2406LR
L-Band/Wideband Standalone Fiber Receiver
User Manual

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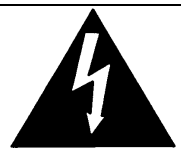
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
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WARNING TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE
WARNING DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT
WARNING TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE
WARNING THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

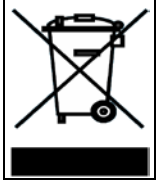
INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE	EN60065	Safety
	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity



EN504192 2005
Waste electrical products should not be disposed of with household waste.
Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Dec 2016

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1. OVERVIEW

The 2406LR is a fiber optic receiver for signals in the satellite L-Band and other frequency ranges. It accepts a single fiber optic input on an FC/APC connector and provides a pair of equal power electrical outputs. Packaged in a small, standalone enclosure, the 2406LR is temperature-hardened and ideal for mounting on or near antenna structures, or in any application where modular/rack-mount products are not practical. The –WP version features dust and water protection for direct outdoor mounting without a secondary enclosure. When combined with the 2408LT, a bi-directional link can be created, ideal for VSAT and similar applications.

Two gain modes are provided for flexible output level adjustment to suit the requirements of the coaxial distribution system and the connected equipment. Manual gain mode allows a fixed gain level to be applied to the output signal. AGC mode allows the user to set a target output level, and the 2406LR's microprocessor will automatically apply the correct amount of gain to maintain that level. Comprehensive local LED indicators provide instant information relating to optical input, DC power input and RF output levels.

Features:

- Mounts directly to the antenna structure or other outdoor locations
- –WP option provides a weatherproof version of the product
- Wide bandwidth allows use with L-Band, over-the-air DTV and other frequency ranges
- Protocol independent design – passes all modulation formats
- Dual, full power outputs
- Tri-color LED status indicators for optical input, DC input and RF output levels
- Flexible powering options including power brick (+PS option), 2400PSU-8 or customer's own 11-20VDC source
- Fiber link provides electrical isolation between antenna and facility, mitigating ground loop and lightning issues
- Fiber transport offers increased signal quality over coax at longer distances and is not prone to high-frequency roll-off

Applications:

- L-Band over Fiber Transport to L-Band up-converter for uplinks
- VSAT and other bi-directional signals
- Portable antenna deployment
- Any RF fiber receive application requiring a standalone device

