3400 Series
Coarse WDM Optical Modules
User Manual

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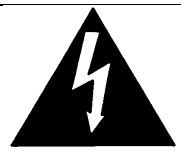
IMPORTANT SAFETY INSTRUCTIONS

	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.

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

FIBER OPTIC DEVICES

Some modules in this product may have fiber optic outputs. The following safety information applies to the optical outputs of these modules. Consult individual chapters for specific safety information for handling fiber optics.

WARNING

Never look directly into an optical fiber. Irreversible eye damage can occur in a matter of milliseconds.

ELECTROSTATIC SENSITIVE DEVICES

The hand symbol within an equilateral triangle is intended to alert the user to instructions related to precautions for handling electrostatic-sensitive devices. See “Electro Static Discharge (ESD) Precautions” section for further details.

INFORMATION TO USERS IN EUROPE

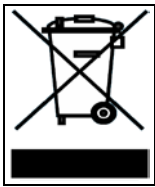
NOTE

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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Figures

REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Release	Jan 2015

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1. OVERVIEW

The Evertz 3400 Series encompasses the 3400FR. The 3400FR is a passive optical frame which is a powerful solution for today's dense, modular, passive fiber optic distribution needs. The 3400FR provides flexible optical signal distribution in the form of splitter/combiner modules that fit in the passive optical FR frame.

The 3400 series passive splitter/combiners can support any bit rate and are fully passive without the need for an active power supply.

All components are hot swappable through the front of the frame. This ensures that the unit can be fully removed without having to disrupt other signals being distributed within the same enclosure.

The 3400FR is a 1RU frame designed to house up to 10 splitter/combiner modules. Each module can be quad 1x2, dual 1x4 or a single 1x8 passive splitter/combiner. The frame can be configured for a mix of different splitter/combiner units.

In fiber optic transmission systems it is often necessary to split or combine optical signals. The 3400 series passive optical modules provide an effective way of accomplishing these tasks, while maintaining the isolation of the individual signals. Each of the various splitter/combiner modules are also available in a compact standalone version.

Figure 1-1: Styles of Frames

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

MODEL	DESCRIPTION	FUNCTION
3400DS2-4	Distribution Splitter/Combiner	Quad 1 X 2 optical splitter
3400DS4-2	Distribution Splitter/Combiner	Dual 1 X 4 optical splitter
3400DS8	Distribution Splitter/Combiner	Single 1 X 8 optical splitter
3400MS2-4	Monitoring Splitter	Quad 1 X 2 optical monitoring splitter
3400MS2-4-9010	Monitoring Splitter	Quad 1 X 2 optical monitoring splitter
3400MS4-2	Monitoring Splitter	Dual 1 X 4 optical monitor splitter
3400CWDM-M8	Coarse Wave Division Multiplexor	1470nm to 1610nm optical multiplexer
3400CWDM-M8LB	Coarse Wave Division Multiplexor	1270nm to 1450nm optical multiplexer
3400CWDM-D8	Coarse Wave Division Multiplexor	1470nm to 1610nm optical demultiplexer
3400CWDM-D8LB	Coarse Wave Division Multiplexor	1270nm to 1450nm optical demultiplexer
3400CWDM-M4	Coarse Wave Division Multiplexor	1510nm to 1570nm optical multiplexer
3400CWDM-D4	Coarse Wave Division Multiplexor	1510nm to 1570nm optical demultiplexer

Table 1-1: Passive Optical Modules

1.1. 3400CWDM COARSE WAVELENGTH DIVISION MULTIPLEXORS

The 3400CWDM's are bi-directional Multiplexors/De-multiplexors that combine/separate up to sixteen different wavelengths over a single fiber. The 3400CWDM-M4/D4 and 3400CWDM-M8/D8 are designed to mux/demux up to 16 wavelengths in the 1270nm to 1610nm spectrum. While the 3400CWDM-M8LB/D8LB are expandable from four or eight to 12 or 16 channel systems. 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.

