

## Features

- 30 MHz to 3 GHz RF Bandwidth
- -40°C to +75°C Operating Temperature Range (1310 nm)
- Rugged Dust-Tight Housing
- 1310 nm, 1550 nm, CWDM Wavelengths
- High SFDR
- Automatic Optical Power Control
- Local LED and Monitor/Alarm Indications
- Uncooled DFB Lasers
- Wide DC Power Input Range, +9V to +30V
- Lasers Conform to Class 1 Emission Level Per CDRH and IEC-825 (EN 60825) Standards

## Options

- Integrated +20 dB Transmitter LNA
- Extended Low Frequency, 10 kHz
- Integrated WDM
- Manual Gain Adjust, 30 dB Range
- +5 VDC or +12 VDC Bias-T
- Multimode Fiber Capability
- Low Phase Noise Reference Clock Distribution

## Applications

- L-band Satcom
- Cellular Backhaul
- MMDS
- Antenna Remoting
- GPS Distribution
- Antenna Site Diversity
- In-Building DAS
- Optical Delay Lines

# OZ600

## Description

The OZ600 is a broadband RF over Fiber standalone flange mount module which may be configured as a transmitter, a receiver, or a transceiver (transmitter + receiver). Fiber links may be configured for unidirectional or bidirectional RF traffic. The OZ600 has a wide dynamic range and supports RF transport in situations where transport distance or flexibility of cabling may prohibit the use of coaxial cable. Packaged in a rugged dust-tight cast metal housing, the OZ600 provides high Spurious Free Dynamic Range (SFDR) transport for RF signals in the frequency range 30 MHz to 3 GHz. Optional extended bandwidth of 10 kHz (for lower rolloff) is also available. Manual Gain Control is available to adjust end-to-end RF link gain and to optimize the receiver output RF level. The OZ600 features a linear optically isolated DFB laser diode operating at 1310 nm or 1550 nm and/or a high performance InGaAs photodiode. CWDM wavelengths are also available. Standard transport is over 9/125  $\mu\text{m}$  Single Mode Fiber, however Multimode fiber transport is also an option (contact Optical Zonu for details). The standard RF interface is 50 Ohm SMA and the standard optical interface is SC/APC (FC/APC is also available). Average Automatic Power Control (AAPC) provides closed loop control of the transmitter optical output power over the full operating temperature range. Alarm and monitoring functions are available through a DB9 connector. LEDs provide status of laser bias current (transmitter) and received optical power (receiver). The OZ600 module is powered from +12 VDC.

See patent number US 10,257,739 B1.

## Absolute Maximum Ratings

| Parameter                          | Symbol        | Min | Typical | Max    | Units |
|------------------------------------|---------------|-----|---------|--------|-------|
| Operating Temperature <sup>1</sup> | $T_{op}$      | -40 | -       | 75     | °C    |
| Storage Temperature                | $T_{storage}$ | -40 |         | 85     | °C    |
| DC Supply Voltage                  | $V_{CC}$      | +8  | 12      | +32    | V     |
| Transmitter RF Input (no LNA)      | $RF_{in}$     | -   | -       | +17    | dBm   |
| Transmitter RF Input (LNA)         | $RF_{in}$     | -   | -       | -5     | dBm   |
| Transmitter Optical Output         | $P_{Tx,out}$  | -   | -       | +8     | dBm   |
| Receiver Optical Input             | $PR_{x,in}$   | -   | -       | +11    | dBm   |
| Unpackaged Weight                  | -             | -   | -       | 315    | g     |
| Relative Humidity                  | RH            | 20  | -       | 90     | %     |
| Altitude                           | -             | -   | -       | 10,000 | MASL  |

<sup>1</sup> -40°C assumes 1310 nm. 1550 nm transmitters operate down to -20°C

## DC Characteristics

| Parameter                      | Symbol             | Min | Typical | Max | Units |
|--------------------------------|--------------------|-----|---------|-----|-------|
| DC Supply Voltage              | $V_{CC}$           | 9   | 12      | 30  | V     |
| Transmitter Current (no LNA)   | $I_{CC, Tx}$       | -   | 70      | 80  | mA    |
| Transmitter Current (with LNA) | $I_{CC, Tx, LNA}$  | -   | 150     | 220 | mA    |
| Receiver Current               | $I_{CC, Rx}$       | -   | 170     | 180 | mA    |
| Transceiver Current (no LNA)   | $I_{CC, TRx}$      | -   | 240     | 320 | mA    |
| Transceiver Current (with LNA) | $I_{CC, TRx, LNA}$ | -   | 320     | 380 | mA    |

