



RF OVER FIBER

3000 MHz RF Signal Transport Standalone Modules



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, down to 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
- Output to 1x2 RF Splitter

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 dual transmitter, a receiver, a dual 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 μm 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 US10,257,739 B1.

Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Units
Operating Temperature ¹	T _{op}	-40	-	78	°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	P _{Rx, in}	-	-	+11	dBm
Unpackaged Weight	-	-	-	315	g

¹ -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
Dual Transmitter Current (no LNA)	I _{CC, 2Tx}	-	140	160	mA
Dual Transmitter Current (with LNA)	I _{CC, 2Tx, LNA}	-	300	440	mA
Receiver Current	I _{CC, Rx}	-	170	180	mA
Dual Receiver Current	I _{CC, Rx}	-	340	360	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	6.5	mW
Transmitter Wavelengths	λ _{Tx}	1270 1470	-	1330 1610	nm
Receiver Wavelengths	λ _{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 _{p-p}	
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)	$EIN_{\text{no LNA}}$	-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)	$P1dB_{\text{no LNA}}$	+13	+16	-	dBm	2
Input 1dB Compression (with LNA)	$P1dB_{\text{LNA}}$	-6	-3	-	dBm	2
Input 3rd Order Intercept (no LNA)	$IIP3_{\text{no LNA}}$	+28	+32	-	dBm	2,4
Input 3rd Order Intercept (with LNA)	$IIP3_{\text{LNA}}$	+8	+10	-	dBm	2,4
Spur Free Dynamic Range (no LNA)	$SFDR_{\text{no LNA}}$	-	110	-	dB/Hz ^{2/3}	1
Spur Free Dynamic range (with LNA)	$SFDR_{\text{LNA}}$	-	109	-	dB/Hz ^{2/3}	1
Group Delay (30 - 2700 MHz)	GD	-	0.5	1	nsec	
Input/Output Impedance	$Z_{\text{in/out}}$	-	50	-	Ω	
Input/Output VSWR	$VSWR_{\text{in/out}}$	1.5:1	2.0:1	-		

¹ Measured with 1 meter single mode fiber jumper

² Measured at 1 GHz

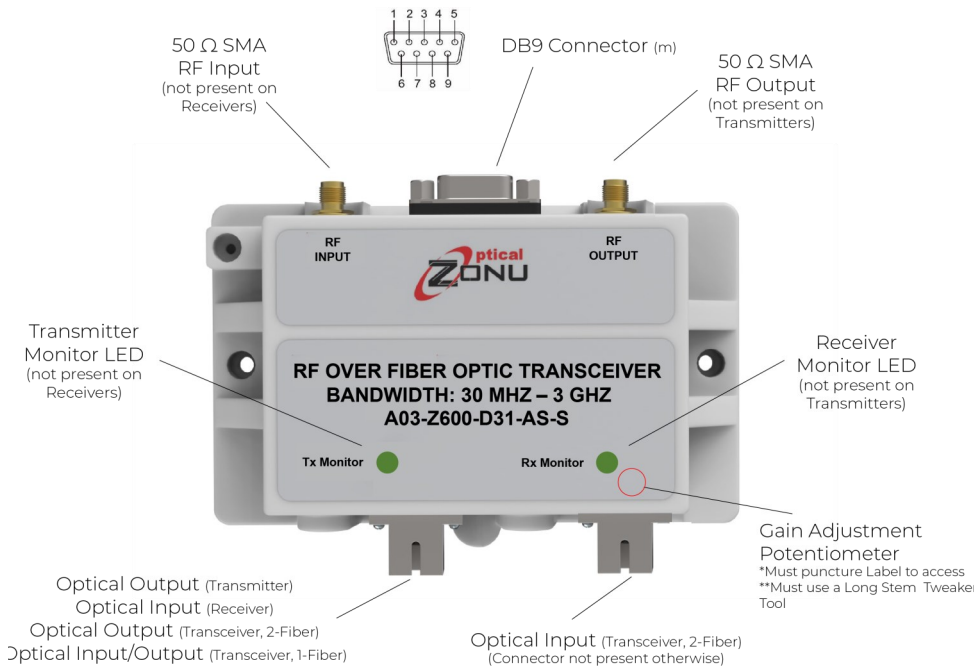
³ NF (dB) = EIN (dBm-Hz) + 174 (dBm/Hz)

