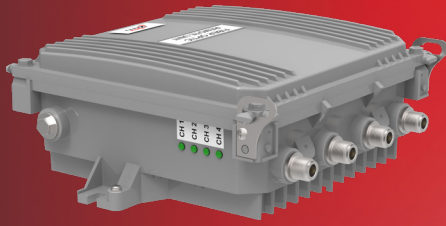




RF AND TIMING DISTRIBUTION OVER FIBER

Antenna Remoting RF Over Fiber Subsystem



Features

- 30 MHz to 3 GHz Fiber Optic Transport Between Satcom Modem and Outdoor Unit (4 GHz and 6 GHz Bandwidths Available)
- -20°C to +60°C Operating Temperature Range
- IP-67 Rated Outdoor Unit
- 19" 1RU Rack Mounted Indoor Unit
- 1310 nm, 1550 nm, CWDM Wavelengths
- High SFDR
- Low Phase Noise Reference Clock Distribution
- Automatic Optical Power Control
- Local LEDs and Dry Contact Alarms (Indoor Unit)
- SSH CLI, HTTP Web UI, Managed RFoF Graphical User Interface (GUI) and SNMP v2 and v3 for Remote Monitoring
- Uncooled DFB Lasers
- Lasers Conform to Class 1 Emission Level Per CDRH and IEC-825 (EN 60825) Standards

Options

- Integrated +20 dB Transmitter LNA
- Extended High Frequency, 4, 0, 6.0 GHz
- Extended Low Frequency, 10 kHz
- Integrated CWDM
- LNB Bias 13V, 13V (22 kHz), 18V, 18V (22 kHz)
- Various architectures for reference clock distribution

Applications

- RF Over Fiber Transport
- Teleport RF Signal Distribution
- Antenna Remoting
- Maritime RF Signal Transport
- Disaster Recovery
- Oil & Gas Platforms
- TVRO
- VSAT

eFiberSAT

Description

The eFiberSat L/S-Band Satcom fiber transport subsystem provides a simple, cost-effective, and reliable RF connection between a satellite antenna and a satcom modem in those cases where coaxial cable is impractical or additional security is required. Fiber optic transmitters feature linear uncooled isolated DFB laser diodes. Fiber optic receivers feature high performance InGaAs photodiodes. The standard transported RF frequency band with high spur free dynamic range (SFDR) is 30 – 3000 MHz. Options exist for extending the frequency range to 6 GHz on the upper end, and/or 10 kHz on the lower end.

A single eFiberSat fiber transport link can accommodate any combination of up to four, uplinks and/or downlinks. eFiberSat utilizes Coarse Wavelength Division Multiplexing (CWDM) to transport all RF signals between the Indoor Unit (IDU) and the Outdoor Unit (ODU) over a single fiber. Low phase noise reference clocks may be transported from satcom modems or timing servers to elements at the antenna in a number of ways. An optional low noise transmitter pre-amplifier ensures a margin on signal-to-noise ratio (especially on low received power downlinks) while keeping the signal in the most linear operating range of the fiber link. Options exist for integrating Bias-Ts into ODU transmitters for the purpose of powering antennas and providing control/biasing to LNBS and BUCs. 13/18V (with or without 22 kHz) biasing is available on the ODU RF connectors.

The eFiberSat transport subsystem may be monitored in a number of ways. Locally, LEDs and dry contact relay alarms (IDU) provide status. There are multiple ways to monitor the subsystem remotely including serial or SSH console connection, HTTP web user interface, Optical Zonu's Managed RFoF graphical command and control interface. The management interface also supports SNMP v2 and v3.

The standard RF interface is 50Ω SMA (IDU) and 50Ω N (ODU). The ODU is powered from 12 VDC (-48V optional). The IDU may be powered from AC or 48 VDC.

Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Units	Note
Operating Temperature (Outdoor Unit)	T_{op}	-20	-	60	°C	
Operating Temperature (Indoor Unit)	T_{op}	0	-	50	°C	
Storage Temperature	$T_{storage}$	-40		85	°C	
DC Supply Voltage (Outdoor Unit)	$V_{CC,ODU}$	11	12	13	VDC	1
DC Supply Current (Outdoor Unit)	$I_{CC,ODU}$	-	-	2	A	2
AC Supply Voltage (Indoor Unit)	V_{IDU}	85	-	264	VAC	3,4
Transmitter RF Input (no LNA)	RF_{in}	-	-	+17	dBm	
Transmitter RF Input (LNA)	RF_{in}	-	-	-3	dBm	
Transmitter Optical Output Power	$P_{Tx,out}$	-	-	+8	dBm	
Receiver Optical Input Power	$P_{Rx,in}$	-	-	+12	dBm	
Power Supply Certifications	-	EN 60950 ITE, EN 60601-1 Medical			-	
Power Supply EMC Compliance	-	EN 61000-4-2, 3, 4, 5, 6, 11, EN 60601-1-2			-	
Power Supply Emissions	-	Class B per EN 55022, 11			-	
Unpackaged Weight (ODU)	-	-	-	3.2	kg	
Unpackaged Weight (IDU)	-	-	-	5.1	kg	
Relative Humidity	RH	20	-	90	%	
Altitude	-	-	-	10,000	MASL	

¹ External +24VDC/-48VDC optional, contact Optical Zonu

² $V_{CC} = 12$ VDC

³ -48 VDC supply optional, contact Optical Zonu

⁴ 50 - 60 Hz

DC Characteristics

Parameter	Symbol	Min	Typical	Max	Units	Note
DC Supply Voltage (Outdoor Unit)	$V_{CC,ODU}$	11	12	13	VDC	1
DC Supply Current (Outdoor Unit)	$I_{CC,ODU}$	-	-	2	A	2

¹ External +24VDC/-48VDC optional, contact Optical Zonu

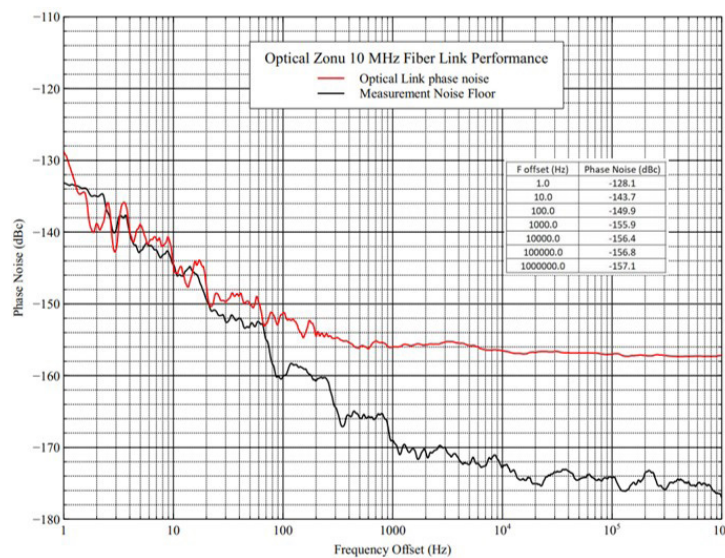
² $V_{CC} = 12$ VDC

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Units
Output Optical Power	P_{Txout}	2	4	8	dBm0
Transmitter Wavelengths	λ_{Tx}	1270 1470	-	1330 1610	nm
Receiver Wavelengths	λ_{Rx}	1270	-	1610	nm

10 MHz Reference Phase Noise Performance

Frequency Offset (MHz)	Phase Noise (dBc)
0.001	-128.1
0.01	-143.7
0.1	-149.9
1	-155.9
10	-156.4
100	-156.8
1000	-157.1