## Optical Characteristics

| Parameter                | Symbol         | Min          | Typical | Max          | Units |
|--------------------------|----------------|--------------|---------|--------------|-------|
| Transmitter Output Power | $P_{Tx,out}$   | -            | 2       | 6            | mW    |
| Transmitter Wavelengths  | $\lambda_{Tx}$ | 1270<br>1470 | -       | 1330<br>1610 | nm    |
| Receiver Wavelengths     | $\lambda_{Rx}$ | 1270         | -       | 1610         | nm    |

## RF Characteristics

| Parameter                            | Symbol              | Min   | Typical | Max | Units                | Notes |
|--------------------------------------|---------------------|-------|---------|-----|----------------------|-------|
| High Frequency Cutoff                | $f_{high}$          | -     | 3000    | -   | MHz                  |       |
| Low Frequency Cutoff                 | $f_{low}$           | 20    | 30      | -   | MHz                  |       |
| Frequency Response Flatness          | S21                 | -     | 3       | 4   | dB <sub>p-p</sub>    |       |
| RF Gain (no LNA)                     | $G_{unity}$         | -2    | 0       | +2  | dB                   | 1     |
| RF Gain (with LNA)                   | $G_{high}$          | +18   | +20     | +22 | dB                   | 1     |
| Equivalent Input Noise (no LNA)      | $EIN_{no\ LNA}$     | -129  | -133    | -   | dBm-Hz               | 1,2,3 |
| Equivalent Input Noise (with LNA)    | $EIN_{LNA}$         | -149  | -153    | -   | dBm-Hz               | 1,2,3 |
| Input 1dB Compression (no LNA)       | $P_{1dB_{no\ LNA}}$ | +13   | +16     | -   | dBm                  | 2     |
| Input 1dB Compression (with LNA)     | $P_{1dB_{LNA}}$     | -6    | -3      | -   | dBm                  | 2     |
| Input 3rd Order Intercept (no LNA)   | $IIP3_{no\ LNA}$    | +28   | +32     | -   | dBm                  | 2,4   |
| Input 3rd Order Intercept (with LNA) | $IIP3_{LNA}$        | +8    | +10     | -   | dBm                  | 2,4   |
| Spur Free Dynamic Range (no LNA)     | $SFDR_{no\ LNA}$    | -     | 110     | -   | dB/Hz <sup>2/3</sup> | 1     |
| Spur Free Dynamic range (with LNA)   | $SFDR_{LNA}$        | -     | 109     | -   | dB/Hz <sup>2/3</sup> | 1     |
| Group Delay (30 - 2700 MHz)          | GD                  | -     | 0.5     | 1   | nsec                 |       |
| Input/Output Impedance               | $Z_{in/out}$        | -     | 50      | -   | $\Omega$             |       |
| Input/Output VSWR                    | $VSWR_{in/out}$     | 1.5:1 | 2.0:1   | -   |                      |       |

<sup>1</sup> Measured with 1 meter single mode fiber jumper

<sup>2</sup> Measured at 1 GHz

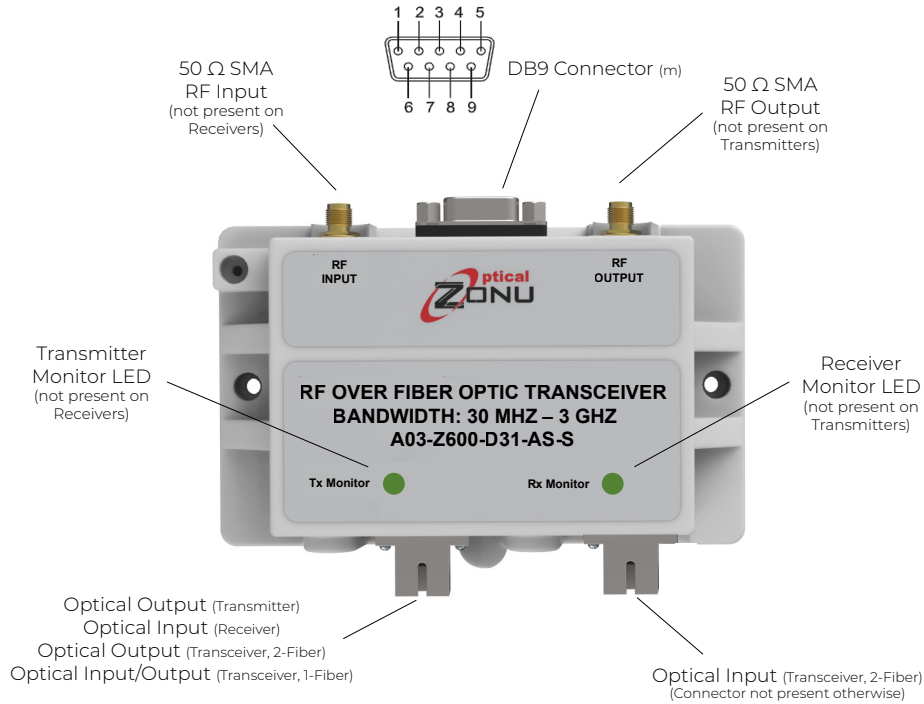
<sup>3</sup> NF (dB) = EIN (dBm-Hz) + 174 (dBm/Hz)