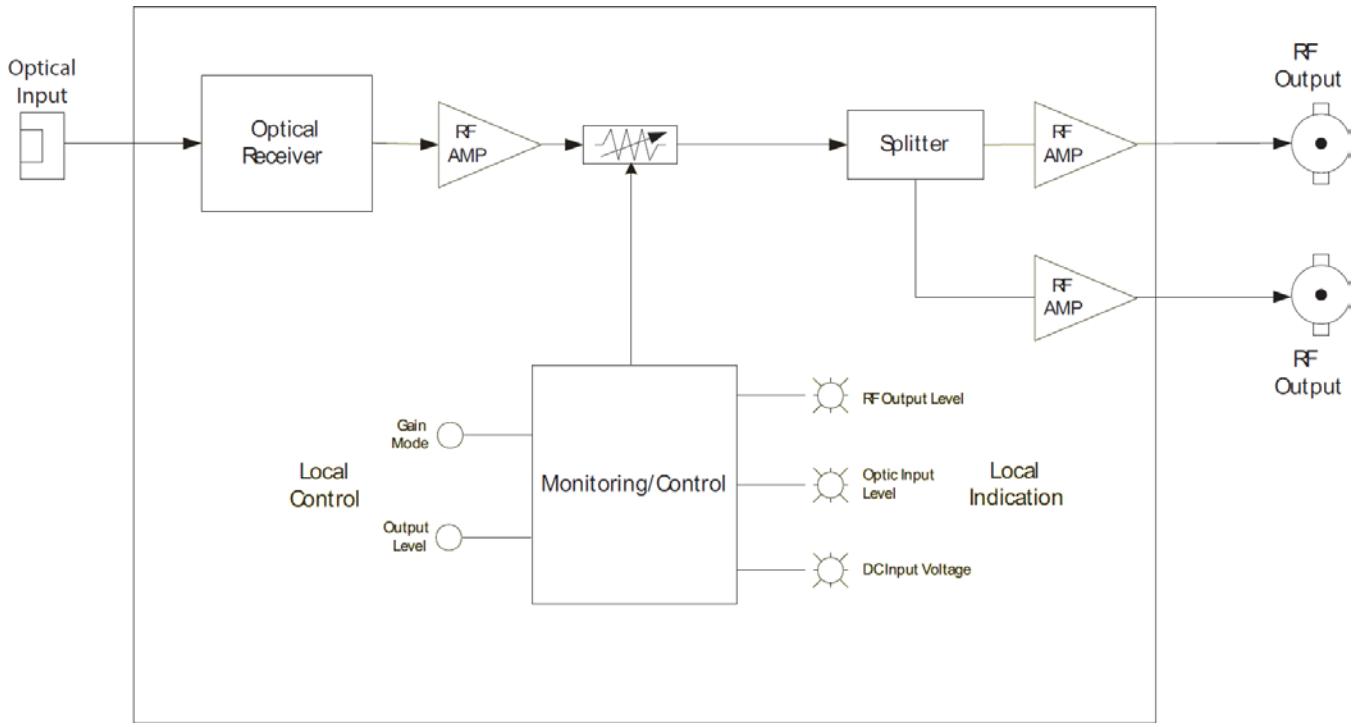

Figure 1-1: 2406LR Block Diagram

2. INSTALLATION

The 2406LR comes in a die cast enclosure with integral mounting flanges. It is recommended that the enclosure be mounted on a flat surface with the connectors facing down. For units with the -WP option exposed to the elements, while not required to prevent water ingress into the unit, good outdoor installation practice suggests the use of waterproof connectors, boots and/or protecting connectors with a wrap of Scotch 130C rubber tape followed by Scotch Super 88 vinyl tape, or equivalent.