RF Characteristics - 3 GHz Uplink/Downlink¹

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						
no LNA	S21	-	3.5	4	dB _{p-p}	2
with LNA	S21	-	4	4.5	dB _{p-p}	2
RF Gain						
no LNA	$G_{no\ LNA}$	-2	0	+6	dB	2,3
with LNA	G_{LNA}	+18	+19	+25	dB	2,3
Equivalent Input Noise						
no LNA (1 GHz / 3 GHz)	$EIN_{no\ LNA}$	-	-135/-131	-130/-120	dBm/Hz	3,4
with LNA (1 GHz / 3 GHz)	EIN_{LNA}	-	-156/-152	-150/-145	dBm/Hz	3,4
Input 3rd Order Intercept						
no LNA (1 GHz / 3 GHz)	$IIP3_{no\ LNA}$		+34/+28	-	dBm	3,5
with LNA (1 GHz / 3 GHz)	$IIP3_{LNA}$		+11/+6	-	dBm	3,5
Spur Free Dynamic Range						
no LNA (1 GHz / 3 GHz)	$SFDR_{no\ LNA}$	-	109/105	-	dB/Hz ^{2/3}	3,4,5
with LNA (1 GHz / 3 GHz)	$SFDR_{LNA}$	-	109/105	-	dB/Hz ^{2/3}	3,4,5
Group Delay Link Variation to 3 GHz ⁶	GD	-	0.5	1	nsec	6
Input/Output Impedance	$Z_{in/out}$	-	50	-	Ω	
Input/Output VSWR						
no LNA	$VSWR_{in/out}$	-	1.7:1	2.0:1	dB	2
with LNA	$VSWR_{in/out}$	-	1.8:1	2.0:1	dB	2

1. All measurements are taken at 25° C
2. 30 - 3000 MHz
3. Measured with 1 meter single mode fiber jumper
4. NF (dB) = EIN (dBm/Hz) + 174 (dBm/Hz)
5. Equivalent to IMD 60 dB at 0 dBm total output power (2-tone measurement)
6. The absolute link delay is less than 11 nsec due to the internal fiber management

RF Characteristics - 4 GHz Uplink/Downlink¹

Parameter	Symbol	Min	Typical	Max	Units	Notes
High Frequency Cutoff	f_{high}	-	4000	-	MHz	
Low Frequency Cutoff	f_{low}	20	30	-	MHz	
Frequency Response Flatness						
no LNA	S21	-	3.5	4	dB _{p-p}	2
with LNA	S21	-	4	4.5	dB _{p-p}	2
RF Gain						
no LNA	G_{unity}	-2	0	+5	dB	2,3
with LNA	G_{high}	+16	+18	+24	dB	2,3
Equivalent Input Noise						
no LNA (1 GHz / 4 GHz)	$EIN_{no\ LNA}$	-	-133/-124	-130/-119	dBm/Hz	3,4
with LNA (1 GHz / 4 GHz)	EIN_{LNA}	-	-151/-143	-149/-140	dBm/Hz	3,4
Input 3rd Order Intercept						
no LNA (1 GHz / 4 GHz)	$IIP3_{no\ LNA}$		+27/+22	-	dBm	3,5
with LNA (1 GHz / 4 GHz)	$IIP3_{LNA}$		+5/0	-	dBm	3,5
Spur Free Dynamic Range						
no LNA (1 GHz / 4 GHz)	$SFDR_{no\ LNA}$	-	102/96	-	dB/Hz ^{2/3}	3,4,5
with LNA (1 GHz / 4 GHz)	$SFDR_{LNA}$	-	102/96	-	dB/Hz ^{2/3}	3,4,5
Group Delay Link Variation to 4 GHz ⁶	GD	-	0.5	1	nsec	6
Input/Output Impedance	$Z_{in/out}$	-	50	-	Ω	
Input/Output VSWR						
no LNA	$VSWR_{in/out}$	-	1.7:1	2:01	dB	2
with LNA	$VSWR_{in/out}$	-	1.8:1	2:01	dB	2

1. All measurements are taken at 25° C
2. 30 - 4000 MHz
3. Measured with 1 meter single mode fiber jumper
4. NF (dB) = EIN (dBm/Hz) + 174 (dBm/Hz)
5. Equivalent to IMD 60 dB at 0 dBm total output power (2-tone measurement)
6. The absolute link delay is less than 11 nsec due to the internal fiber management

RF Characteristics - 6 GHz Uplink/Downlink¹

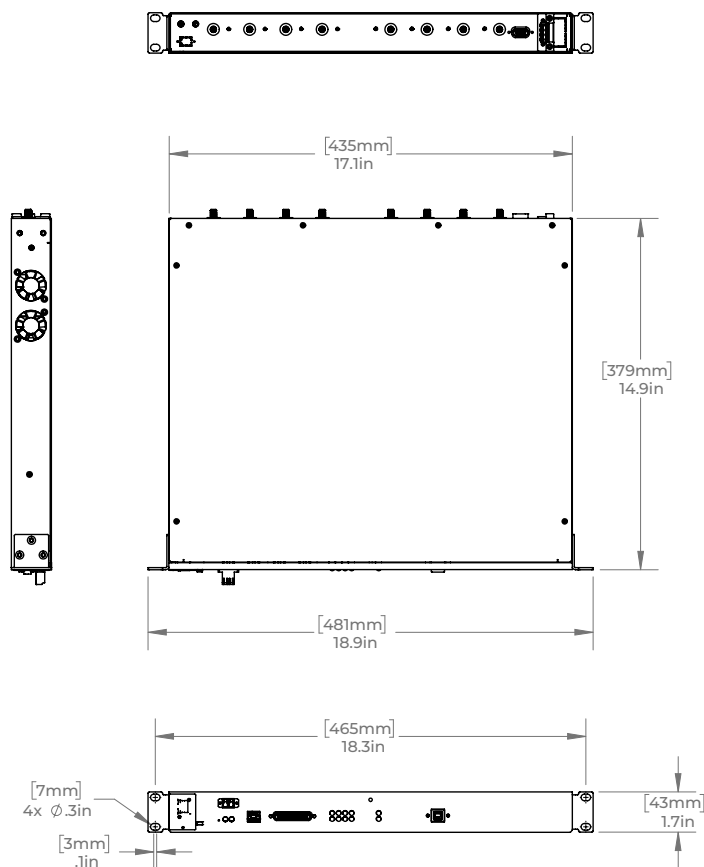
Parameter	Symbol	Min	Typical	Max	Units	Notes
High Frequency Cutoff	f_{high}	-	6000	-	MHz	
Low Frequency Cutoff	f_{low}	20	30	-	MHz	
Frequency Response Flatness						
no LNA	S21	-	-	5	dB _{p-p}	2
with LNA	S21	-	-	5.5	dB _{p-p}	2
RF Gain						
no LNA	G_{unity}	-2	0	+5	dB	2,3
with LNA	G_{high}	+14	+16	+23	dB	2,3
Equivalent Input Noise						
no LNA (1 GHz / 6 GHz)	$EIN_{no LNA}$	-	-130/-120	-126/-115	dBm/Hz	3,4
with LNA (1 GHz / 6 GHz)	EIN_{LNA}	-	-153/-145	-144/-136	dBm/Hz	3,4
Input 3rd Order Intercept						
no LNA (1 GHz / 6 GHz)	$IIP3_{no LNA}$		+25/+20	-	dBm	3,5
with LNA (1 GHz / 6 GHz)	$IIP3_{LNA}$		+3/-2	-	dBm	3,5
Spur Free Dynamic Range						
no LNA (1 GHz / 6 GHz)	$SFDR_{no LNA}$	-	101/95	-	dB/Hz ^{2/3}	3,4,5
with LNA (1 GHz / 6 GHz)	$SFDR_{LNA}$	-	101/95	-	dB/Hz ^{2/3}	3,4,5
Group Delay Link Variation to 6 GHz ⁶	GD	-	0.5	1	nsec	6
Input/Output Impedance	$Z_{in/out}$	-	50	-	Ω	
Input/Output VSWR						
no LNA	$VSWR_{in/out}$	-	1.8:1	2.0:1	dB	2
with LNA	$VSWR_{in/out}$	-	1.9:1	2.0:1	dB	2