MODEL	DESCRIPTION	FUNCTION
3400CWDM-M4	4 Channel CWDM Mux (1510nm-1570nm)	4 Channel CWDM-M4
3400CWDM-D4	4 Channel CWDM Demux (1510nm-1570nm)	4 Channel CWDM Demux
3400CWDM-M8	8 Channel CWDM Mux (1470nm-1610nm)	8 Channel CWDM Mux
3400CWDM-D8	8 Channel CWDM Demux (1470nm-1610nm)	8 Channel CWDM Demux
3400CWDM-M8L8	8 Channel CWDM Mux (1270nm-1450nm)	8 Channel CWDM Mux Low Band
3400CWDM-D8L8	8 Channel CWDM Demux (1270nm-1450nm)	8 Channel CWDM Demux Low Band

Features:

- Bi-directional mux/demux handles 1270nm and 1610nm wavelengths
- 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
- LC/PC or LC/APC connector options
- Fiber protector to prevent connector damage

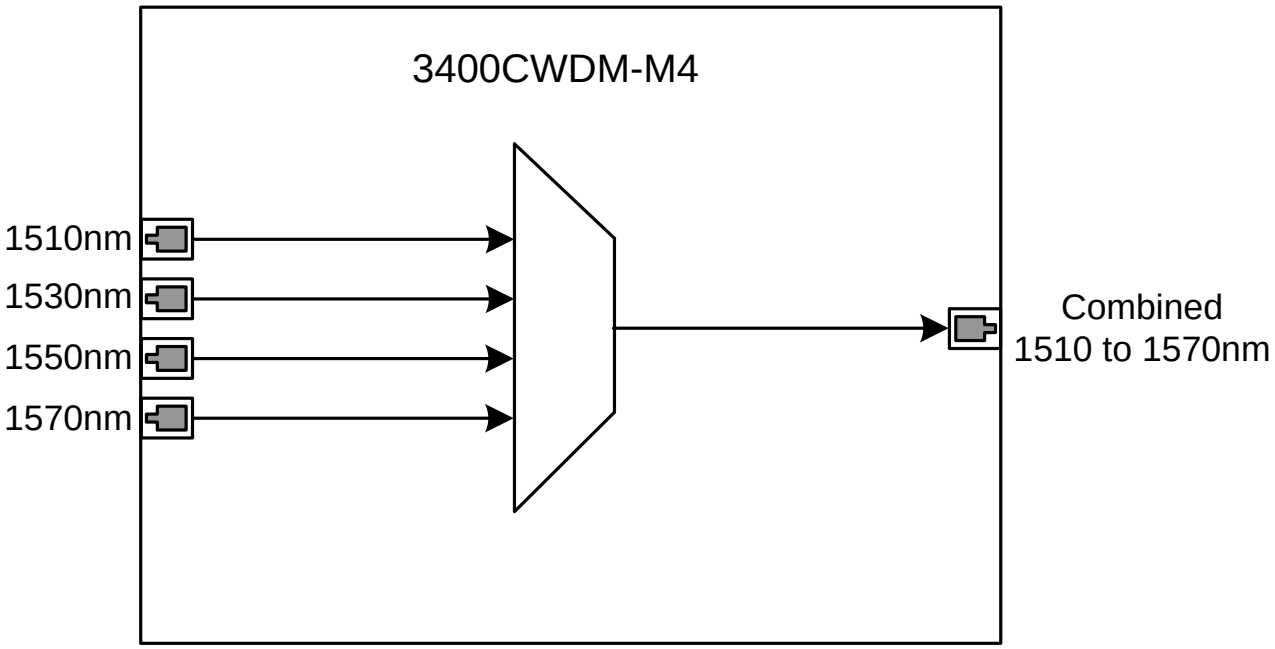

