Passive Optical Modules
Instruction Manual

EVERTZ MICROSYSTEMS LTD.
5288 John Lucas Drive,
Burlington, Ontario,
Canada L7L 5Z9
Phone: 905-335-3700
Service Phone: 905-335-7570

Sales:	sales@evertz.com	Fax:	905-335-3573
Tech Support:	service@evertz.com	Fax:	905-335-7571
Web Page:	http://www.evertz.com		

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Aug 99
1.1	Changed Insertion Loss parameter on 7705MS to 9 dB	Jan 00
1.2	Added Safety notice	Mar 00
1.3	Added 7705CWDM-4, 7705CWDM-8	Nov 00
1.4	Added 7705DS-4, 7705DS-8 Updated specifications	Mar 01
1.5	Added 7705WDM13/15, removed 7705DS-4 Updated specifications	Apr 02
1.6	Added 7705CWDM-8LB Updated specifications	Mar 03
1.7	Added DWDM information	June 03
1.8	Updated Specifications	Sept 04
1.9	Included information on dual slot card retention system and updated rear diagrams	Oct 05
1.9.1	Added retention system torque setting	Jun 08

1. OVERVIEW

In fiber optic transmission systems it is often necessary to split or combine optical signals. The 7705 series passive optical modules provide an effective way of accomplishing these tasks, while maintaining the isolation of the individual signals.

There are currently 7 modules in the passive optical module family.

MODEL	DESCRIPTION	FUNCTION
7705WDM13/15	Standard Wavelength Division Multiplexor	Allows use of single fiber for transmission of two signals at different wavelengths.
7705WDM	Wideband Wavelength Division Multiplexor	Allows use of single fiber for transmission of two signals at different wavelengths.
7705DS	Distribution Splitter/Combiner	Splits single wavelength signal to two signals of 50% power or combines two wavelengths to one signal.
7705DS-8	Distribution Splitter/Combiner	Splits single wavelength signal to eight signals of 12.5% power or combines eight wavelengths to one signal.
7705MS	Monitoring Splitter	Splits signal to two signals of 80% / 20% power – used for fiber confidence monitoring.
7705CWDM	Coarse Wave Division Multiplexor	Allows use of single fiber for transmission of 4/8/12/16 signals at different wavelengths.
7705DWDM	Dense Wave Division Multiplexor	Allows use of single fiber for transmission of 8/16 signals at different wavelengths.

Table 1-1: Passive Optical Modules

1.1. 7705WDM13/15 AND 7705WDM WAVELENGTH DIVISION MULTIPLEXORS

The 7705WDM13/15 and 7705WDM are bi-directional multiplexors/demultiplexors that combine two different signals of different wavelengths onto a single fiber for simultaneous transmission. At the receiving end, the 7705WDM13/15 and 7705WDM can act as a demultiplexor to separate the combined wavelengths from a single fiber onto individual fibers.

The 7705WDM is a wideband WDM that can accept the entire 1470nm to 1610nm CWDM spectrum into the 1550nm port for multiplexing with 1310nm ±30nm. The 7705WDM13/15 is a standard fused fiber type WDM that can accept a 1550nm ±30nm signal into its 1550nm port for multiplexing with 1310nm ±30nm.

Features:

- 7705WDM13/15 Bi-directional mux/demux handles 1310 nm ±30nm and 1550 nm ±30nm wavelengths
- 7705WDM Bi-directional mux/demux handles 1310 nm and 1470 nm to 1610nm wavelengths
- Passive design for any bit rate
- Fully hot-swappable from front of frame with no fiber disconnect/reconnect required
- Low insertion loss to conserve system power
- Available in SC, ST and FC connector options