1. All measurements are taken at 25° C
2. 30 - 6000 MHz
3. Measured with 1 meter single mode fiber jumper
4. NF (dB) = EIN (dBm/Hz) + 174 (dBm/Hz)
5. Equivalent to IMD 60 dB at 0 dBm total output power (2-tone measurement)
6. The absolute link delay is less than 11 nsec due to the internal fiber management

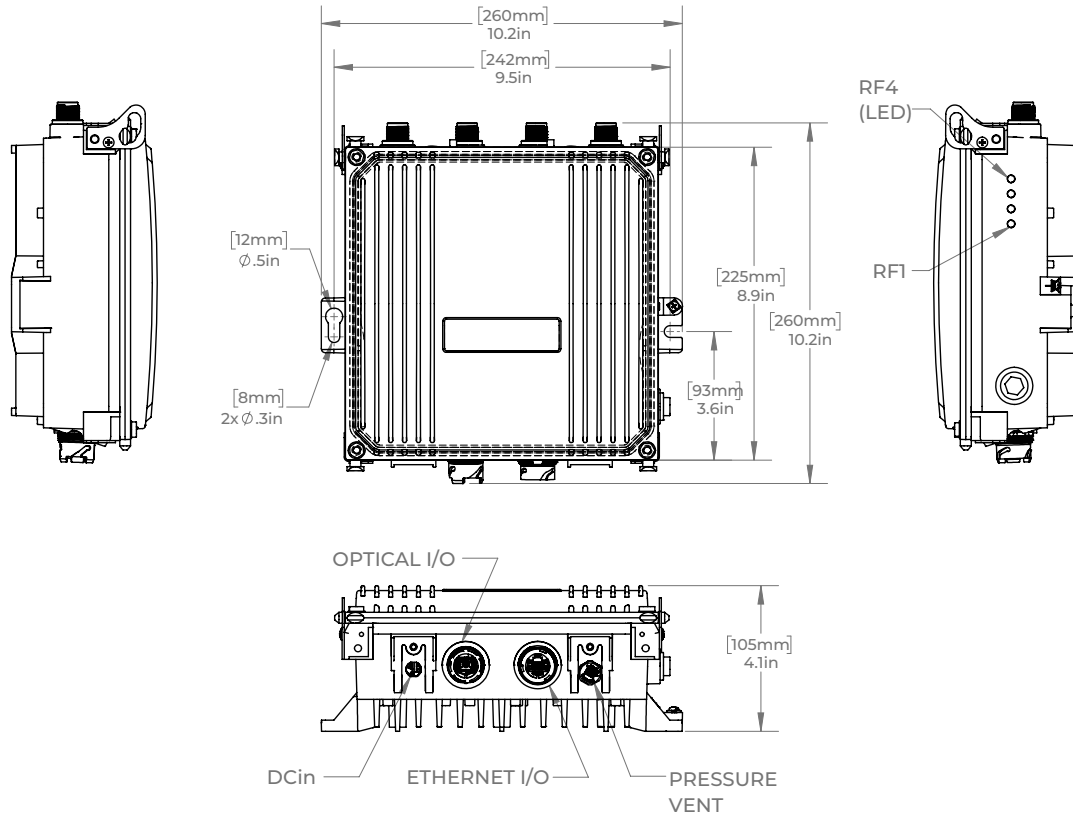
Low Phase Noise Reference Clock Transport

Satcom Modems and Timing Servers may provide low phase noise reference clocks either as separate inputs to the fiber transport link (IDU), or multiplexed onto an RF uplink or downlink port. The eFiberSat Indoor Unit can accommodate both ways of transporting the reference out to the Outdoor Unit. If an RF link is multiplexed onto a single IDU connector with a reference clock, the signals are separated and transported on separate wavelengths to the ODU. In this way, intermodulation distortion is eliminated from both the signals. Phase noise would degrade from the RF signal sidebands, RF signals would degrade from mixing with the higher power reference clocks. These impairments are eliminated. Reference clock frequencies from 1 MHz to 200 MHz are supported.

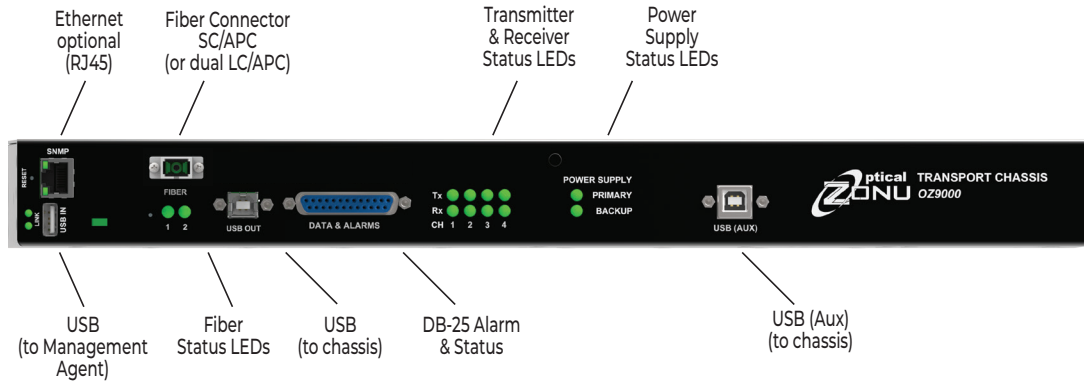
Mechanical Outline - IDU



Mechanical Outline - ODU



Front Panel Features - IDU



The Ethernet (RJ45) port and the internal Management Agent are optional features that enable remote access to the chassis. The USB (to chassis) serial port provides access to sub-assemblies within the eFiberSat IDU. This access may be from a Management Agent within the eFiberSat IDU chassis, or from the Management Agent within any other Optical Zonu Chassis via serial USB. An optional Auxiliary USB port, may provide access to the eFiberSat IDU from a separate Optical Zonu Management Agent.

Some architectures may require the eFiberSat IDU to be connected to two redundant locations. In such situations, an optical switch within the eFiberSat IDU will route to one of two fibers. Either Fiber 1 or Fiber 2 LED will be GREEN, depending on routing. If a redundancy switch is not present, both fiber LEDs will be dark. Contact Optical Zonu for detailed information. Using a dual LC/APC connector, the IDU may also connect to two ODUs.

