returned to Ascent Communication Technology for repair.

### **No RF output**

Ensure that a forward-path signal is present on the system, at the correct wavelength for the AON120 to receive. If the signal is present, but not at the desired level, adjust the RF ATT control.

Keep the optical connector clean, a poor link will reduce the RF output level.



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