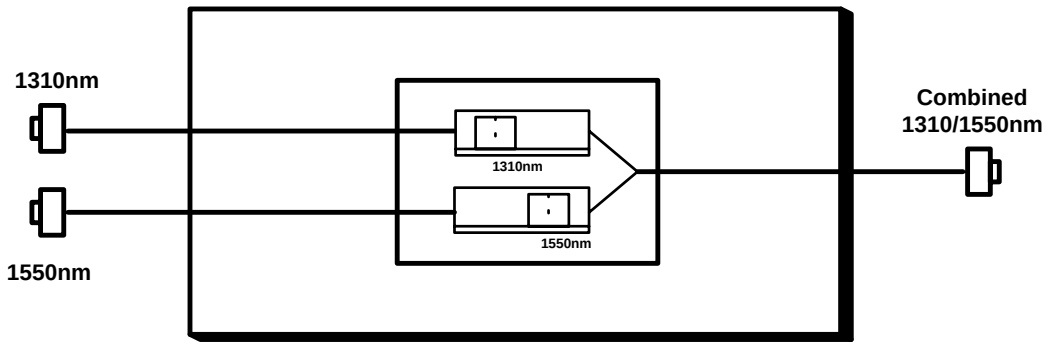

Figure 1-1: 7705WDM13/15 and 7705WDM Block Diagram

1.2. 7705DS AND 7705MS SPLITTERS

The 7705DS and 7705MS are optical splitters that take a single fiber input and split it proportionately into separate fiber outputs. The 7705DS is used in optical signal distribution applications and splits the signal so that each output fiber carries equal proportions of the input optical power. The 7705MS is used in active fiber monitoring applications and splits the signal so that the transmit fiber carries 80% of the input optical power and the monitoring fiber carries 20% of the input power.

Features:

- Wideband splitter handles 1260 nm to 1610 nm wavelengths
- Passive splitter design for any bit rate
- Fully hot-swappable from front of frame with no fiber disconnect/reconnect required
- Low insertion loss to conserve system power
- Available in SC, ST and FC connector options

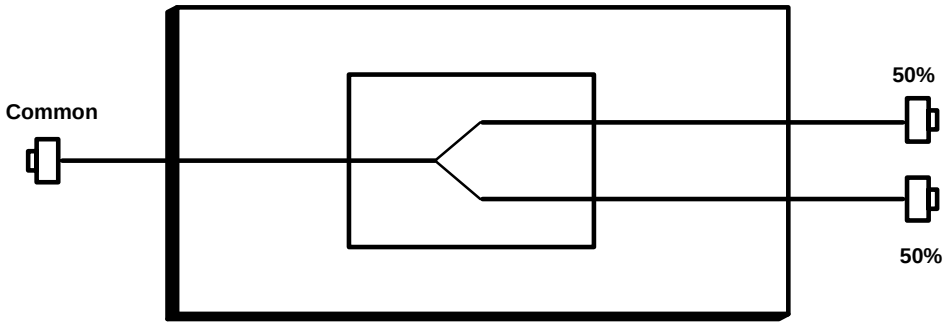

Figure 1-2: 7705DS Block Diagram

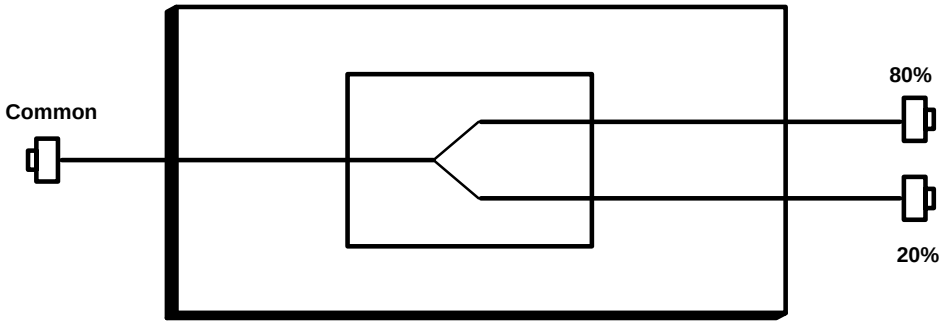

Figure 1-3: 7705MS Block Diagram

1.3. 7705DS-8 SPLITTERS

The 7705DS-8 is a bi-directional optical splitter/combiner that takes a single wavelength fiber feed and splits it proportionally into eight separate fiber feeds. The 7705DS-8 can be used in uni-directional transport applications to combine eight optical signals into one fiber for reception by the 7705CWDM-D8 eight channel CWDM Demux, or in distribution applications as an eight channel optical fan out DA.