IDU Channel Status LED Definitions

Channel	Transmitter	Receiver
1	GREEN = OK, RED = ALARM	GREEN = OK, RED = ALARM
2	GREEN = OK, RED = ALARM	GREEN = OK, RED = ALARM
3	GREEN = OK, RED = ALARM	GREEN = OK, RED = ALARM
4	GREEN = OK, RED = ALARM	GREEN = OK, RED = ALARM

IDU Power Supply LED Definitions

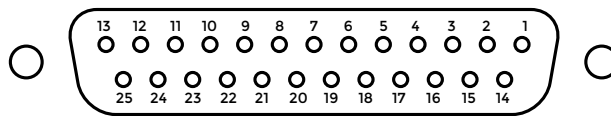
Power Supply	Status
1	GREEN = OK, RED = ALARM
2	GREEN = OK, RED = ALARM

IDU Fiber LED Definitions

Fiber	Status
1	GREEN = OK and Connected, OFF = Not Connected
2	GREEN = OK and Connected, OFF = Not Connected

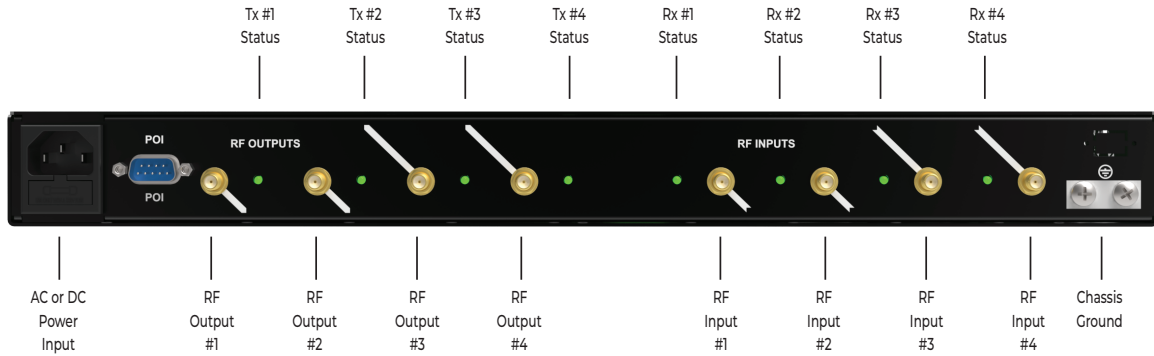
Note: LEDs are not active if internal optical switch is not configured.

IDU DSUB-25 Dry Contact Monitors/Alarms



Pin	Function	Comment
1	Receiver #1 Alarm, $P_{in} < -10$ dBmO	Closed = OK, Open = Fault
2	Receiver #2 Alarm, $P_{in} < -10$ dBmO	Closed = OK, Open = Fault
3	Receiver #3 Alarm, $P_{in} < -10$ dBmO	Closed = OK, Open = Fault
4	Receiver #4 Alarm, $P_{in} < -10$ dBmO	Closed = OK, Open = Fault
5	No Connection	-
6	Transmitter #1 Alarm	Closed = OK, Open = Fault
7	Transmitter #2 Alarm	Closed = OK, Open = Fault
8	Transmitter #3 Alarm	Closed = OK, Open = Fault
9	Transmitter #4 Alarm	Closed = OK, Open = Fault
10	No Connection	-
11	Ground	-
12	Receiver Alarm Common	Closed = OK, Open = Fault
13	Transmitter Alarm Common	Closed = OK, Open = Fault
14	Receiver #1 Optical Monitor	0.1 V / mW
15	Receiver #2 Optical Monitor	0.1 V / mW
16	Receiver #3 Optical Monitor	0.1 V / mW
17	Receiver #4 Optical Monitor	0.1 V / mW
18	No Connection	-
19	Transmitter #1 Optical Monitor	0.1 V / mW
20	Transmitter #2 Optical Monitor	0.1 V / mW
21	Transmitter #3 Optical Monitor	0.1 V / mW
22	Transmitter #4 Optical Monitor	0.1 V / mW
23	No Connection	-
24	+12 VDC Out	500 mA Internal Fuse
25	+12 VDC Out	500 mA Internal Fuse

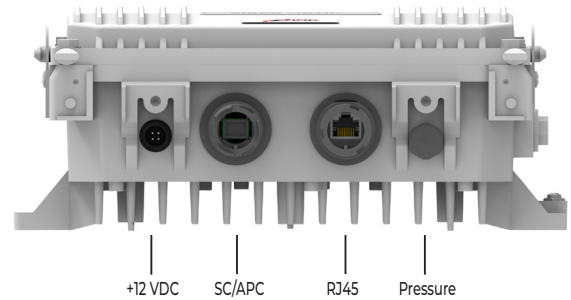
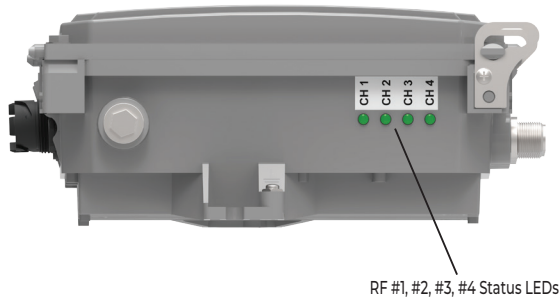
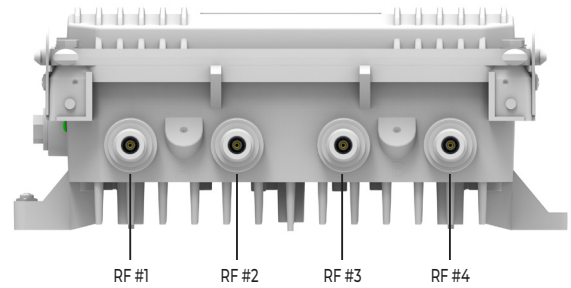
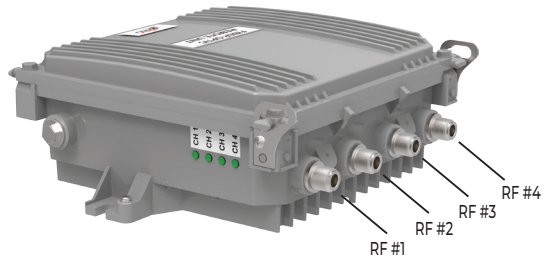
Back Panel Features - IDU



IDU Back Panel Status LED Definitions

Channel	Transmitter	Receiver
1	GREEN = OK, RED = Laser Bias Current High (> 110 mA)	GREEN = OK, RED = Optical Input Power Low (< 10 dBm)
2	GREEN = OK, RED = Laser Bias Current High (> 110 mA)	GREEN = OK, RED = Optical Input Power Low (< 10 dBm)
3	GREEN = OK, RED = Laser Bias Current High (> 110 mA)	GREEN = OK, RED = Optical Input Power Low (< 10 dBm)
4	GREEN = OK, RED = Laser Bias Current High (> 110 mA)	GREEN = OK, RED = Optical Input Power Low (< 10 dBm)

Features - ODU



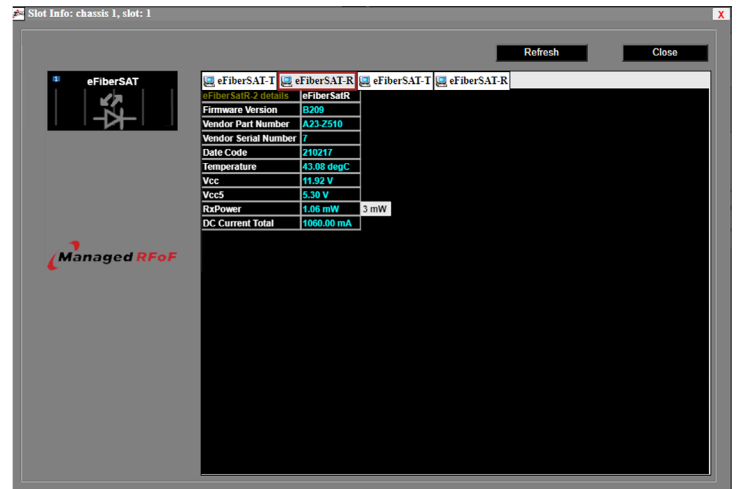
ODU LED Definitions

LED State	Condition - LED #N
OFF	Power Off
GREEN	Normal Operation, OK
RED	System Current Alarm, and/or System Temperature Alarm, and/or Voltage Alarm
AMBER	System Current Warning, and/or System Temperature Warning, and/or Voltage Warning
RED (fast blink)	Transmitter/Receiver Bias Alarm
GREEN (normal blink)	Transmitter/Receiver Bias Warning
BLUE	LNB Current High Alarm
BLUE (normal blink)	LNB Current High Warning
BLUE (fast blink)	LNB Shorted High Alarm, and/or Temperature Alarm
AMBER (fast blink)	Channel #N 10 MHz Alarm
AMBER (normal blink)	Channel #N 10 MHz Warning

User Configurable Options

In addition to the static and dynamic read-only values (e.g., internal temperature) there are several options that the user can configure remotely via the Managed RfOfF graphical user interface if an Ethernet over fiber datalink is in place between the IDU and ODU. The Ethernet datalink may be multiplexed onto the same fiber as the RF uplinks and downlinks.