<sup>4</sup> Equivalent to IMD 60 dB at 0 dBm total output power (2-tone measurement)

## LED Definitions

| LED State | Transmitter                        | Receiver                            |
|-----------|------------------------------------|-------------------------------------|
| OFF       | Module Not Powered                 | Module Not Powered                  |
| GREEN     | Normal Operation                   | Normal Operation                    |
| RED       | Laser Bias Current High (> 110 mA) | Optical Input Power Low (< -10 dBm) |

## Module Features

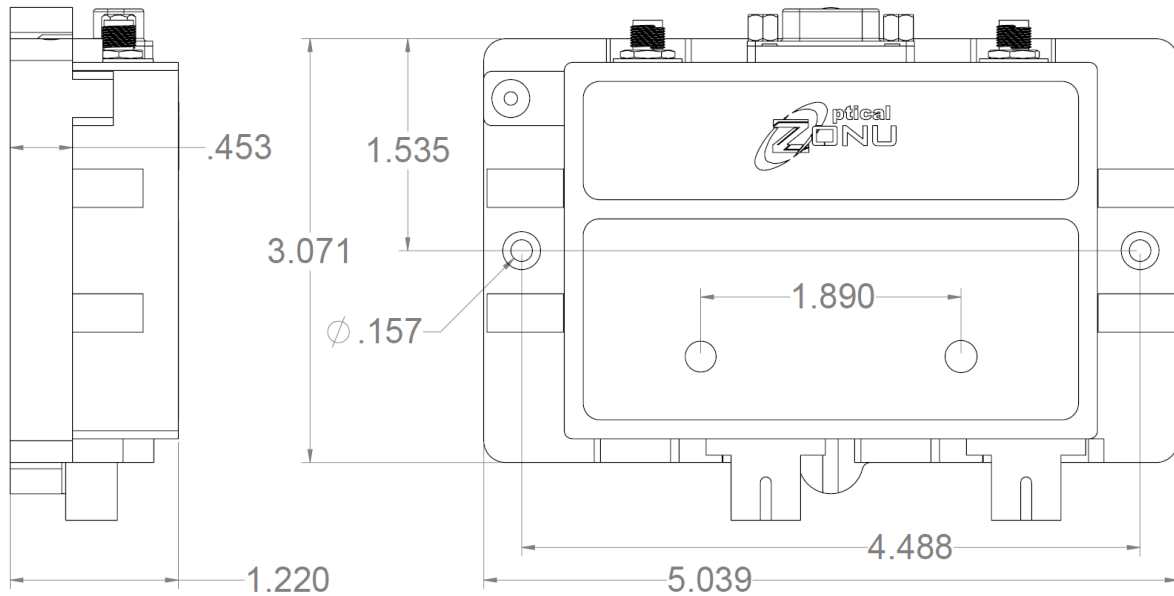


## DB-9 Pin Assignments

| Pin | Transmitter                                 | Receiver  | Transceiver                                     |
|-----|---|---|---|
| 1   | Laser ENABLE <sup>1</sup>                   | N/C   | Laser ENABLE <sup>1</sup>                       |
| 2   | N/C   | N/C   | N/C   |
| 3   | N/C   | N/C   | N/C   |
| 4   | VCC (+12V)                                  | VCC (+12V)                                      | VCC (+12V)                                      |
| 5   | Ground                                      | Ground  | Ground  |
| 6   | Laser Bias Monitor<br>(0.1V per 10 mA)      | N/C   | Laser Bias Monitor<br>(0.1V per 10 mA)          |
| 7   | Laser Bias Alarm<br>(open collector, 25 mA) | N/C   | Laser Bias Alarm<br>(open collector, 25 mA)     |
| 8   | N/C   | Received Power Monitor<br>(0.1V per 1 mW)       | Received Power Monitor<br>(0.1V per 1 mW)       |
| 9   | N/C   | Received Power Alarm<br>(open collector, 25 mA) | Received Power Alarm<br>(open collector, 25 mA) |