Features:

- Wideband operation from 1260nm to 1610nm wavelengths
- Passive splitter design for any bit rate
- Fully hot-swappable from front of frame with no fiber disconnect/reconnect required
- Low insertion loss to conserve system power
- Supports single mode fiber
- Available in SC, ST and FC connector options (ST and FC connectors only on common port)

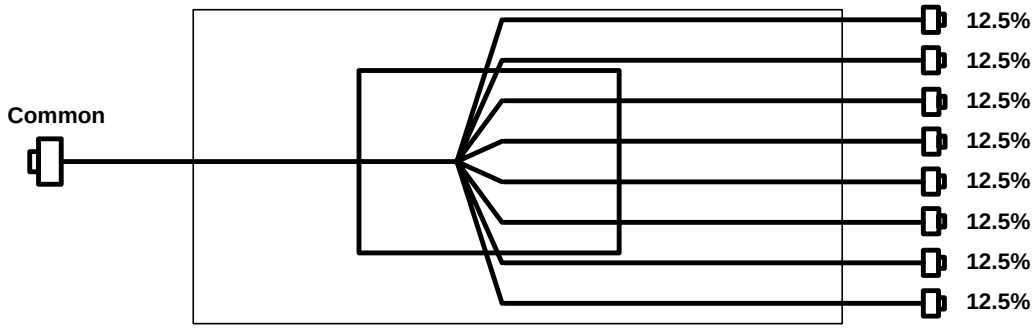

Figure 1-4: 7705DS-8 Block Diagram

1.4. 7705CWDM COARSE WAVELENGTH DIVISION MULTIPLEXOR

The 7705CWDM's are bi-directional Multiplexors/De-multiplexors that combine/separate up to sixteen different wavelengths over a single fiber. The 7705CWDM-M4/D4 and 7705CWDM-M8/D8 are designed to mux/demux 4 and 8 wavelengths respectively while the 7705CWDM-M8LB/D8LB are designed to expand the 4 and 8 wavelengths systems to 12 and 16 wavelengths over a single fiber.

The 7705CWDM is available in the following versions:

7705CWDM-M4	4 Channel CWDM Multiplexor (1510nm -1570nm)
7705CWDM-D4	4 Channel CWDM Demultiplexor (1510nm -1570nm)
7705CWDM-M8	8 Channel CWDM Multiplexor (1470nm - 1610nm)
7705CWDM-D8	8 Channel CWDM Demultiplexor (1470nm - 1610nm)
7705CWDM-M8LB	8 Channel CWDM Multiplexor with expansion port (1270nm -1450nm)
7705CWDM-D8LB	8 Channel CWDM Demultiplexor with expansion port (1270nm -1450nm)

Features:

- Bi-directional mux/demux of up to 16 wavelengths in the 1270nm to 1610nm spectrum (ITU-T G.694.2 compliant)
- Expandable from 4 or 8 to 12 or 16 channel systems
- Passive design for any bit rate
- Low insertion loss to conserve system power
- High optical isolation for low crosstalk
- Fully hot-swappable from front of frame with no fiber disconnect/reconnect required
- SC/PC, ST/PC, FC/PC connector options
- Fiber protector to prevent connector damage