The figures below represent typical eFiberSat ODU transmitter (downlink, left) and receiver (uplink, right) subslot information windows that are accessed remotely via Managed RfOfF.



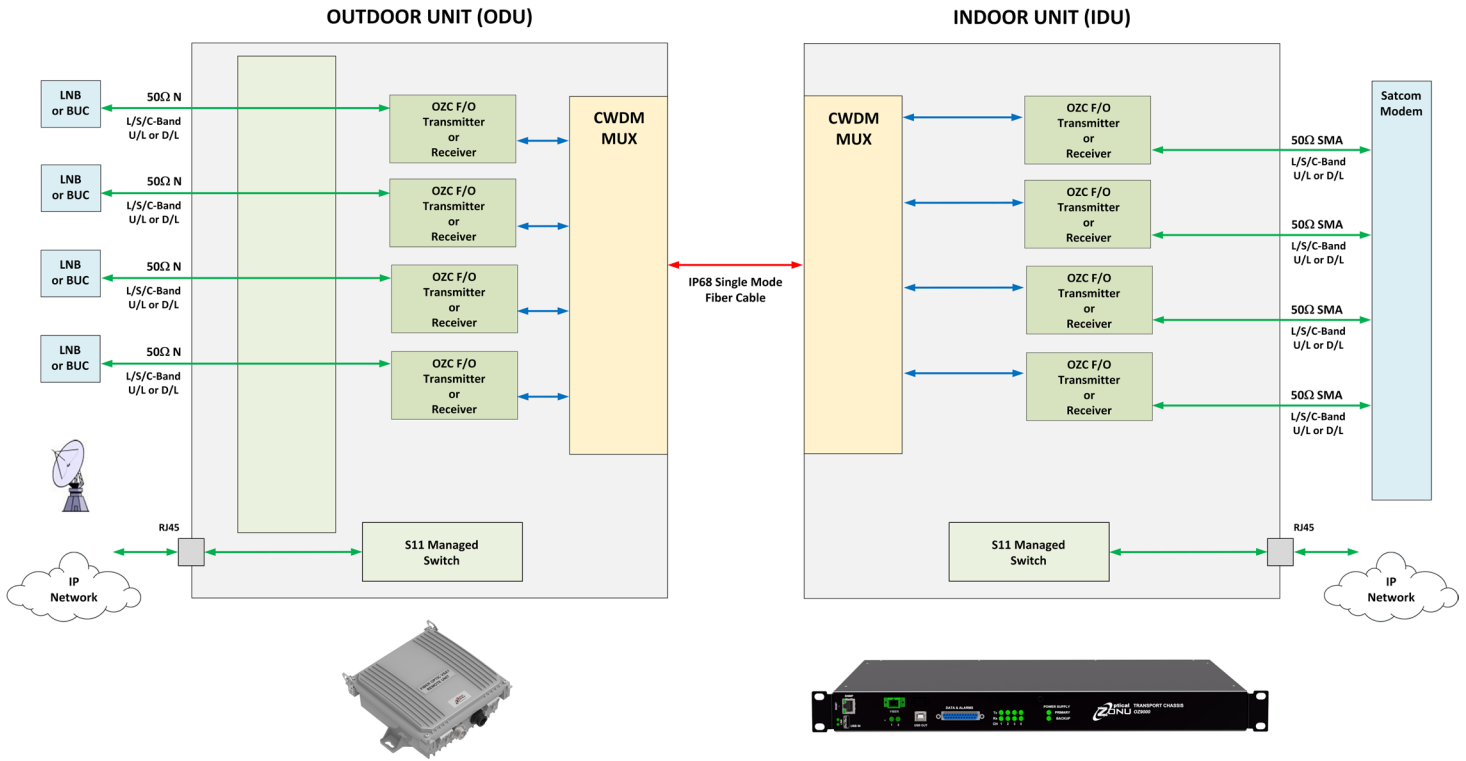
Fiber transmitters in both the IDU (uplink) and ODU (downlink) may be individually Enabled and Disabled remotely. In addition, fiber transmitters in the ODU have remotely configurable Bias-Ts to supply LNB power and control. LNB powering/signaling options include OFF, 13V, 13.33V, 13.66V, 14V, 18.15V, 18.48V, 18.82V. A 22 kHz tone may be Enabled or Disabled.

Fiber receivers in both the IDU (downlink) and ODU (uplink) may have received optical power upper and lower alarm limits set remotely. Alarm limits are set to 50% below and 50% above the value entered into the text box.

Managed RfOfF facilitates the integration of eFiberSat into larger systems of Optical Zonu equipment.

Typical Configurations

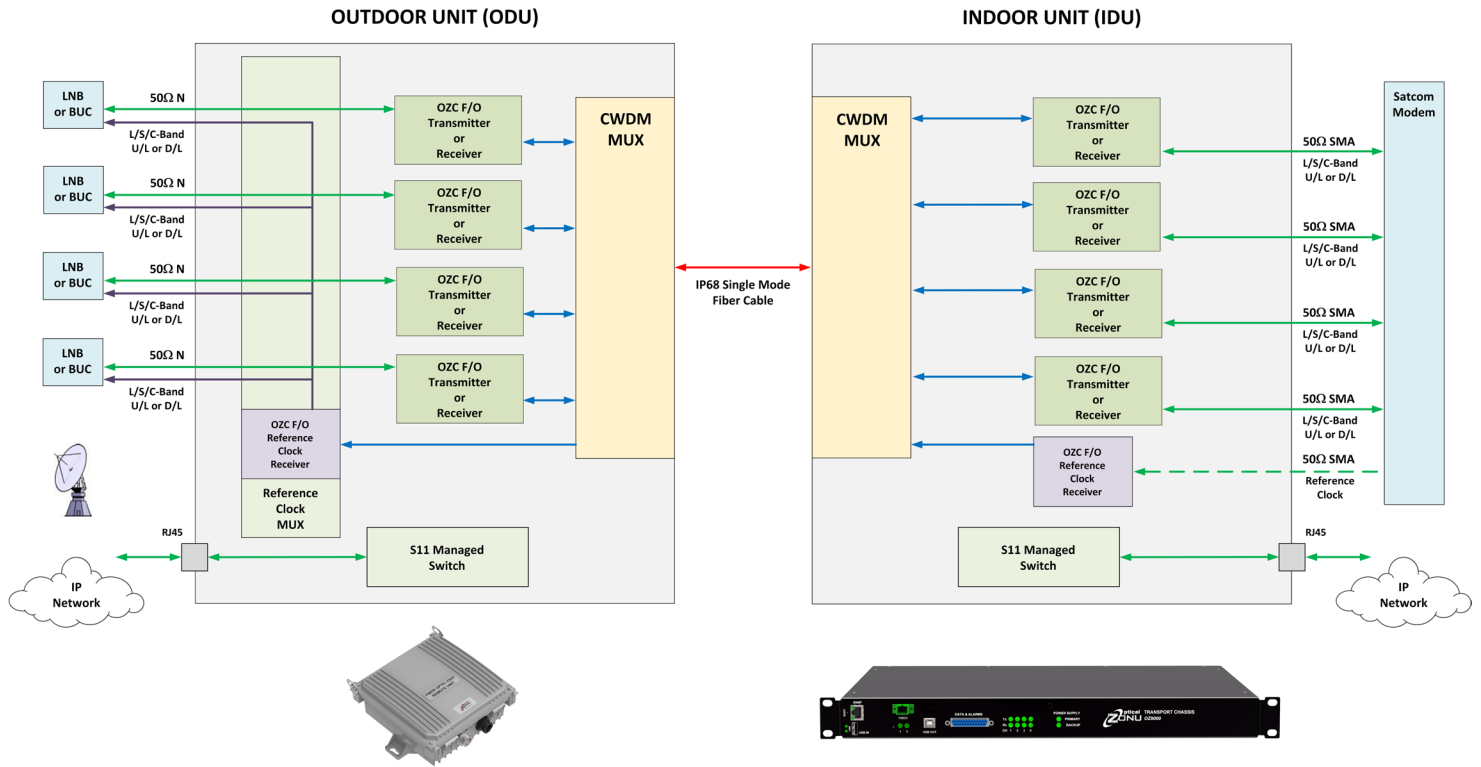
The most basic eFiberSat configuration supports up to four, uplinks and/or downlinks. Multiple RF signals are wavelength division multiplexed onto a single fiber for transport between the Indoor Unit (IDU) and the Outdoor Unit (ODU). Both IDU and ODU may be monitored remotely via SSH CLI, HTTP Web user interface, J-Control graphical user interface (GUI), and SNMP v2/v3.