⁴ 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 (Transmitter, Receiver, Transceiver)

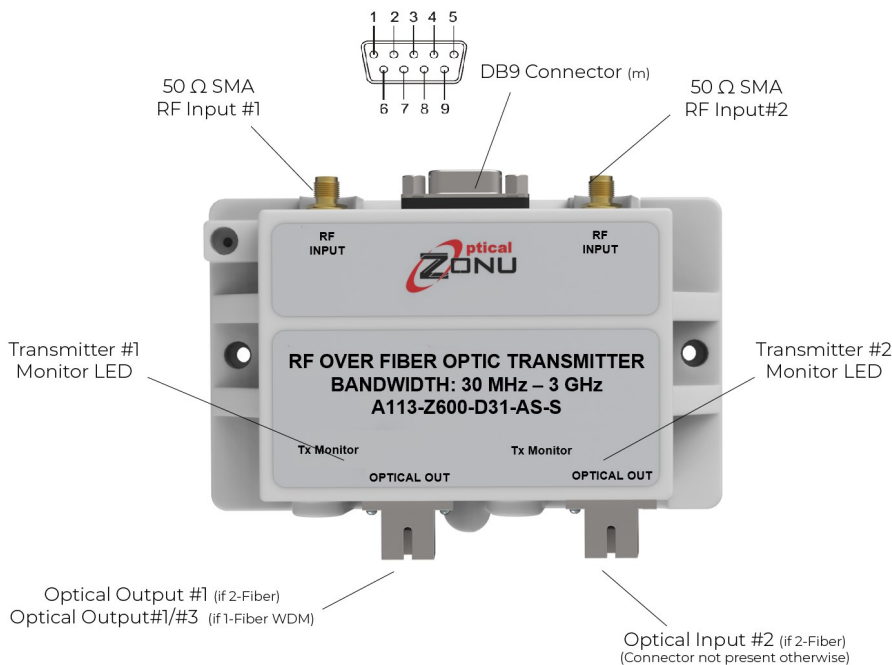


Number of Fibers
1: Transmitter
1: Receiver
2: Transceivers
1: Transceiver with WDM

Optical Connector
SC/APC (standard)
FC/APC
LC/APC

Fiber Type
Single Mode (standard)
62.5 μ m Multimode
50 μ m Multimode

Module Features (Dual Transmitter)

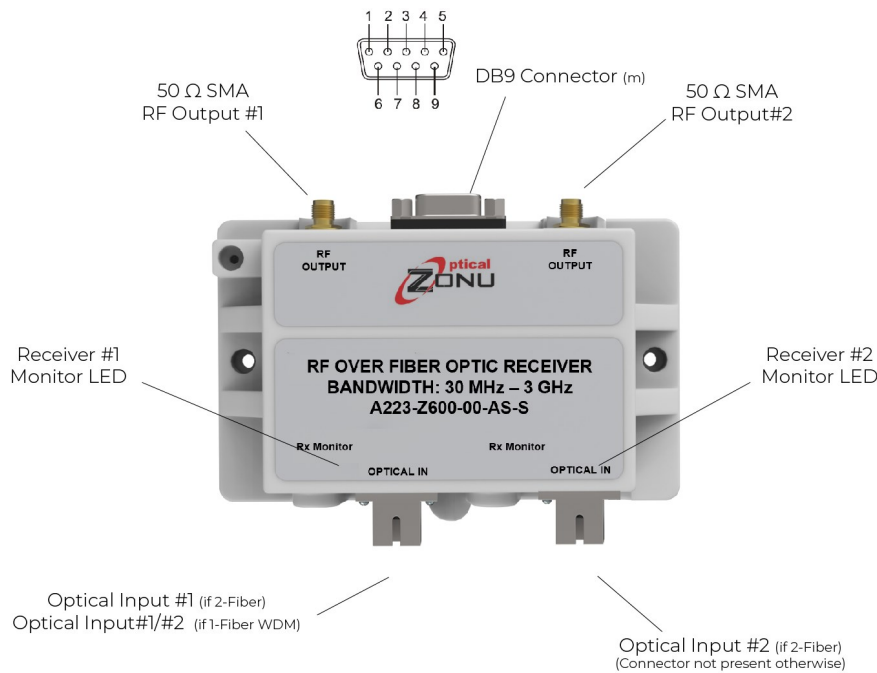


Number of Fibers
2: Dual Transmitter no WDM
1: Dual Transmitter with WDM

Optical Connector
SC/APC (standard)
FC/APC
LC/APC

Fiber Type
Single Mode (standard)
62.5 μ m Multimode
50 μ m Multimode

Module Features (Dual Receiver)