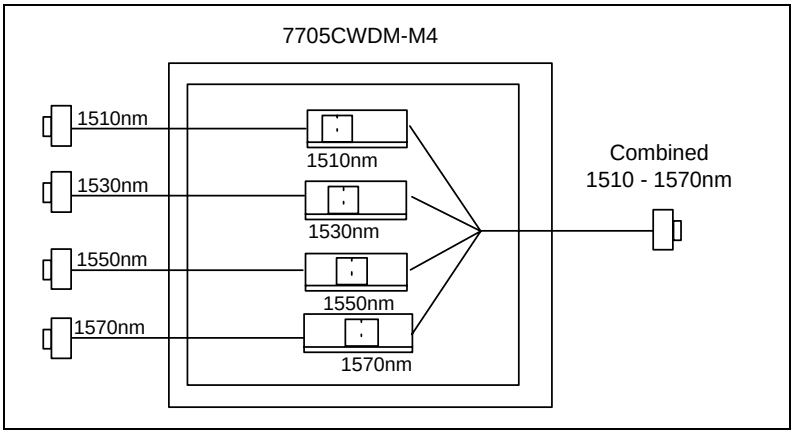

Figure 1-5: 7705CWDM-4 Block Diagram

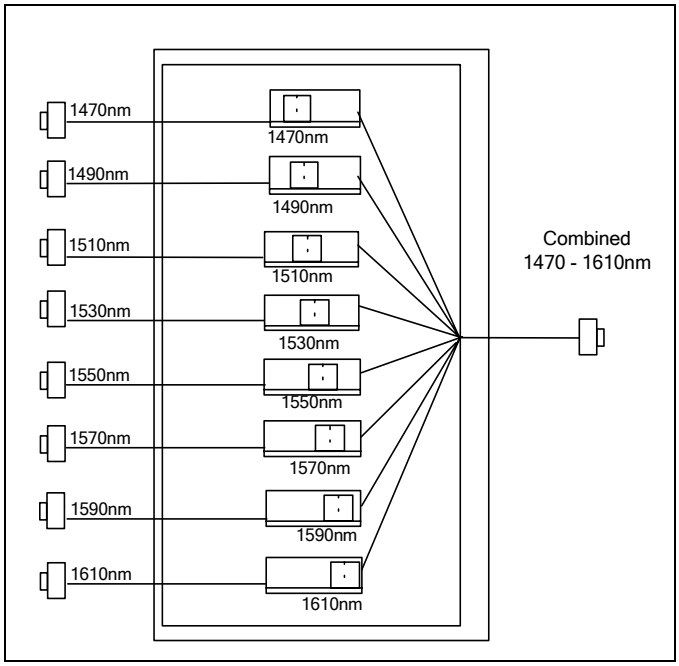

Figure 1-6: 7705CWDM-8 Block Diagram

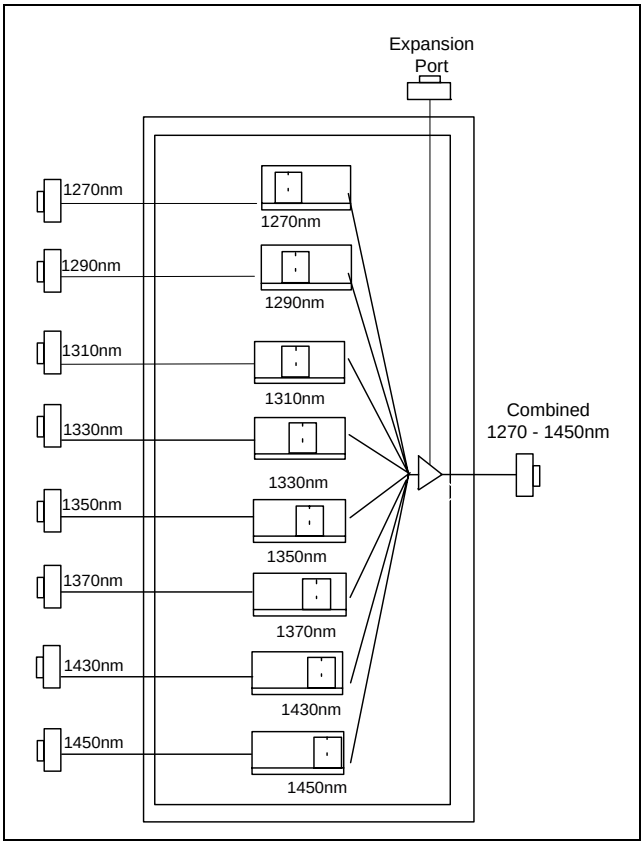

Figure 1-7: 7705CWDM-8LB Block Diagram

1.5. 7705DWDM DENSE WAVELENGTH DIVISION MULTIPLEXOR

The 7705DWDM's are bi-directional Multiplexors/De-multiplexors that combine/separate up to sixteen different wavelengths over a single fiber. The 7705DWDM-33-M8/D8 are designed to mux/demux 8 wavelengths while the 7705CWDM-25-M8/D8 are designed to expand the 8 wavelength systems to 16 wavelengths over a single fiber.

The mux/demux device used in the 7705DWDM uses a lens system to maintain maximum isolation of the signals.

The 7705DWDM is available in the following versions:

7705DWDM-33-M8	8 Channel DWDM Multiplexor for Ch33-40 (1550.92nm –1545.32nm)
7705DWDM-33-D8	8 Channel DWDM Demultiplexor for Ch33-40 (1550.92nm –1545.32nm)
7705DWDM-25-M8	8 Channel DWDM Multiplexor for Ch25-32 (1557.36nm – 1551.72nm)
7705DWDM-25-D8	8 Channel DWDM Demultiplexor for Ch25-32 (1557.36nm – 1551.72nm)

Features:

- Bi-directional mux/demux of up to 16 wavelengths in the C-Band spectrum (ITU-T G.694.1 compliant)
- Expandable from 8 to 16 channel systems
- Passive design for any bit rate
- Low insertion loss to conserve system power
- High optical isolation for low crosstalk
- Fully hot swappable from front of frame with no fiber disconnect/reconnect required
- SC/PC, ST/PC, FC/PC connector options
- Fiber protector to prevent connector damage