Note: ODU may be monitored remotely via local IP67 RJ45 connection (optional) or via Ethernet over fiber data link to IDU (optional).

Typical Configurations (continued)

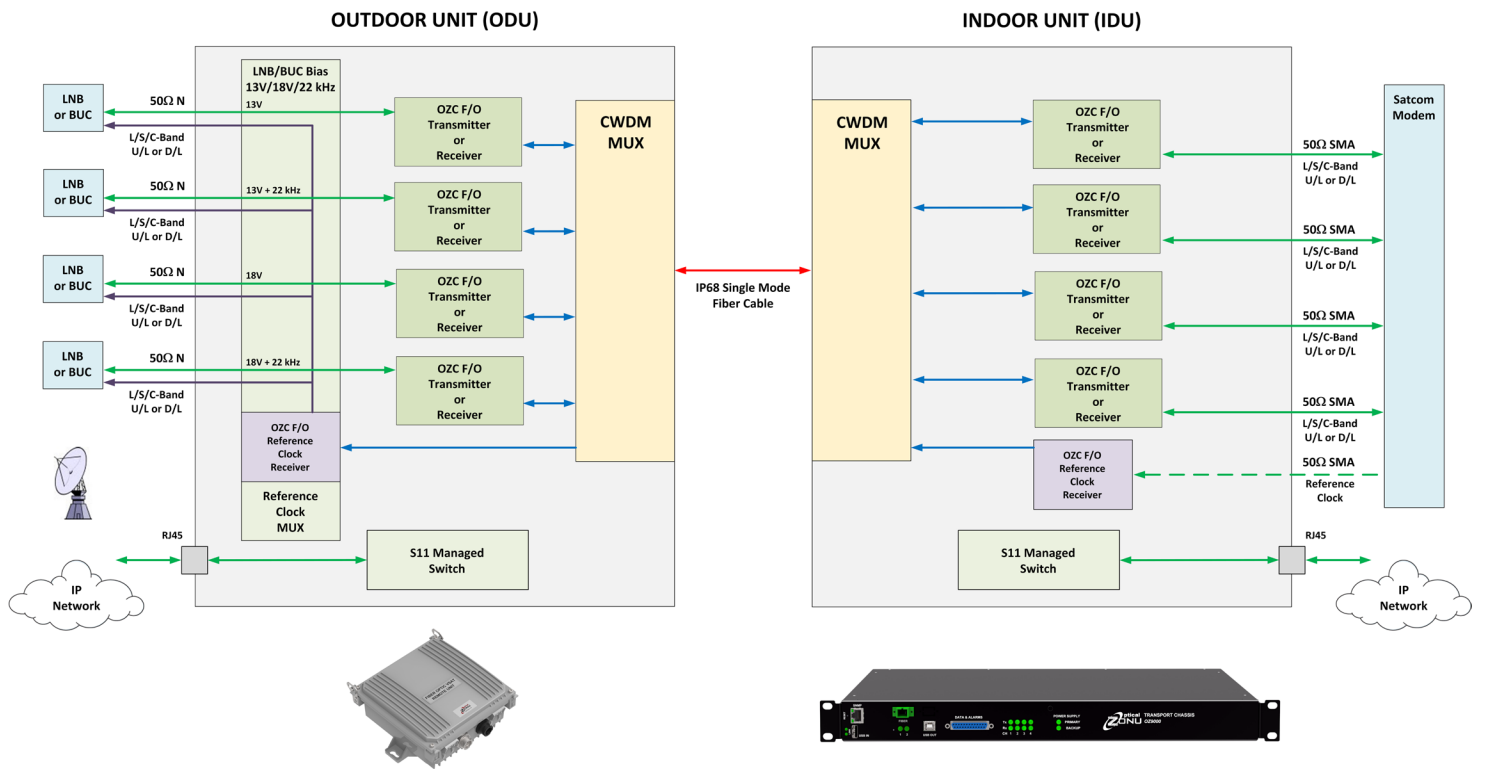
eFiberSat may distribute one or two independent low phase noise reference clocks from a satcom modem or a timing server from indoors to the ODU. The IDU can transport the low phase noise reference clock either multiplexed onto an uplink or downlink signal, or it may be input to the IDU on a dedicated connector. The low phase noise reference clock may be distributed to any combination of LNAs or BUCs (multiplexed with the RF signal), or may it be output on a dedicated RF connector.



Note: ODU may be monitored remotely via local IP67 RJ45 connection (optional) or via Ethernet over fiber data link to IDU (optional).

Typical Configurations (continued)