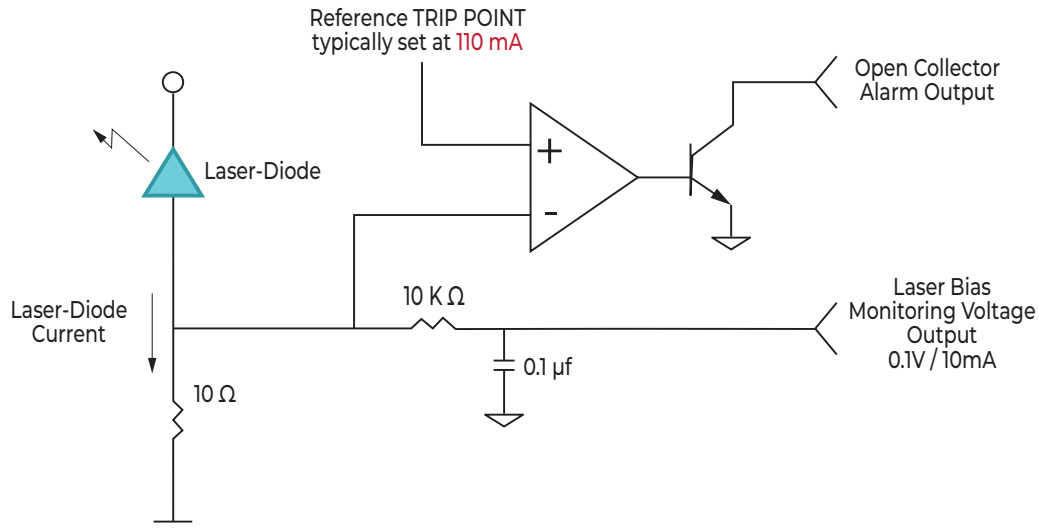
<sup>1</sup>Laser ON = +12VDC, Laser OFF = Ground, Laser OFF = Floating/Not Connected

## Mechanical Outline

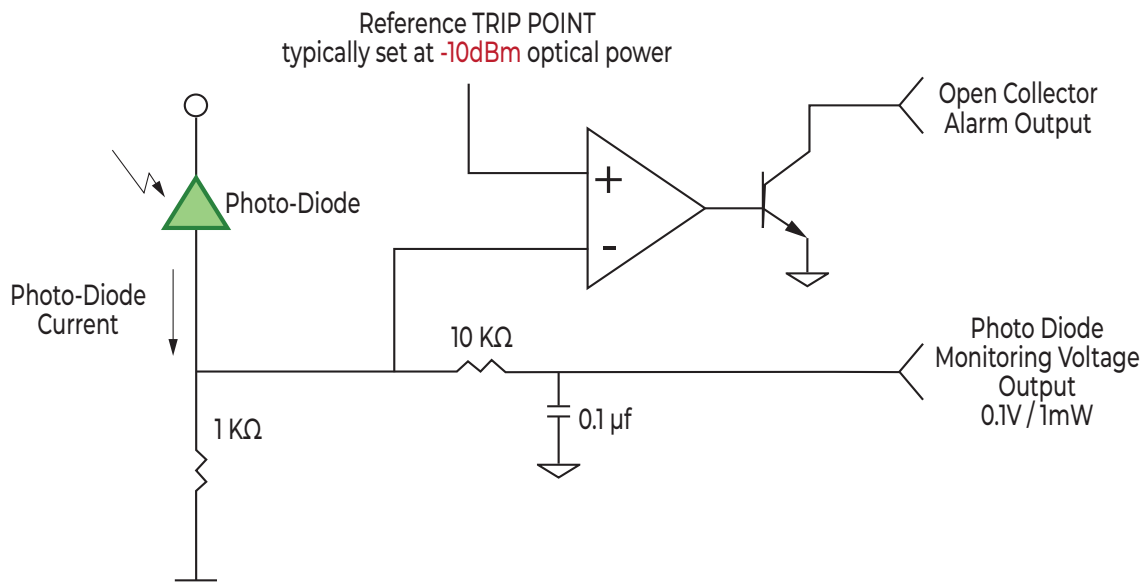


Drawing shows two RF connectors and two Optical connectors. Not all are necessarily present on every model.

## Individual Transmitter Alarm & Monitoring Circuit Diagram



## Individual Receiver Alarm & Monitoring Circuit Diagram



All alarms are Open Collector topology, with Active Low for Normal operations and during Alarm condition the open collector will Pull to High logic levels. Reverse polarity alarm is also available upon request, such as under normal conditions the Open collector will be High and vice versa under fault conditions.