Figure 1-2: 3400CWDM-4 Block Diagram

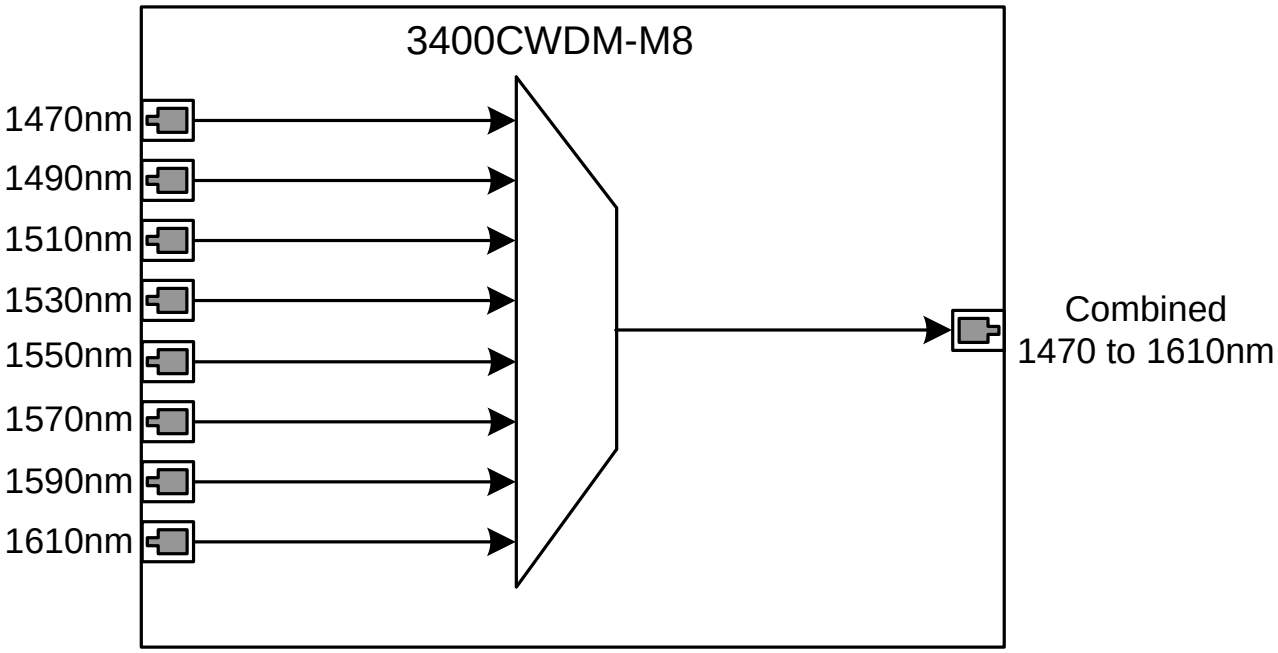

Figure 1-3: 3400CWDM-8 Block Diagram

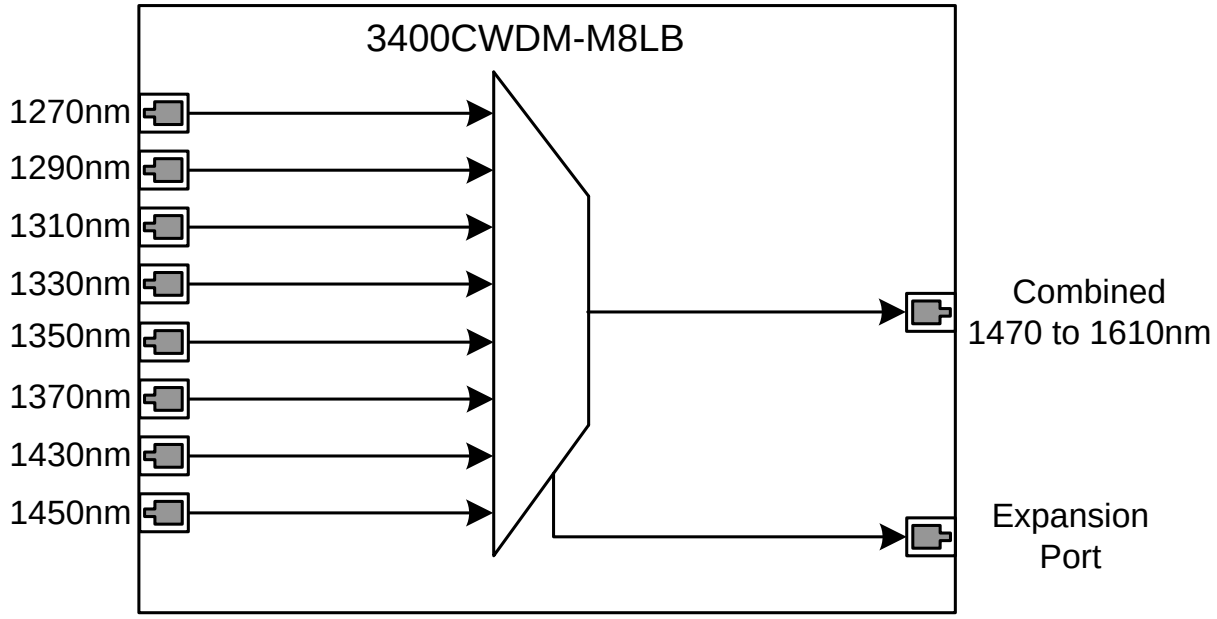

Figure 1-4: 3400CWDM-8LB Block Diagram

1.2. 3400DS AND 3400MS SPLITTERS

The 3400DS and 3400MS are optical splitters that take a single fiber input and split it proportionately into separate fiber outputs. The 3400DS 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 3400MS 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.

MODEL	DESCRIPTION	FUNCTION
3400DS2-4	Quad 1x2 optical splitter with LC/UPC Connectors (1270nm – 1610nm)	Quad 1x2 optical splitter with LC/UPC Connectors
3400DS4-2	Dual 1x4 optical splitter with LC/UPC Connectors (1270nm – 1610nm)	Dual 1x4 optical splitter with LC/UPC Connectors
3400DS8	Single 1x8 optical splitter with LC/UPC Connectors (1270nm – 1610nm)	Single 1x8 optical splitter with LC/UPC Connectors
3400MS2-4	Quad 1x2 optical monitoring splitter, 95%/5% with LC/UPC Connectors (1270nm – 1610nm)	Quad 1x2 optical monitoring splitter, 95%/5% with LC/UPC Connectors
3400MS2-4-9010	Quad 1x2 optical monitoring splitter, 90%/10% with LC/UPC Connectors (1270nm – 1610nm)	Quad 1x2 optical monitoring splitter, 90%/10% with LC/UPC Connectors
3400MS4-2	Dual 1x4 optical monitoring splitter, 30%/30%/30%/10% with LC/UPC Connectors (1270nm – 1610nm)	Dual 1x4 optical monitoring splitter, 30%/30%/30%/10% with LC/UPC Connectors