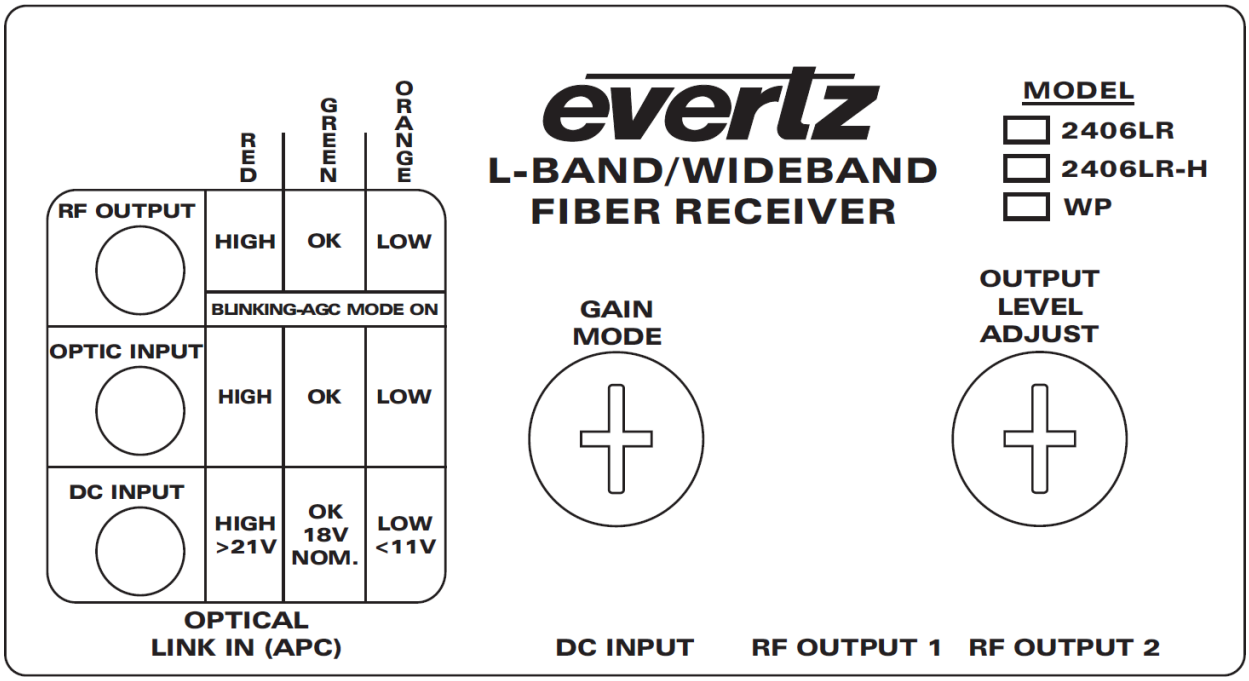

Figure 2-1: 2406LR Module

2.1. 2406LR CONNECTIONS

Coaxial connectors accept conductors in the range of 23-18 AWG (0.26-0.82 mm^2). Using a larger conductor will damage the connector. If you are using cable with a center conductor larger than 18 AWG (0.82 mm^2), a connector with a fixed or crimp pin of a suitable diameter must be.

RF OUTPUT 1,2: **F-Type connector for L-band satellite signals.**

DC INPUT: Input F-Type connector for DC power supply. Input power supply range is from 11-20 VDC.

Do not exceed 21VDC at the DC input connector or damage to the unit will result.

OPTICAL LINK IN: **FC/APC female connector with the optical input from the 2406LR. This connector should be connected to the FIBER OUT connector of an appropriate Evertz companion transmitter model at the transmitting end with a suitable fiber optic cable.**

2.2. CARE AND HANDLING OF OPTICAL FIBER

2.2.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

CAUTION: USE OF ANY CONTROLS, ADJUSTMENTS, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

Background colour: yellow
Triangular band: black
Symbol: black

2.2.2. Assembly

Assembly or repair of the laser sub-module is done only at Evertz facility and performed only by Evertz technical personnel.

2.2.3. Labeling

Certification and Identification labels are combined into one label.

Date of manufacture on this label can be traced by serial number.

Figure 2-2: Reproduction of 2406LR Certification and Identification Label for Models that are Class 1 Laser Products

2.2.4. Handling and Connecting Fibers

Never touch the end face of an optical fiber. Always keep dust caps on optical fiber connectors when not connected and always remember to properly clean the optical end facet of a connector before making a connection.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that the user maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable.

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3. 2406LR SPECIFICATIONS

3.1. RF OUTPUTS

Number of Outputs:	2
Connector:	F-type (50Ω BNC optional)
Conductor Range:	23-18 AWG (0.26-0.82 mm^2)
I/O Impedance:	75Ω (50Ω optional)
Frequency Range:	
2406LR:	120MHz – 3GHz
2406LR-H:	120MHz – 2.3GHz
Return Loss:	
120MHz to 2.3GHz:	> 15dB
2.3GHz to 3GHz:	> 12dB
Output IP3:	+28dBm
IMD:	< -55dBc at -3dBm output and 25dB gain
Output Signal Level:	
Manual Gain:	0 to -60dBm (depending on input signal level, gain setting and optical loss)
AGC Mode:	-10 to -40dBm (adjustable, maintainable within available gain range)
Available Gain:	-6dB to +24dB in 2dB steps

3.2. OPTICAL INPUT

Number of Inputs:	1
Connector:	Female FC/APC
Operating Wavelength:	1270nm-1610nm
Maximum Input Power:	
2406LR:	+3dBm
2406LR-H:	-7dBm
Optical Sensitivity:	
2406LR:	-14dBm at 35dB C/N on a 36MHz carrier
2406LR-H:	-20dBm at 35dB C/N on a 36MHz carrier