### Ordering Information

TRANSMITTER PART NO.

**A13 - Z600 - DXX - AX - XXX<sup>2</sup> - X**

|                                  |                     |                              |                  |                      |                        |
|----------------------------------|---------------------|------------------------------|------------------|----------------------|------------------------|
| <b>31</b> - 1310 nm              | <b>S</b> - SC / APC | <b>S</b> - Single Mode       | (blank) - no LNA | (blank) - no Bias-T  | (blank) - 12V Supply   |
| <b>55</b> - 1550 nm              | <b>F</b> - FC / APC | <b>M</b> - 62.5 μm Multimode | <b>L</b> - LNA   | <b>B</b> - 5V Bias-T | <b>48</b> - 48V Supply |
| <b>yy</b> - lyy0 nm <sup>1</sup> |                     | <b>M50</b> - 50 μm Multimode |                  |                      |                        |

<sup>1</sup> CWDM wavelengths - 47 = 1470 nm. Standard wavelengths 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm. For others, contact Optical Zonu

<sup>2</sup> For 12V bias-T, contact Optical Zonu

RECEIVER PART NO.

**A23 - Z600 - 00 - AX - X - X**

|                     |                              |                        |
|---------------------|------------------------------|------------------------|
| <b>S</b> - SC / APC | <b>S</b> - Single Mode       | (blank) - 12V Supply   |
| <b>F</b> - FC / APC | <b>M</b> - 62.5 μm Multimode | <b>48</b> - 48V Supply |
|                     | <b>M50</b> - 50 μm Multimode |                        |

Note: For multimode Fiber option, receiver optical connector is SC/UPC or FC/UPC.

TRANSCIEVER PART NO.

**A03 - Z600 - DXX - AX - XXXX<sup>2</sup> - X**

|                                  |                     |                              |                  |                  |                      |                        |
|----------------------------------|---------------------|------------------------------|------------------|------------------|----------------------|------------------------|
| <b>31</b> - 1310 nm              | <b>S</b> - SC / APC | <b>S</b> - Single Mode       | (blank) - no LNA | (blank) - no WDM | (blank) - no Bias-T  | (blank) - 12V Supply   |
| <b>55</b> - 1550 nm              | <b>F</b> - FC / APC | <b>M</b> - 62.5 μm Multimode | <b>L</b> - LNA   | <b>W</b> - WDM   | <b>B</b> - 5V Bias-T | <b>48</b> - 48V Supply |
| <b>yy</b> - lyy0 nm <sup>1</sup> |                     | <b>M50</b> - 50 μm Multimode |                  |                  |                      |                        |

<sup>1</sup> CWDM wavelengths - 47 = 1470 nm. Standard wavelengths 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm. For others, contact Optical Zonu

<sup>2</sup> For 12V bias-T, contact Optical Zonu

POWER SUPPLY PART NO.

**ZA1 - 1 - 12 - 15 - D<sup>1</sup>**

<sup>1</sup> For North America only. For other international power supplies contact Optical Zonu

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### Related Products

[OZ81x Transmitter/Receiver Standalone Modules \(30 - 6000 MHz\), optional AGC, CWDM, RS232 Transport, I2C Serial Interface](#)

[OZ10x OEM Transmitter/Receiver Modules \(30 - 6000 MHz\), Low Size/Weight/Power, optional CWDM and I2C Serial Interface](#)

[OZ5xx OEM Transmitter/Receiver Modules \(30 - 6000 MHz\), optional Tunable RF Gain, CWDM, I2C Serial Interface](#)

[Low Phase Noise Transmitter/Receiver Modules \(10 - 200 MHz\), Multiple Form Factors, optional CWDM](#)

[OZ16xx Transmitter/Receiver Standalone Modules \(30 - 10000 MHz\), Cooled Laser Diode, DWDM, optional I2C Serial Interface](#)

[OZC9500 19" IRU Chassis, up to 8 Transmitter and/or Receiver Assemblies, CWDM, Remote Access via HTTP, GUI, SNMP v2 and v3](#)

[OZ9800 19" IRU Chassis up to 5 "OZ600/ OZ81x/OZ16xx-type" Transmitter, Receiver, or Transceiver Modules](#)

### Additional Resources

[Standalone RF Over Fiber Modules](#)

[RF Over Fiber Rack Mount Integrated Subsystems](#)

[RF Over Fiber Rack Mount Modular Subsystems](#)

[RF Over Fiber Applications](#)