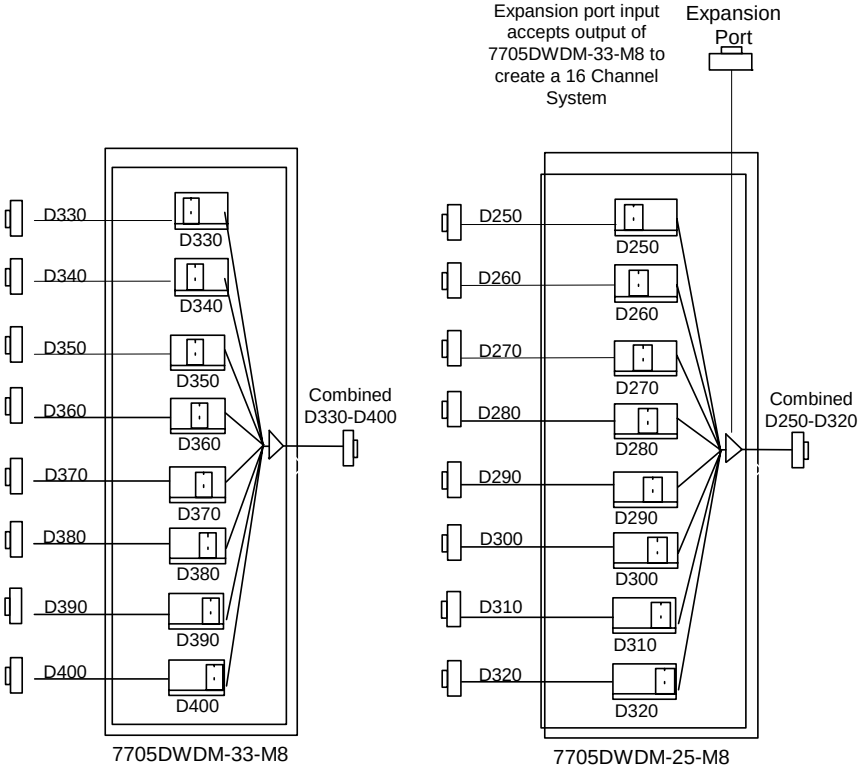

Figure 1-8: 7705DWDM Block Diagrams

2. INSTALLATION

The 7705 series passive optical modules come with a companion rear plate that has several SC/PC optical connectors. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter. Dual slot cards (7705DS and 7705CWDM) use a retention mechanism as illustrated in Figure 2-1. Follow the steps described in Figure 2-2 to insert and anchor the card into the frame.