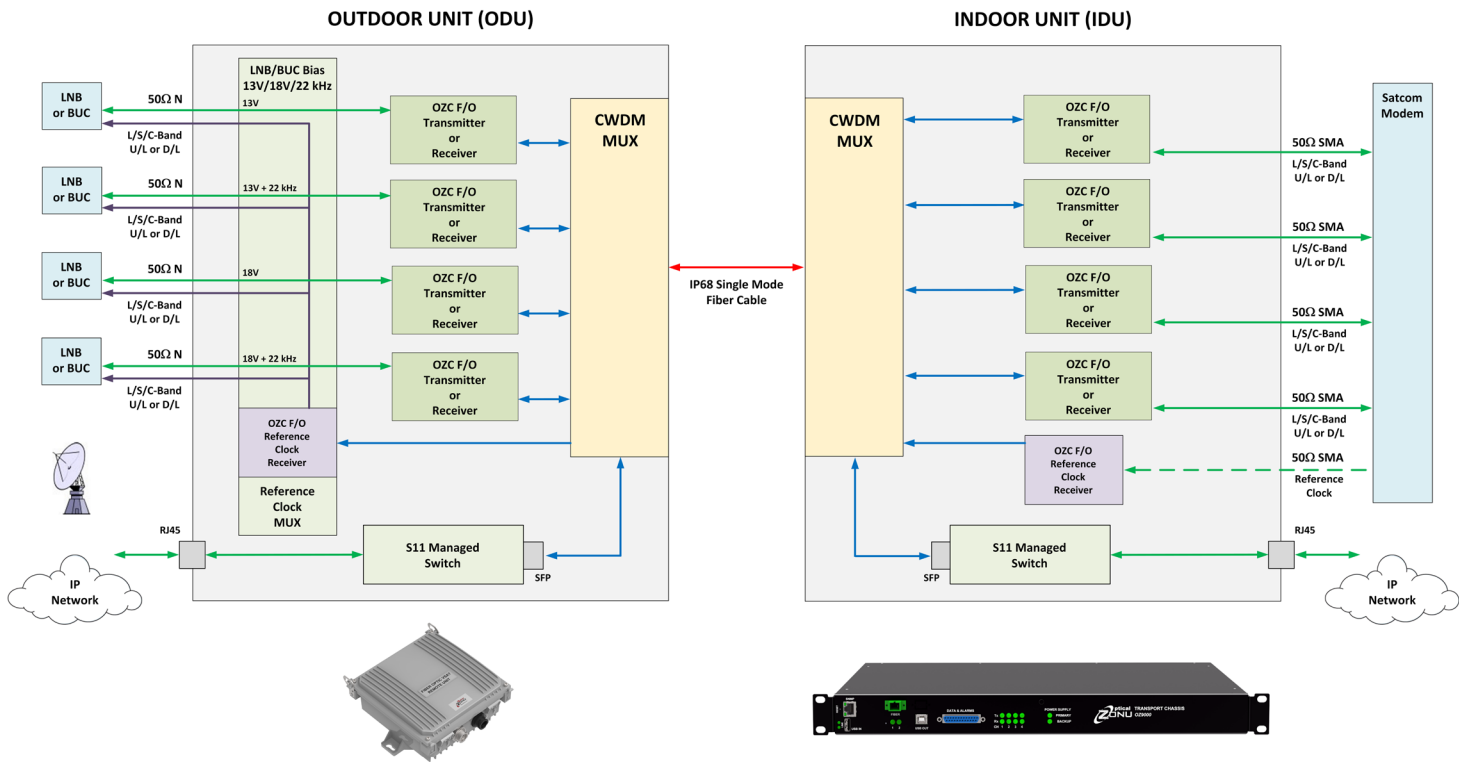
eFiberSat can also accommodate Bias-Ts on any or all of the ODU RF connectors. These are factory installed and may be any combination of 13V, 13V + 22 kHz, 18V, or 18V + 22 kHz.



Note: ODU may be monitored remotely via local IP67 RJ45 connection (optional) or via Ethernet over fiber data link to IDU (optional).

Typical Configurations (continued)

The S11 managed switches within the eFiberSat IDU and ODU (optional) may be connected via an optical Ethernet datalink between IDU and ODU. The bidirectional Ethernet data link is wavelength division multiplexed onto the same fiber that transports the RF signals. With the optical data link, the ODU may be monitored directly from the IDU.

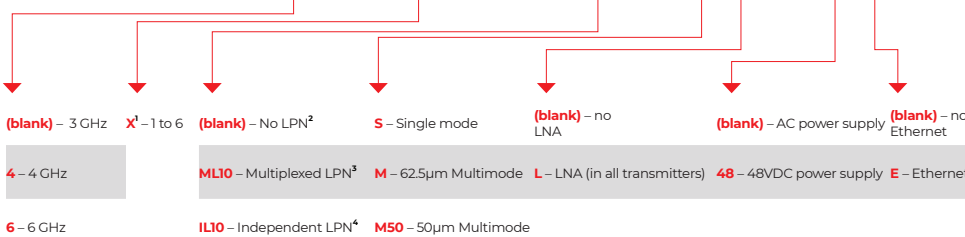


Note: ODU may be monitored remotely via local IP67 RJ45 connection (optional) or via Ethernet over fiber data link to IDU (optional).

Ordering Information

Indoor Unit - Uplink Only Part Numbers.

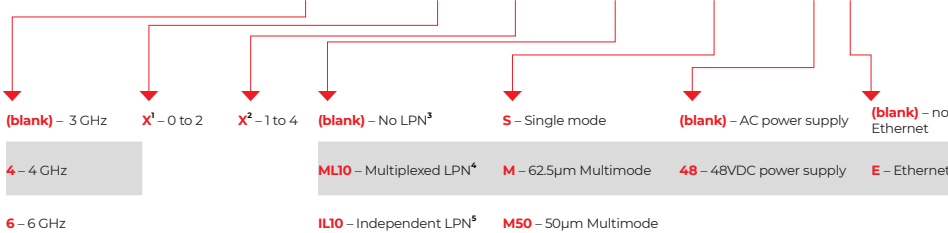
A13-eFI - X - TXR0 - X - XX - XX



¹ X = # of uplink transmitters (1-4) + # of independent low phase noise reference clocks transported to ODU (0-2).
² No low phase noise reference clock to transport to ODU
³ Low phase noise reference clock multiplexed onto uplink signal #1 IDU connector
⁴ Low phase noise reference clock input to IDU on dedicated connector

Indoor Unit - Downlink Only Part Numbers.

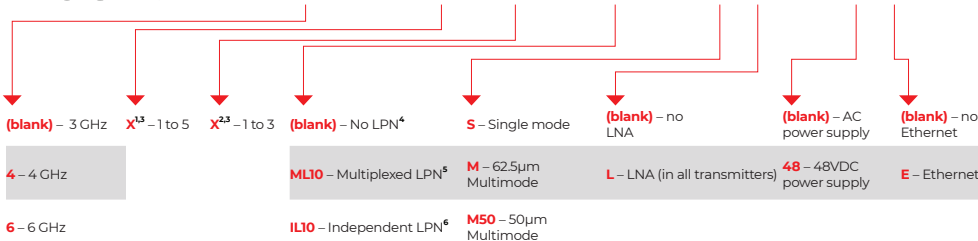
A23-eFI - X - TXRX - X - X - XX



¹ X = # of independent low phase noise reference clocks (0-2)
² X = # of downlink signals (1-4)
³ No Low phase noise reference clock to transport to ODU
⁴ Low phase noise reference clock multiplexed onto downlink signal #1 IDU connector
⁵ Low phase noise reference clock input to IDU on dedicated connector

Indoor Unit - Uplink/Downlink Part Numbers.

A03-eFI - X - TXRX - X - XX - XX



¹ X = # of uplink transmitters (1-3) + # of independent low phase noise reference clocks (0-2)
² X = # of downlink receivers (1-3)
³ # of uplinks + # of downlinks must be ≤ 4
⁴ No low phase noise reference clock to transport to ODU
⁵ Low phase noise reference clock multiplexed onto uplink signal #1 IDU connector. For different connector, contact Optical Zonu
⁶ Low phase noise reference clock input to IDU on dedicated connector



Related Products

[OZ51x OEM Transmitter/Receiver Modules \(30 - 3000 MHz\), optional LNA, CWDM](#)

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

[OZ600 Transmitter/Receiver/Transceiver Standalone Modules \(30 - 3000 MHz\), optional CWDM](#)

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

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

[TTL/IPPS/IRIG-B OEM Transmitter/Receiver Modules, optional CWDM](#)

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

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](#)

[Managed RF Over Fiber](#)

[19" 1RU J-Chassis](#)

[19" 3RU J3U Chassis](#)

[19" 1RU OZC9500 Chassis](#)

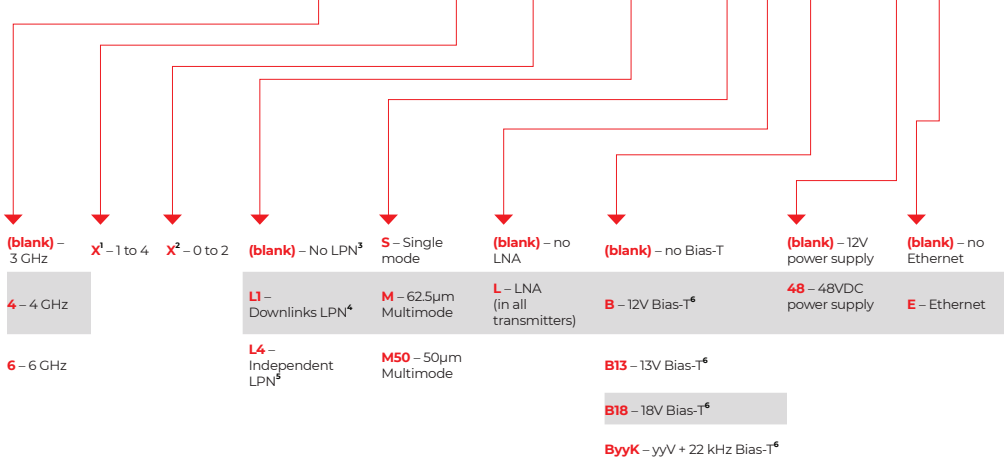
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Ordering Information

Outdoor Unit - Downlink Only Part Numbers.