Number of Fibers
 2 : Dual Receiver no WDM
 1 : Dual Receiver with WDM

Optical Connector
 SC/APC (standard)
 FC/APC
 LC/APC

Fiber Type
 Single Mode (standard)
 62.5 μ m Multimode
 50 μ m Multimode

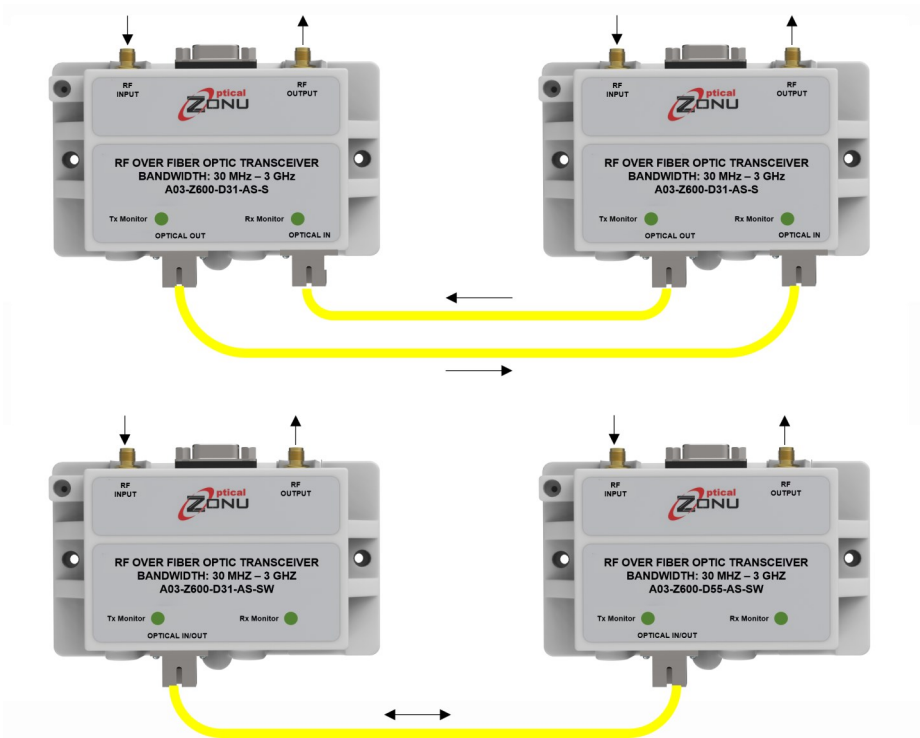
DB-9 Pin Assignments

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

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

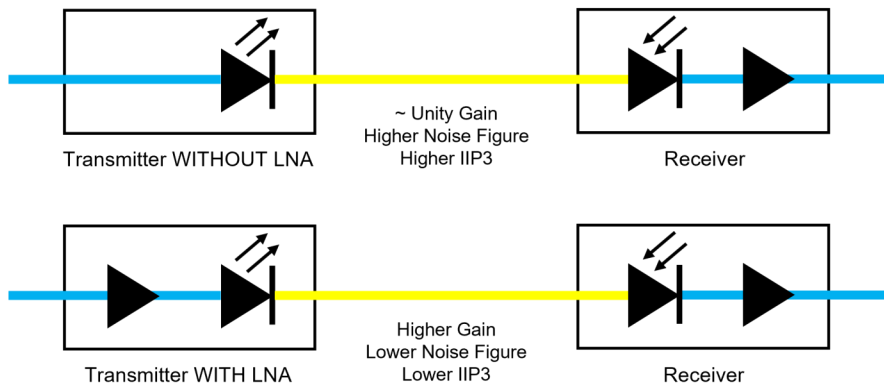
Transceiver, 2 Fiber vs. 1 Fiber

Fiber transceivers may transport bidirectional RF traffic over two fibers or one fiber. For the two-fiber case, any wavelength (or the same wavelength) may be used within the transmitters on each end of the fiber link. The transceiver part numbers may have the same part number. Bidirectional traffic may also pass through a single fiber. For this case, one transmitter transports at 1310 nm, the other transmitter transports at 1550 nm. The different wavelengths do not interfere within the fiber, and a WDM is integrated into the transceivers to separate the wavelengths. Two complementary parts are required for the two ends of the fiber link. Note in the single fiber case below, the different transport wavelengths on each end of the fiber link, and the addition of "W" in the part number to indicate WDM. WDM is also available for dual transmitters and dual receivers.