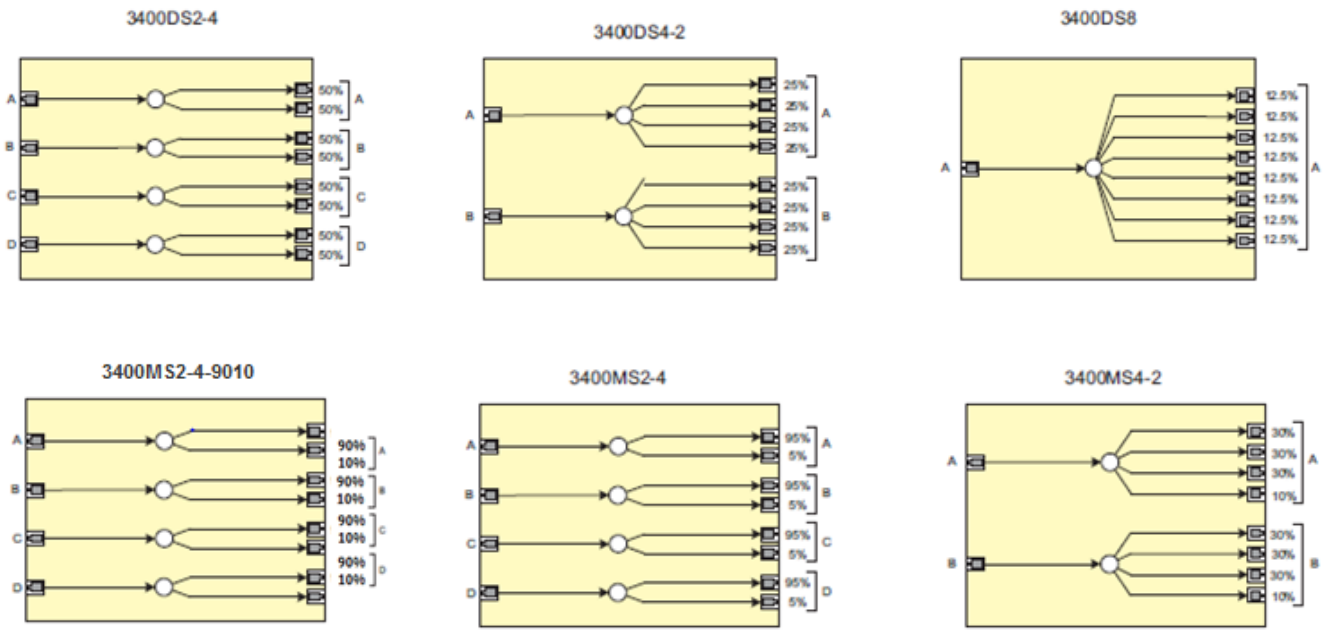

Figure 1-5: 3400DS and 3400MS Splitter/Combiners Functional Block Diagrams

1.2.1. 3400DS2-4 QUAD DISTRIBUTION SPLITTER

The 3400DS 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 3400DS2-4 is a quad 50/50 passive optical splitter. Each of the 4 independent fiber inputs are split proportionally between 2 fiber outputs.

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
- Supports single mode fiber

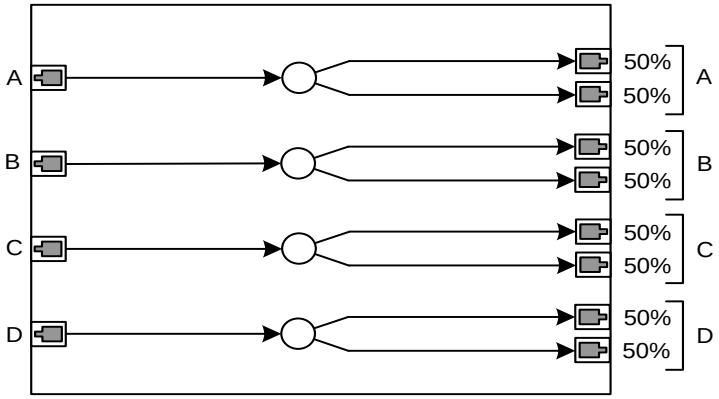

Figure 1-6: 3400DS2-4 Block Diagram

1.2.2. 3400DS4-2 DUAL DISTRIBUTION SPLITTER

The 3400DS 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 3400DS4-2 is a dual 25% passive optical splitter. Each of the 2 independent fiber inputs are split proportionally between 4 fiber outputs.

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
- Supports single mode fiber