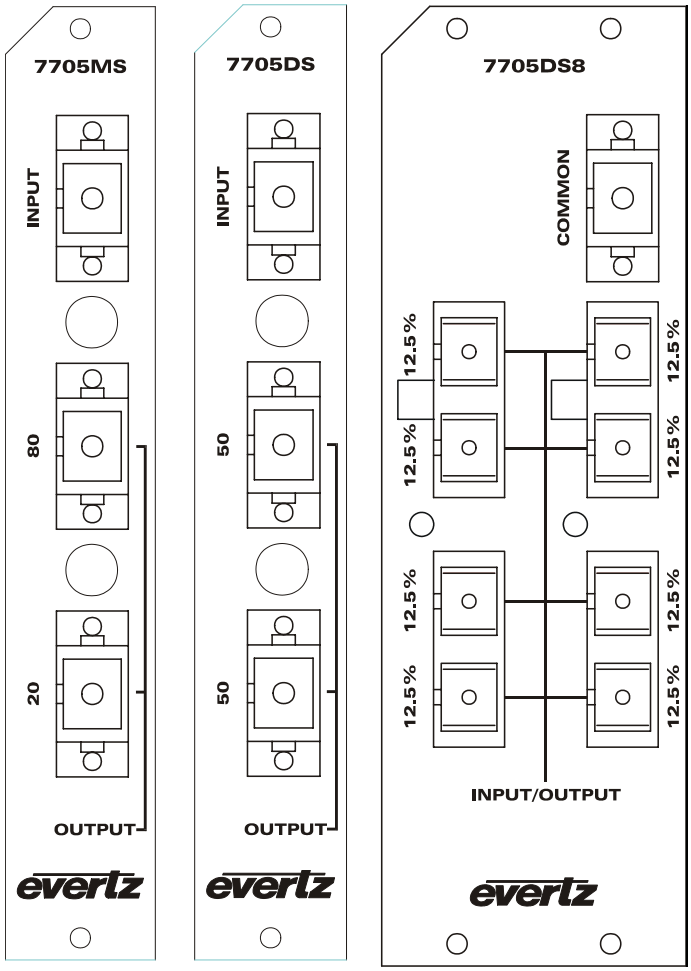

Figure 2-1: 7705MS and 7705DS Rear Panels

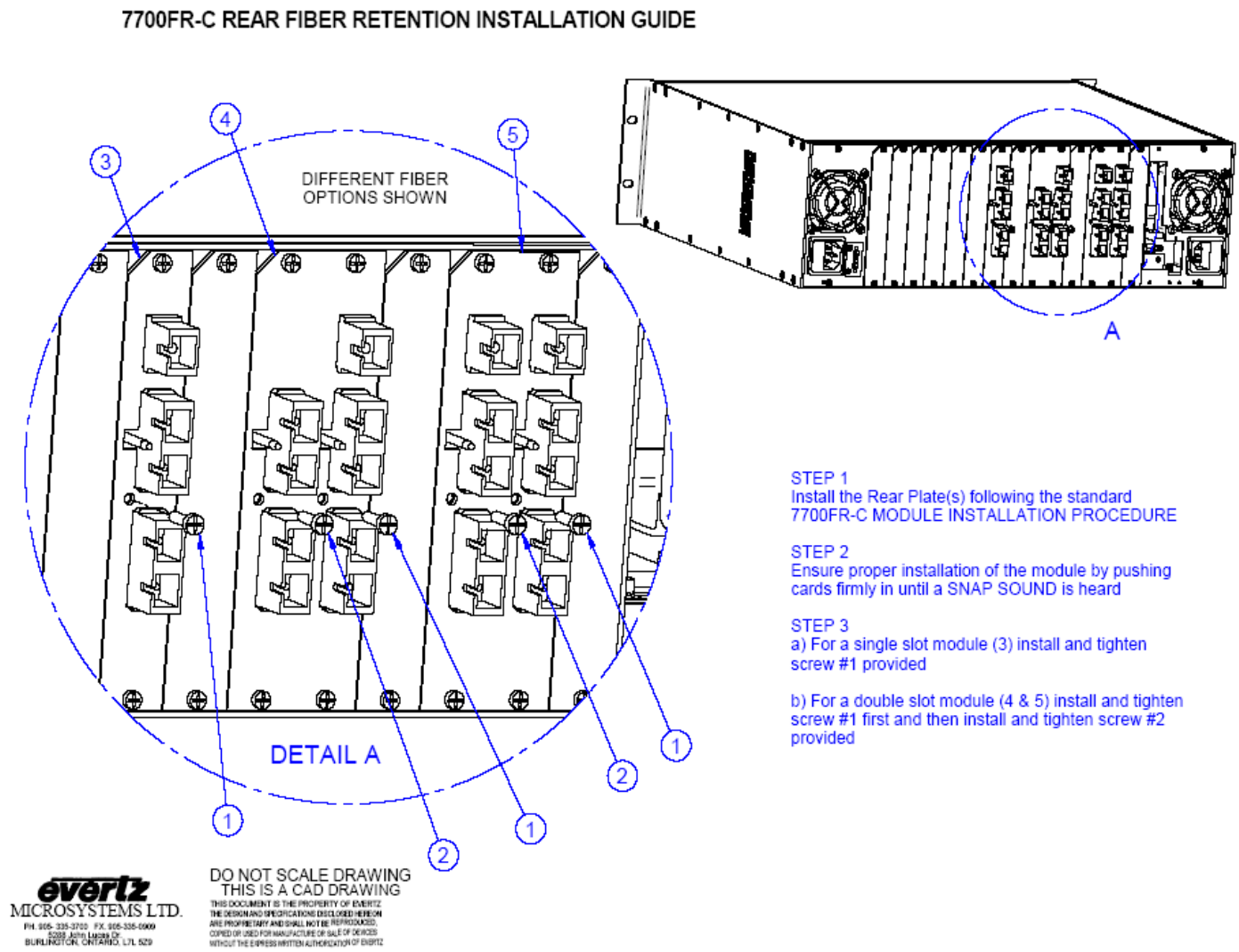

Figure 2-2: Dual Slot Card Retention Mechanism

It is recommended that rear plate retention screws 1 and 2 are tightened to a torque setting of 70 cN.m

