Model 2405EO
SMPTE259M Re-Clocking
Electrical to Fiber Converter

Instruction Manual

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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.

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

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Jan 02
2.0	Updated safety section and added assembly & labeling sections	July 05

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Tables

1. OVERVIEW

The 2405EO Electrical to fiber converter provides an economical method of connecting in-plant coaxial distribution and longer distance optical distribution for SMPTE 259M (143 - 540Mb/s) serial digital signals. The companion 2405OE or 7705EO Fiber to Electrical converters facilitate conversion back to coaxial distribution at the destination. The 2405EO is ideal for use in portable, remote and link extension applications where the small size, rugged enclosure and high performance operation meet the stringent requirements of these applications.

The 2405EO converter features one auto-equalized coaxial input with two reclocked serial digital outputs and one reclocked fiber output. The 2405EO has been designed to be used primarily as a reclocking SMPTE 259M or DVB-ASI distribution amplifier and converter, however SMPTE 310M (19.4 Mb/s) signals can also be reclocked.

The 2405EO is available in different versions to meet a variety of applications. (See specifications for complete information)

2405EO3F	1310 nm MQW	Suitable for distances up to 6 Km @ 1.5 Gb/s
2405EO3D	1310 nm DFB	Suitable for distances up to 40 Km @ 1.5 Gb/s
2405EO5D	1550 nm DFB	Suitable for distances up to 50 Km @ 1.5 Gb/s

There are several versions with built in isolators specifically suited to coarse wave division multiplexing (CWDM) applications. When combined with the Evertz 7705CWDM Coarse Wave Division Multiplexor/Demultiplexor products, up to eight independent signal types on separate wavelengths can be combined on a single fiber. These versions are suitable for distances up to 75 Km @ 270 Mb/s.

2405EO47	1470 nm DFB
2405EO49	1490 nm DFB
2405EO51	1510 nm DFB
2405EO53	1530 nm DFB
2405EO55	1550 nm DFB
2405EO57	1570 nm DFB
2405EO59	1590 nm DFB
2405EO61	1610 nm DFB

Features:

- Reclocking for all for SDTV video rates including SMPTE 259M (143Mb/s-540Mb/s), DVB-ASI (270Mb/s) and SMPTE 310M (19.4Mb/s)
- Automatic cable equalization to 300 m
- Automatic laser shutdown on absence of input signal for extended laser life
- Operation with multi-mode or single-mode fiber
- Long reach transmission capability
- Rugged, small form factor enclosure
- SC/PC, ST/PC or FC/PC connector options
- Comprehensive signal, laser and modules status indicator LEDs
- Low power +12 VDC operation

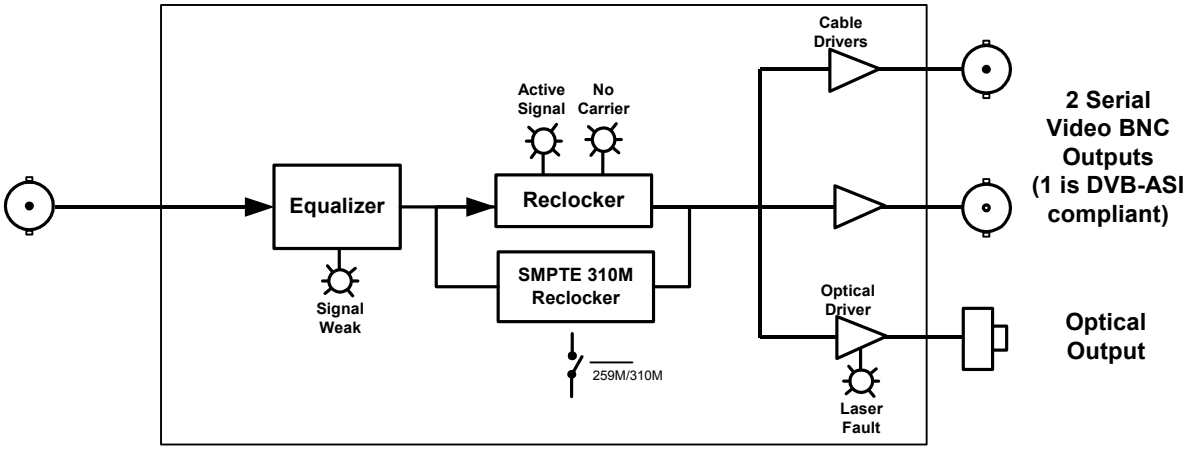

Figure 1: 2405EO Block Diagram

2. INSTALLATION

The 2405EO is a compact module that has three BNC connectors and one SC/PC (shown), ST/PC or FC/PC optical connector.