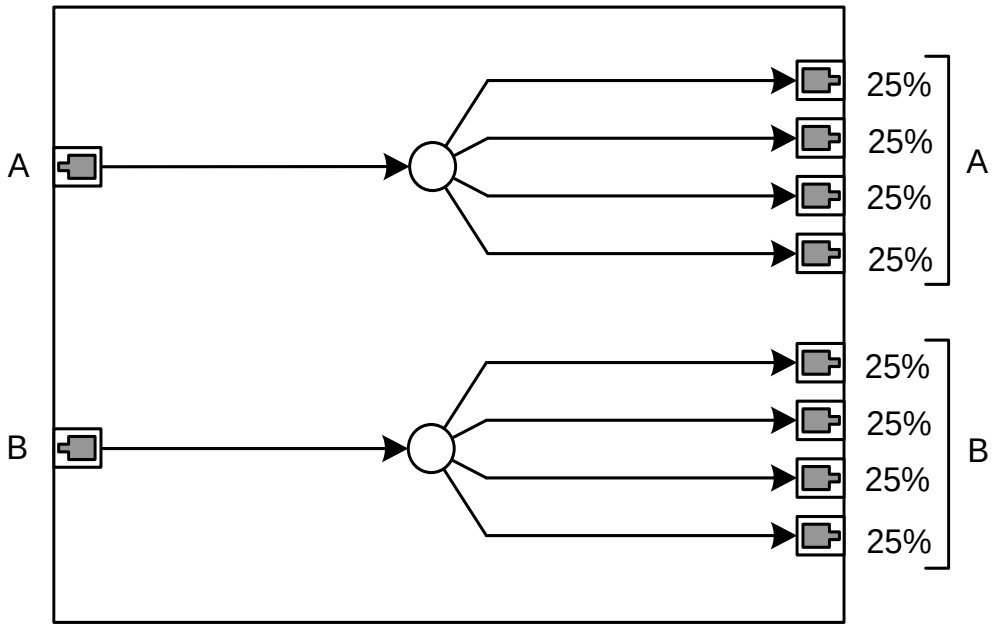

Figure 1-7: 3400DS4-2 Block Diagram

1.2.3. 3400DS-8 DISTRIBUTION SPLITTER

The 3400DS 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 3400DS-8 is a single 12.5% passive optical splitter. The fiber input is split proportionally between 8 fiber outputs.

Features:

- Wideband operation from 1260nm to 1610nm wavelengths
- Passive splitter design for any bit rate
- Low insertion loss to conserve system power
- Supports single mode fiber

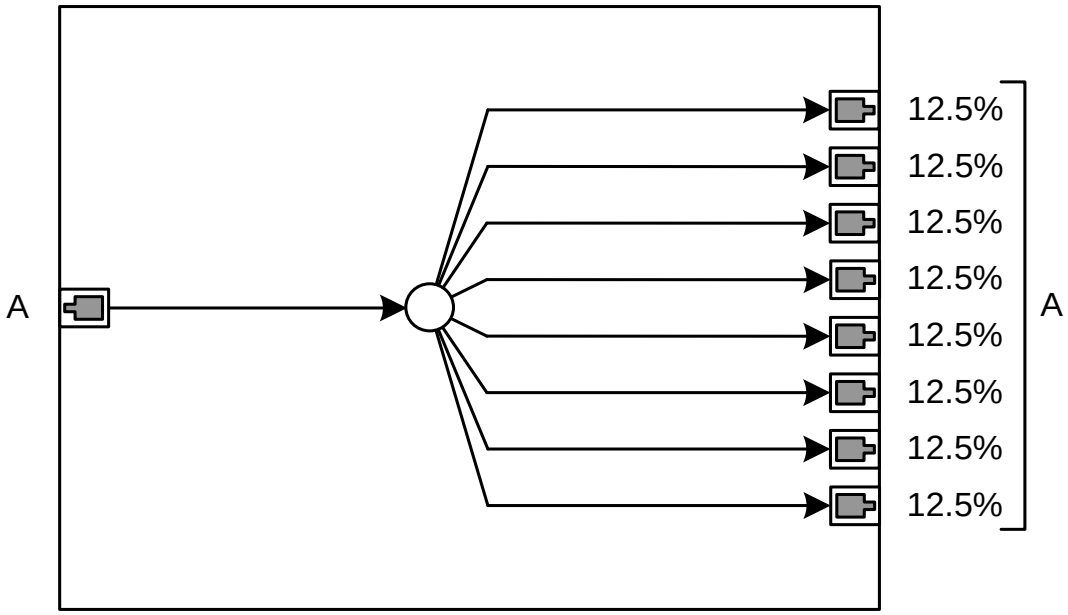

Figure 1-8: 3400DS-8 Block Diagram

1.2.4. 3400MS2-4 QUAD MONITORING SPLITTER

The 3400MS is used in active fiber monitoring applications. The 3400MS2-4 is a quad passive splitter. Each of the 4 indpendent inputs are split so that the transmit fiber carries 95% of the input optical power and the monitoring fiber carries 5% of the input power.

Features:

- Wideband splitter handles 1260 nm to 1610 nm wavelengths
- Passive splitter design for any bit rate
- Low insertion loss to conserve system power
- Supports single mode fiber