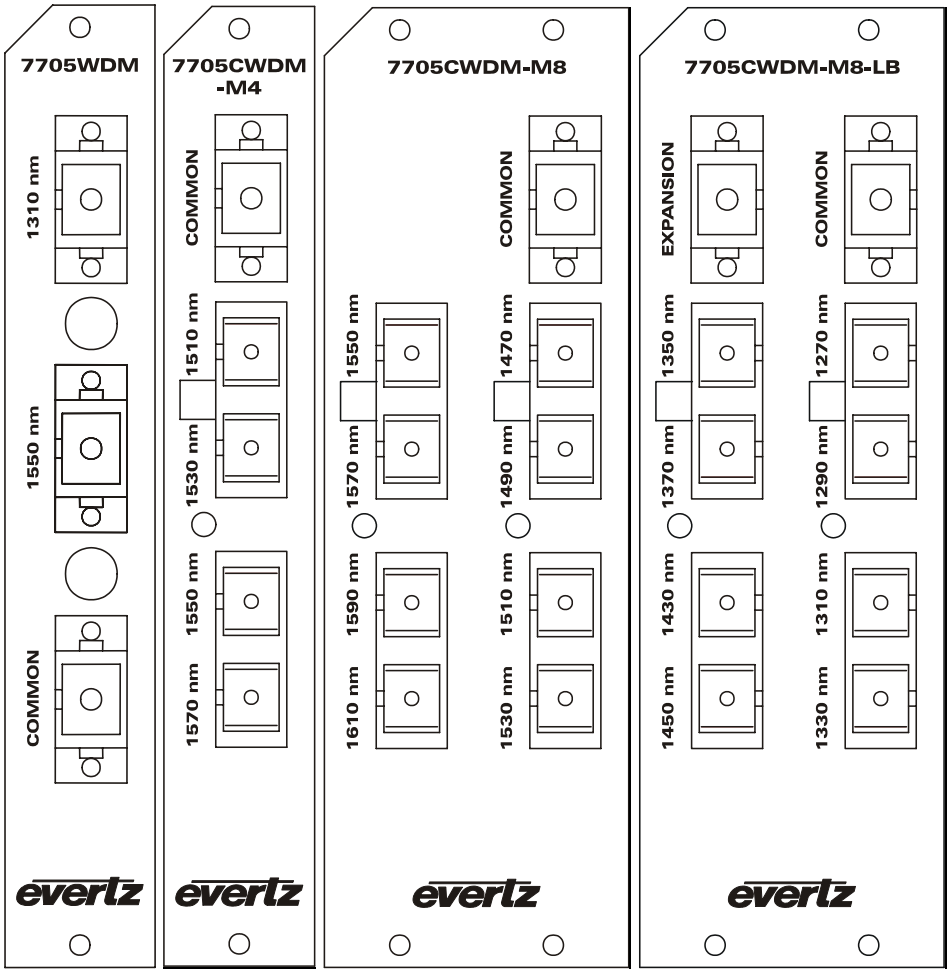

Figure 2-3: 7705WDM and 7705CWDM Rear Panels

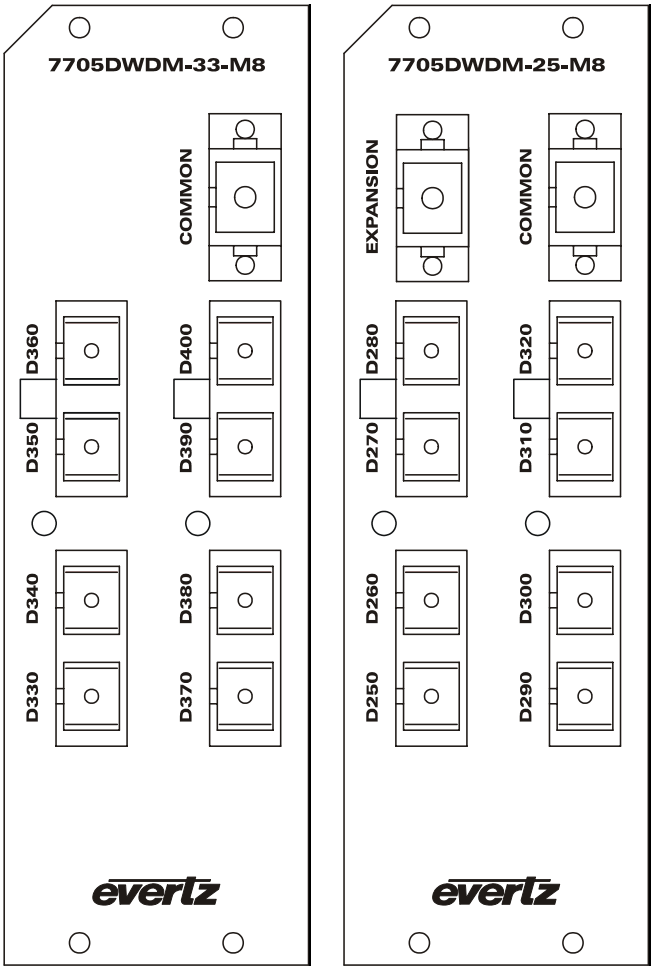

Figure 2-4: 7707DWDM* Rear Panels

2.1. INSTALLING THE 7705CWDM

The 7705CWDM modules are available in a Multiplexor and Demultiplexor version. For optimum insertion loss characteristics, it is important to install a Multiplexor version at one end of the fiber link and a Demultiplexor version at the other end.

When cascading two CWDM modules together to form a 12 or 16 channel system, connect the **COMMON** output from the CWDM-4 or CWDM-8 into the **EXPANSION** connector on the CWDM-8LB module.

Please note the card retention system described in Figure 2-2 that is used on dual slot cards.

3. SPECIFICATIONS

3.1. OPTICAL INPUT/OUTPUT

Connector: SC/PC, ST/PC or FC/PC female housing
Wavelength
7705DS, 7705MS 1260 to 1610 nm
7705WDM13/15 1310 ±30 nm and 1550 ±30 nm
7705WDM 1310 ±60 nm and 1550 ±80 nm
7705CWDM-4 1510 nm to 1570 nm, 20 nm spacing
7705CWDM-8 1470 nm to 1610 nm, 20 nm spacing
7705CWDM-8LB 1270 nm to 1370 nm and 1430 nm to 1470nm, 20 nm spacing
7705DWDM-25-8 Ch25 to 32 (1557.36 nm to 1551.72nm, 0.8 nm spacing)