3.3. DC INPUT

Voltage:	+18VDC nominal, +11VDC to +20VDC range
Connector:	F-Type
Conductor Range:	23-18 AWG (0.26-0.82 mm^2)

3.4. PHYSICAL

Dimensions (with flanges):	5.4”L x 2.4”W x 1.2”H (138mm L x 61 mm W x 31 mm H)

3.5. ENVIRONMENTAL

Temperature:	-20 to +70°C
Dust and Water Protection:	IP65 compliant (-WP version only)

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4. STATUS INDICATORS

The 2406LR module has three LED status indicators on the front of the box to show operational status of the module at a glance.

4.1. RF OUTPUT INDICATOR

In Manual Mode

HIGH: **The RF DRIVE LED will be RED when the incoming RF signal plus the module gain is over -5dBm and is overdriving the laser.**

OK: **The RF DRIVE LED will be GREEN when the incoming RF signal plus the module gain is within the normal drive levels for the laser, which is between -45dBm to -5dBm.**

LOW: **In manual gain mode, the RF DRIVE LED will be ORANGE when the incoming RF signal plus the module gain is under -45dBm and is under driving the laser, leading to non-optimal signal to noise ratio.**

In AGC Mode

HIGH: **This LED will be RED when the gain is above the upper-bound of the AGC hold range.**

OK: **In AGC mode, this LED will be GREEN when the gain is within the AGC hold range.**

LOW: **In AGC mode, this LED will be ORANGE when the gain drops below the lower-bound of the AGC hold range (outside of AGC hold range).**

4.2. OPTIC INPUT INDICATOR

For 2406LR

HIGH: **This indicator will be RED if the optical input gain is over 3dBm.**

OK: **This indicator will be GREEN if the optical input gain is between -14dBm and 3dBm.**

LOW: **This indicator will be ORANGE if the optical input gain is below -14dBm.**

For 2406LR-H

HIGH: **This indicator will be RED if the optical input gain is over -7dBm.**

OK: **This indicator will be GREEN if the optical input gain is between -21dBm and -7dBm.**

LOW: **This indicator will be ORANGE if the optical input gain is below -21dBm.**

4.3. DC INPUT INDICATOR

HIGH >21V: **The DC IN LED will be RED if the supply voltage at the DC input is greater than 21 Volts.**

OK 18V NOM.: **The DC IN LED will be GREEN when the supply voltage at the DC input is between 11 and 21 Volts (18 Volts nominal).**

LOW <11V: **The DC IN LED will be ORANGE when the supply voltage at the DC input is less than 11 Volts.**

5. USER CONTROLS

There are removable plugs covering the Gain Mode and Output Level Adjust rotary dials. Once these plugs are removed, the dials can be used for fine tuning the device and selecting the auto gain modes.

5.1. GAIN MODE

The 2406LR has two gain modes: AGC "0" and Manual "1".

Note: Selecting Gain Modes other than 0 and 1 on the rotary dial will cause a misconfiguration.

AGC will maintain the output of the 2406LR at a constant level even if the input signal level changes, but remains within the AGC hold range.

If conducting frequency response sweeps, both the 2406LR and the companion transmitter should NOT be on AGC mode and should be set to a manual gain value.

5.2. OUTPUT LEVEL ADJUST

When the Gain Mode switch is in manual mode, the Output Level Adjust switch allows the user to make gain adjustments from -5dB to +25dB. Each step on the rotary switch represents a 2dB gain change.

When the Gain Mode switch is in AGC mode, the Output Level Adjust switch allows the user to set the AGC target level from -10dB to -40dB in 2dB steps.

Gain Mode Switch Position	Output Level Adjust Switch Function
0 (AGC)	AGC: -10 to -40dB in 2dB steps
1 (Manual)	Manual Gain: -5dB to 25 dB in 2dB steps

Table 5-1: Output Level Adjust Switch

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