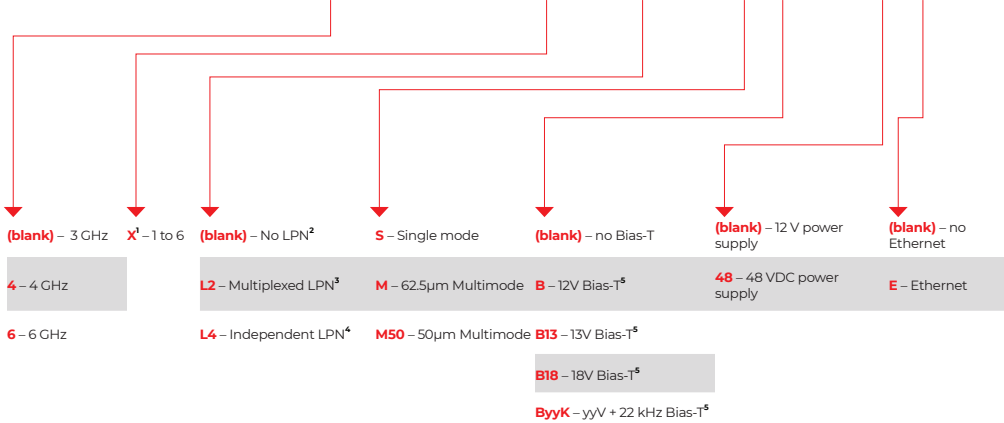
A13-eFO - X - TXXR - X - XXX - XX



¹ X = # of downlink transmitters (1-4)
² X = # of independent low phase noise reference clocks transported from IDU (0-2)
³ No low phase noise reference clock transported from IDU
⁴ Low phase noise reference clock distributed to all downlink ODU connectors
⁵ Low phase noise reference clock output on dedicated ODU connector
⁶ Selected Bias-T applied to all active ODU connectors. For further customization, contact Optical Zonu

Outdoor Unit - Uplink Only Part Numbers.

A23-eFO - X - T0RX - X - XX - XX



¹ X = # of uplink receivers (1-4) + # of independent low phase noise reference clocks transported from IDU (0-2).
² No low phase noise reference clock transported from IDU
³ Low phase noise reference clock distributed to all uplink ODU connectors
⁴ Low phase noise reference clock output on dedicated ODU connector
⁵ Selected Bias-T applied to all active ODU connectors. For further customization, contact Optical Zonu



Related Products

[OZ51x OEM Transmitter/Receiver Modules \(30 - 3000 MHz\), optional LNA, CWDM](#)

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

[OZ600 Transmitter/Receiver/Transceiver Standalone Modules \(30 - 3000 MHz\), optional CWDM](#)

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

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

[TTL/IPPS/IRIG-B OEM Transmitter/Receiver Modules, optional CWDM](#)

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

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](#)

[Managed RF Over Fiber](#)

[19" 1RU J-Chassis](#)

[19" 3RU J3U Chassis](#)

[19" 1RU OZC9500 Chassis](#)

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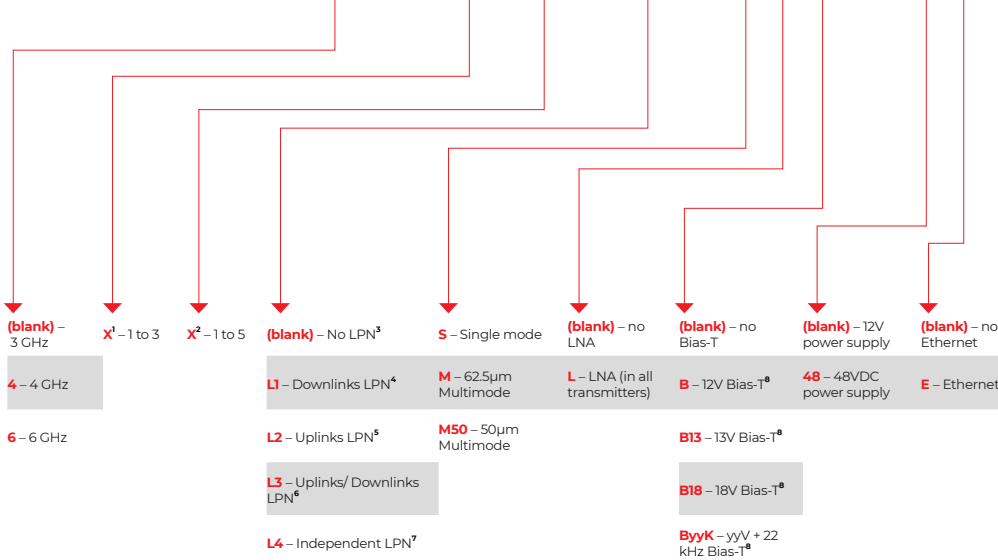
U. S. A.



Ordering Information

Outdoor Unit - Uplink/Downlink Part Numbers.

A03-eFO - X - TXX - X - XXX - XX



¹ X = # of downlink transmitters (1-3)
² X = # of uplink receivers (1-3) + # of independent low phase noise reference clocks transported from IDU (0-2)
³ No low phase noise reference clock transported from IDU
⁴ Low phase noise reference clock distributed to all downlink ODU connectors
⁵ Low phase noise reference clock distributed to all uplink ODU connectors
⁶ Low phase noise reference clock distributed to all downlink and uplink ODU connectors
⁷ Low phase noise reference clock output on dedicated ODU connector
⁸ Selected Bias-T applied to all active ODU connectors. For further customization, contact Optical Zonu



Related Products

- [OZ51x OEM Transmitter/Receiver Modules \(30 - 3000 MHz\), optional LNA, CWDM](#)
- [OZ52x OEM Transmitter/Receiver Modules \(30 - 6000 MHz\), optional Tunable RF Gain, LNA, CWDM, I2C Serial Interface](#)
- [OZ600 Transmitter/Receiver/Transceiver Standalone Modules \(30 - 3000 MHz\), optional CWDM](#)
- [OZ81x Transmitter/Receiver/Transceiver Standalone Modules \(30 - 6000 MHz\), optional CWDM, Optical AGC, RS232 Transport](#)
- [Low Phase Noise Transmitter/Receiver Modules \(10 - 200 MHz\), Multiple Form Factors, optional CWDM](#)
- [TTL/IPPS/IRIG-B OEM Transmitter/Receiver Modules, optional CWDM](#)
- [OZ16xx Transmitter/Receiver Standalone Modules \(30 - 10000 MHz\), Cooled Laser Diode, DWDM, optional I2C Serial Interface](#)

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](#)
- [Managed RF Over Fiber](#)
- [19" 1RU J-Chassis](#)
- [19" 3RU J3U Chassis](#)
- [19" 1RU OZC9500 Chassis](#)

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