7705DWDM-33-8 Ch33 to 40 (1550.92 nm to 1545.32 nm, 0.8 nm spacing)
Fiber Size: 9 μm core / 125 μm overall
Insertion Loss:

Module	Port	Insertion Loss
7705WDM13/15		< 2 dB
7705WDM	1310nm	< 2 dB
	1550nm	< 3 dB
7705DS		< 4 dB
7705DS-8		< 11 dB
7705MS	80 %	< 2 dB
	20 %	< 9 dB
7705CWDM-4		< 2.5 dB
7705CWDM-8		< 3.5 dB
7705CWDM-8LB		< 5.5 dB
7705CWDM-4 + 7705CWDM-8LB		<6 dB
7705CWDM-8 + 7705CWDM-8LB		< 7.5 dB < 5.5 dB
7705DWDM-33/25-8		< 4.5 dB
7705DWDM-33-8 + 7705DWDM-25-8		< 7.5dB

Table 3-1: Insertion Loss Specifications

Isolation:

7705WDM13/15	> 25 dB between 1310nm/1550nm ports at center wavelength
7705WDM	> 50 dB between 1310nm/1550nm ports with 1470nm-1610nm on 1550nm port
7705CWDM	> 30 dB to adjacent channel
7705DWDM	> 30 dB to adjacent channel

Channel Uniformity:

7705DS-8	< 0.9 dB
7705CWDM	< 1.5 dB with mux/demux combination
7705DWDM	< 1.5 dB with mux/demux combination

3.2. PHYSICAL

7700 or 7701 frame mounting:

Number of slots: 1 for 7705DS, 7705MS, 7705WDM, 7705WDM13/15, 7705CWDM-M4, 7705CWDM-D4

2 for 7705DS-8, 7705CWDM-M8, 7705CWDM-D8, 7705CWDM-M8LB, 7705CWDM-D8LB, 7705DWDM-M8U55, 7705DWDM-D8U55, 7705DWDM-M8L55, 7705DWDM-D8L55