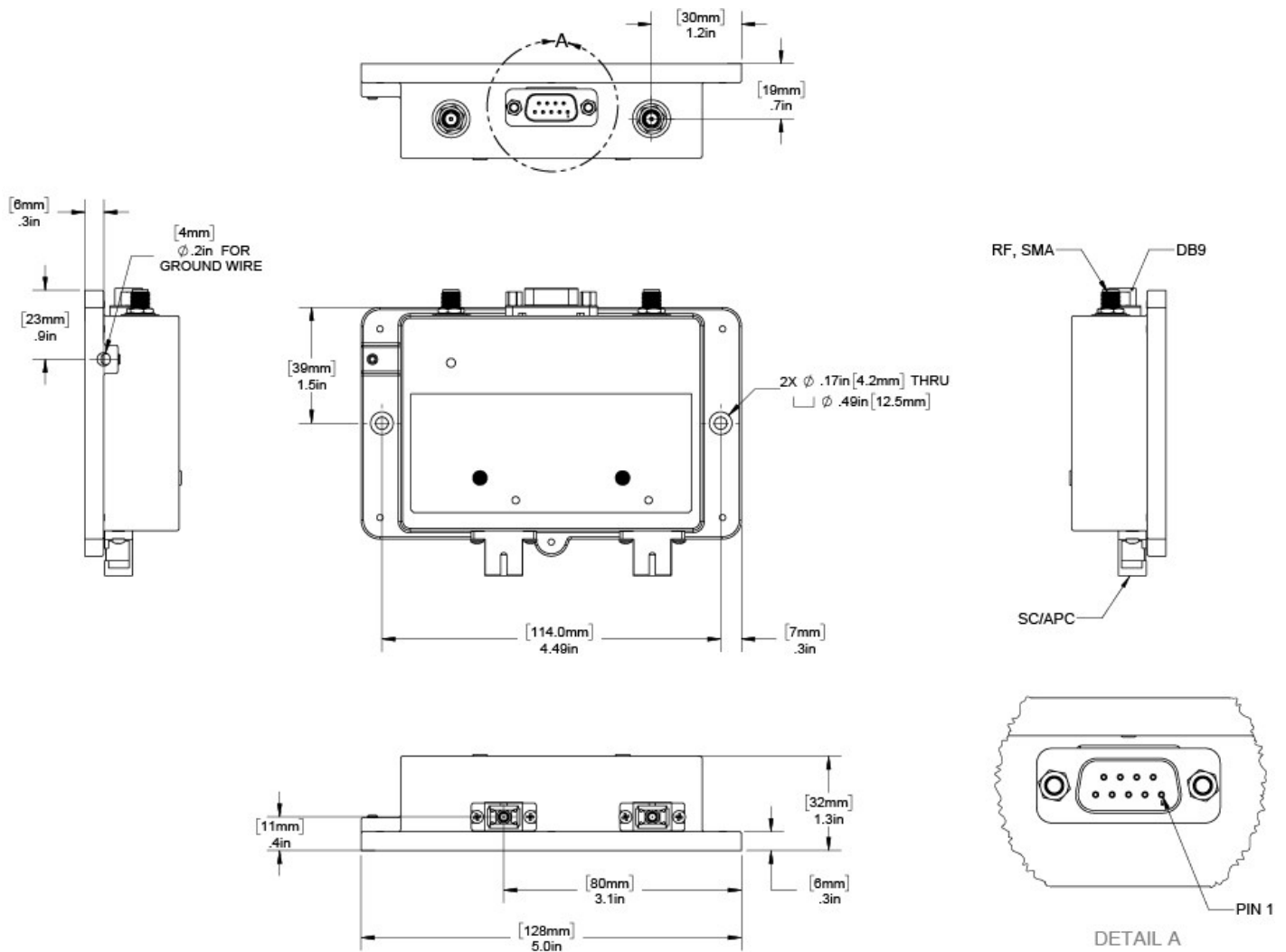


Transmitter Low Noise Amplifier (LNA)

As an option, an LNA may be integrated into the front end of the fiber transmitter. For transceiver pairs, an LNA may be integrated into one, both, or neither of the transmitters. The inclusion of an LNA is primarily dictated by the maximum RF input power to the transmitter (operate linearly, do not saturate) and the desired end-to-end RF gain. The addition of "L" to the transmitter part number indicates an LNA. The standard fiber link without an LNA is designed to have a nominal end-to-end RF gain of ~ 0 dB. With an integrated LNA, the end-to-end fiber link RF gain will typically be 15 – 20 dB. See the RF specifications for performance with and without an LNA.