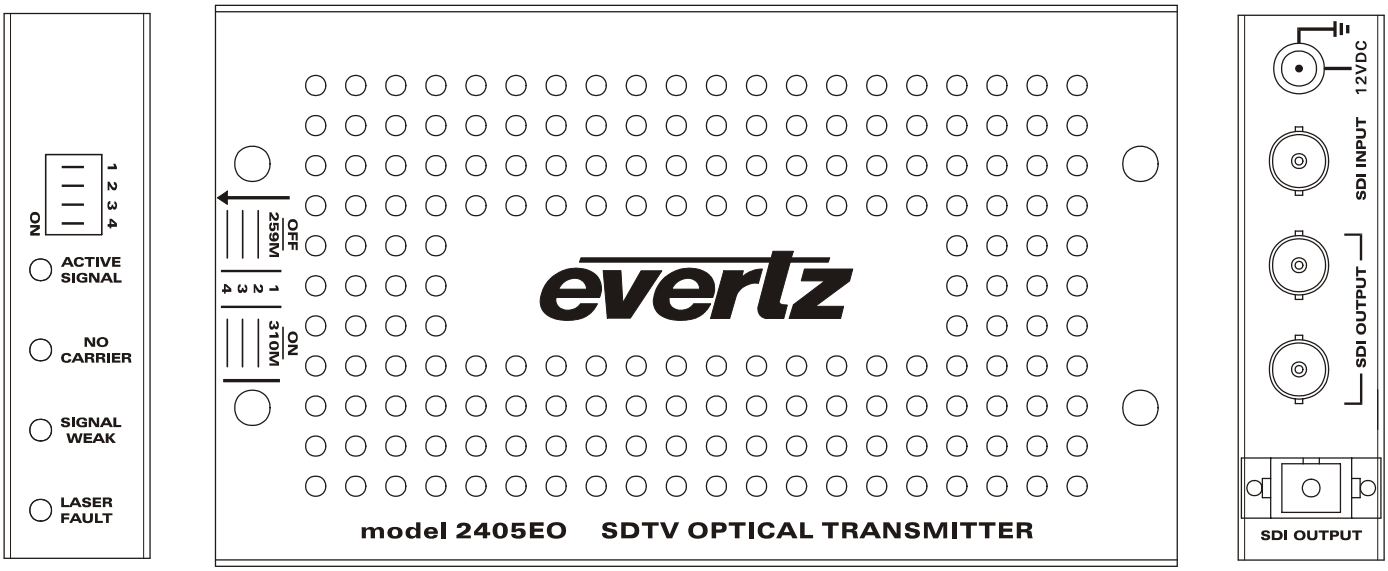

Figure 2: 2405EO Module

SDI INPUT Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 259M, DVB-ASI or SMPTE 310M standard. See section 5.1 for information on choosing the correct video standard.

SDI OUTPUT There are two BNC connectors with reclocked serial component video outputs, compatible with the SMPTE 259M or SMPTE 310M standard. Only the SDI OUTPUT closest to the SDI OUPUT Fiber connector maintains the corect polarity for DVB-ASI signals.

There is one SC/PC (shown), ST/PC or FC/PC female connector with reclocked serial component video outputs, compatible with the SMPTE 259M, DVB-ASI or SMPTE 310M standard. This connector is the optical output from the 2405EO as shown in section 3.3.

The 2405EO comes with an auto-ranging DC voltage adapter that automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the DC voltage adapter. The power cord should be minimum 18 AWG wire size; type SST marked VW-1, maximum 2.5 m in length. The DC cable of the voltage adapter should be connected to the DC power jack on the rear panel. A green LED located beside the power connector will be illuminated when there is power applied to the 2405EO.

2.1. CARE AND HANDLING OF OPTICAL FIBER

2.1.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

The laser modules used in the Evertz fiber optic modules are Class I, with a maximum output power of 2mW, and wavelengths of either 1310 nm or 1470 nm to 1610 nm.

2.1.2. Assembly

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

2.1.3. Labeling

Certification and Identification labels are combined into one label and it is located in the middle of the chassis, on the bottom, close to rear. Date of manufacture can be traced by bar code provided on the label.

Typical 2405EO Certification and Identification Label
(Serial # and bar code differ from unit to unit)

2.1.4. 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 you maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module.