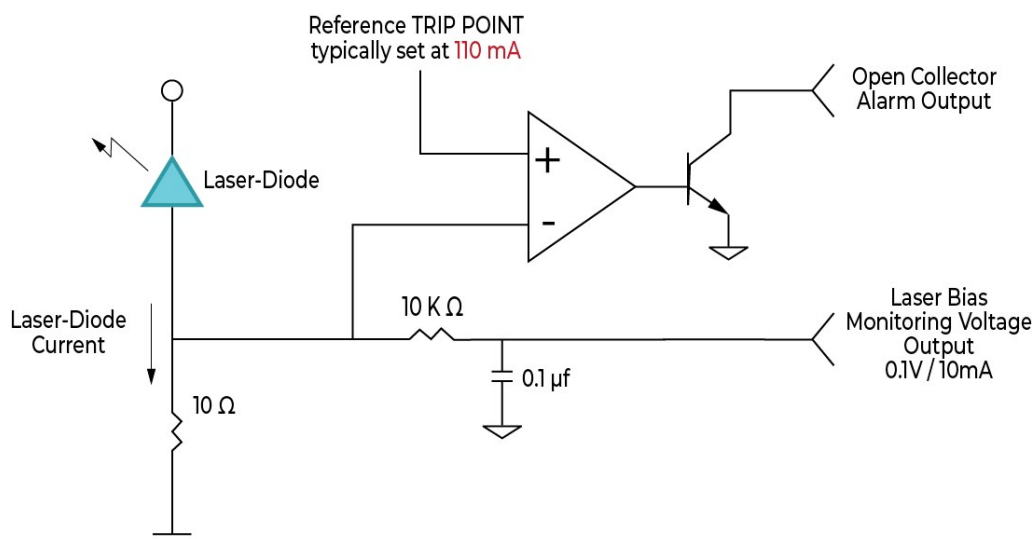


Mechanical Outline

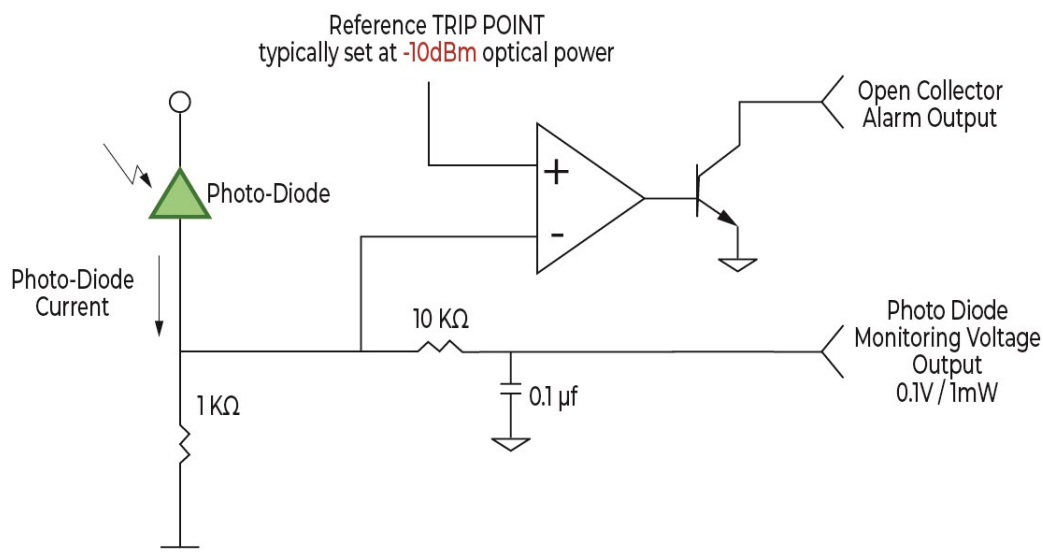


Drawing shows two RF connectors and two Optical connectors. Not all are necessarily present on every model.