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standards:
Normal: SMPTE 259M A, B, C, D (143 to 360 Mb/s) SMPTE 344M (540 Mb/s), SMPTE 305M (SDTI), or DVB-ASI
Switch Selectable: SMPTE 310M (19.4 Mb/s)
Connector: 1 BNC input per IEC 169-8
Equalization: Automatic 300m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss: > 15 dB up to 540 Mb/s

3.2. SERIAL VIDEO OUTPUTS

Number of Outputs: 2 Reclocked.
Standards: same as input
Connectors: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 900 ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB up to 540 Mb/s
Wide Band Jitter: < 0.2 UI (reclocked)

3.3. OPTICAL OUTPUT

Standard: SMPTE 297M
Number of Outputs: 1 reclocked
Connector: SC/PC, ST/PC or FC/PC female housing
Return Loss: < 14 dB
Rise and Fall Time: 400-700 ps
Wide Band Jitter: < 0.2 UI
Fiber Size: 9 μm core / 125 μm overall
Optical Characteristics

Model	Nominal	Laser Feedback	Line Width	Optical

	Wavelength	Structure		Power
2405EO3F	1310 nm	Fabrey Perot	< 4.5 nm	-7.5 dBm
2405EO3D-L	1310 nm	DFB	< 1 nm	0 dBm
2405EO5D-L	1550 nm	DFB	< 1 nm	0 dBm
2405EO47	1470 nm	DFB	< 1 nm	> 0 dBm
2405EO49	1490 nm	DFB	< 1 nm	> 0 dBm
2405EO51	1510 nm	DFB	< 1 nm	> 0 dBm
2405EO53	1530 nm	DFB	< 1 nm	> 0 dBm
2405EO55	1550 nm	DFB	< 1 nm	> 0 dBm
2405EO57	1570 nm	DFB	< 1 nm	> 0 dBm
2405EO59	1590 nm	DFB	< 1 nm	> 0 dBm
2405EO61	1610 nm	DFB	< 1 nm	> 0 dBm

3.4. ELECTRICAL

Voltage: + 12VDC
Power: 6 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.
DC Power Supply: 115/230 VAC 50/60 Hz, 30 VA

3.5. PHYSICAL

Dimensions: 6“ L x 3.5” W x 1” H
(152mm L x 89mm W x 25mm H)
With Mounting Flanges: 6“ L x 4” W x 1” H
(152mm L x 114mm W x 25mm H)
Weight: 0.5 lbs. (0.28 Kg)

4. STATUS LEDS

ACTIVE SIGNAL: This Green LED will be On when there is a valid signal present at the module input.

NO CARRIER: This Red LED will be On when there is no valid signal present at the module input.

SIGNAL WEAK: This Yellow LED will be On when the cable equalizer detects that the cable length is greater than a preset threshold. (factory set for 250 meters of Belden 8281 or equivalent cable). See section 5.2 for information on adjusting the cable equalizer warning threshold.

LASER FAULT This Red LED will be On when there is a fault in the optical output device.

5. USER CONTROLS

The 2405EO is equipped with a 4 position DIP switch to allow the user to configure the module. The On position is down, or closest to the printed circuit board. Table 1 gives an overview of the DIP switch functions. Section 5.1 gives specific information about the DIP switch functions.

DIP Switch	Function
1	Reclock Mode Selection
2	Future Use
3	
4	

Table 1: DIP Switch Functions

5.1. SELECTING THE VIDEO STANDARD

DIP switch 1 determines whether the module will operate operate as a distribution amplifier with SMPTE 259M (143 to 360 Mb/s), SMPTE 344M (540 Mb/s) or DVB-ASI video signals or with SMPTE 310M (19.4 Mb/s) signals as shown in Table 2.

DIP 1	FUNCTION	DESCRIPTION
Off	259M (default)	The 2405EO will reclock SMPTE 259M (143 to 360 Mb/s), SMPTE 344M (540 Mb/s) or DVB-ASI video signals..
On	310M	The 2405EO will reclock SMPTE 310M (19.4 Mb/s) video signals.

Table 2: Reclock Mode Switch Setting

5.2. SETTING THE EQUALIZER WARNING THRESHOLD

The EQ Adj. trimpot (accessible by removing the top cover of the module) is used to set the threshold of the cable equalizer warning. The equalizer warning is factory set to 250 meters of Belden 8281 cable, but may be adjusted for other cable types or cable lengths. To adjust the cable equalizer warning threshold, connect a signal to the input of the module using the required length of cable. Adjust the trimpot slowly until the Weak Signal warning LED comes on. You can verify that the equalizer warning is operating correctly by removing a few meters of cable from the input. The LED should go off.