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.



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Ordering Information

TRANSCIVER PART NO.

A03 - Z600 - DXX - AX² - XXXX⁴ - X⁵

31-1310 nm	S-SC/APC	S-Single Mode	(blank)-no LNA	(blank)-no WDM	(blank)-no Bias-T	(blank)-12V Supply
55-1550 nm	F-FC/APC	M-62.5 μm Multimode ³	L-LNA	W-WDM3	B-5V Bias-T	
yy-1yy0 nm ¹		M50-50 μm Multimode ³				

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

² For LC/APC option, contact Optical Zonu

³ CWDM not available for multimode fiber

⁴ For 12V bias-T, contact Optical Zonu

⁵ -48V supply not available for transceiver

TRANSMITTER PART NO.

A13 - Z600 - DXX - AX² - XXX⁴ - X

31-1310 nm	S-SC/APC	S-Single Mode	(blank)-no LNA	(blank)-no Bias-T	(blank)-12V Supply
55-1550 nm	F-FC/APC	M-62.5 μm Multimode ³	L-LNA	B-5V Bias-T	48 - 48V Supply
yy-1yy0 nm ¹		M50-50 μm Multimode ³			

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

² For LC/APC option, contact Optical Zonu

³ CWDM not available for multimode fiber

⁴ For 12V bias-T, contact Optical Zonu

DUAL TRANSMITTER PART NO.

A113 - Z600 - DXXXXX¹ - AX³ - XX⁴ XX^{4,6}

31-1310 nm	S-SC/APC	S-Single Mode	(blank)-no LNA	(blank)-no WDM	(blank)-no Bias-T
55-1550 nm	F-FC/APC	M-62.5 μm Multimode ³	L-LNA	W-WDM	B-5V Bias-T
yy-1yy0 nm ¹		M50-50 μm Multimode ³			

¹ For dual transmitter with same wavelength, state once (e.g. D31), for different wavelengths, state each (e.g. D3155)

² CWDM wavelengths (e.g. 47 = 1470 nm). Standard wavelengths 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm.

³ For LC/APC option, contact Optical Zonu

⁴ Applies to both transmitters

⁵ CWDM and WDM not available for multimode fiber

⁶ For 12V bias-T, contact Optical Zonu

Contacts

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Related Products

[OZ81x Transmitter/Receiver/Transceiver Standalone Modules \(30 - 6000 MHz\), optional Optical 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](#)

[OZ510 OEM Transmitter/Receiver Modules \(30 - 3000 MHz\), Low Size/Weight/Power, optional CWDM](#)

[OZ52x OEM Transmitter/Receiver Modules \(30 - 6000 MHz\), Tunable RF Gain, CWDM, I2C Serial Interface, optional Dual LNA](#)

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

[OZ16xx Transmitter/Receiver/Transceiver 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](#)

Additional Resources

[OEM RF Over Fiber Modules](#)

[Standalone RF Over Fiber Modules](#)

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

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

[RF Over Fiber Applications](#)





RF OVER FIBER

3000 MHz RF Signal Transport Standardalone Modules

Ordering Information

RECEIVER PART NO.

A23 - Z600 - 00 - AX^{1,2} - X - X - SX2

S-SC/APC	S-Single Mode	(blank)-12V Supply	1x2 RF
F-FC/APC	M-625µm Multimode ³	48-48V Supply	
	M50-50µm Multimode ³		

¹ For multimode Fiber option, receiver optical connector is SC/UPC or FC/UPC.

² For LC/APC option, contact Optical Zonu

³ CWDM not available for multimode fiber

DUAL RECEIVER PART NO.

A223 - Z600 - 00 - AX^{1,2} - XX

S-SC/APC	S-Single Mode	(blank)-no WDM
F-FC/APC	M-625µm Multimode ³	W-WDM
	M50-50µm Multimode ³	

¹ For multimode Fiber option, receiver optical connector is SC/UPC.

² For LC/APC option, contact Optical Zonu

³ WDM not available for multimode fiber

POWER SUPPLY PART NO.¹

ZA1 - 1 - 12 - 15 - D²

¹ Power supplies are ordered separate.

² For North America only. For other international power supplies contact Optical Zonu



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