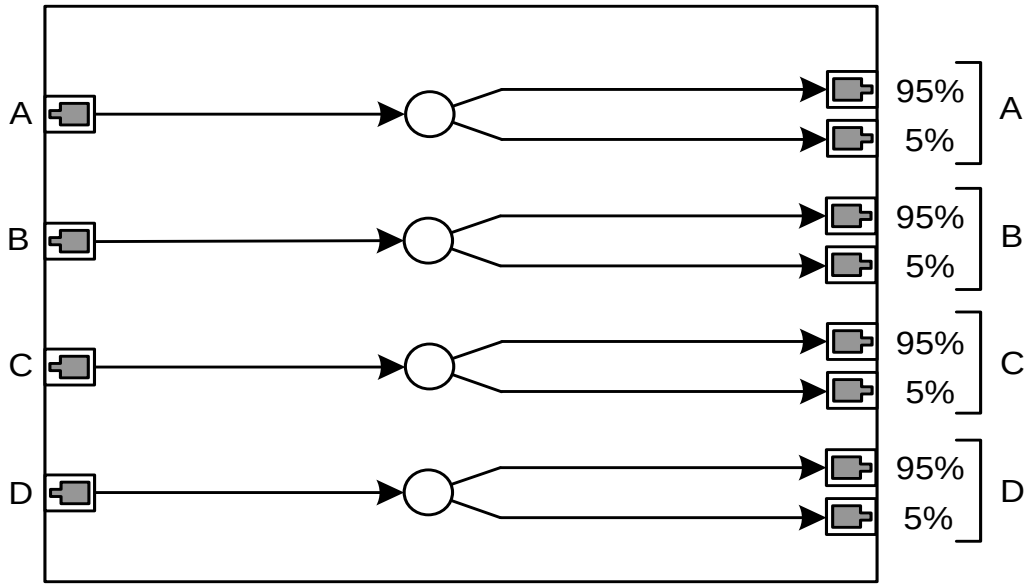

Figure 1-9: 3400MS2-4 Block Diagram

1.2.5. 3405MS4-2 DUAL MONITORING SPLITTER

The 3400MS is used in active fiber monitoring applications. The 3400MS4-2 is a dual passive splitter. Each of the 2 indpendent inputs are split such that the 3 transmit fibers carry 30% of the input optical power and the monitoring fiber carries 10% 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
- Supports single mode fiber

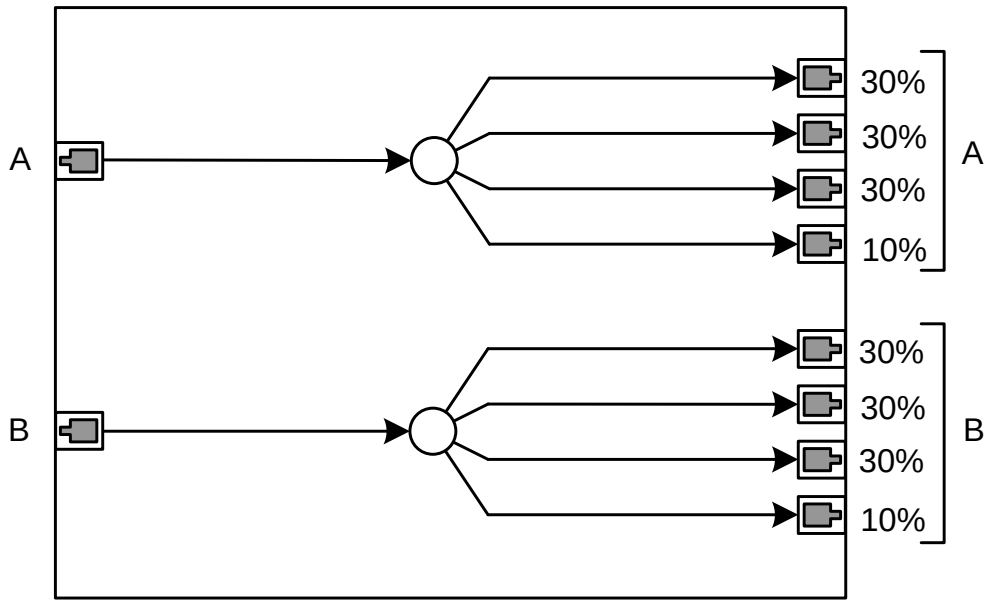

Figure 1-10: 3400MS4-2 Block Diagram

2. MOUNTING THE 3400 SERIES FRAME

2.1. MOUNTING THE 3400FR

The 3400FR frame rack requires 1RU ie 19” (483mm) and 1.75” (45mm) wide rack space. To secure fasten the frame to the equipment rack, make sure that all four mounting screws are tighten securely.

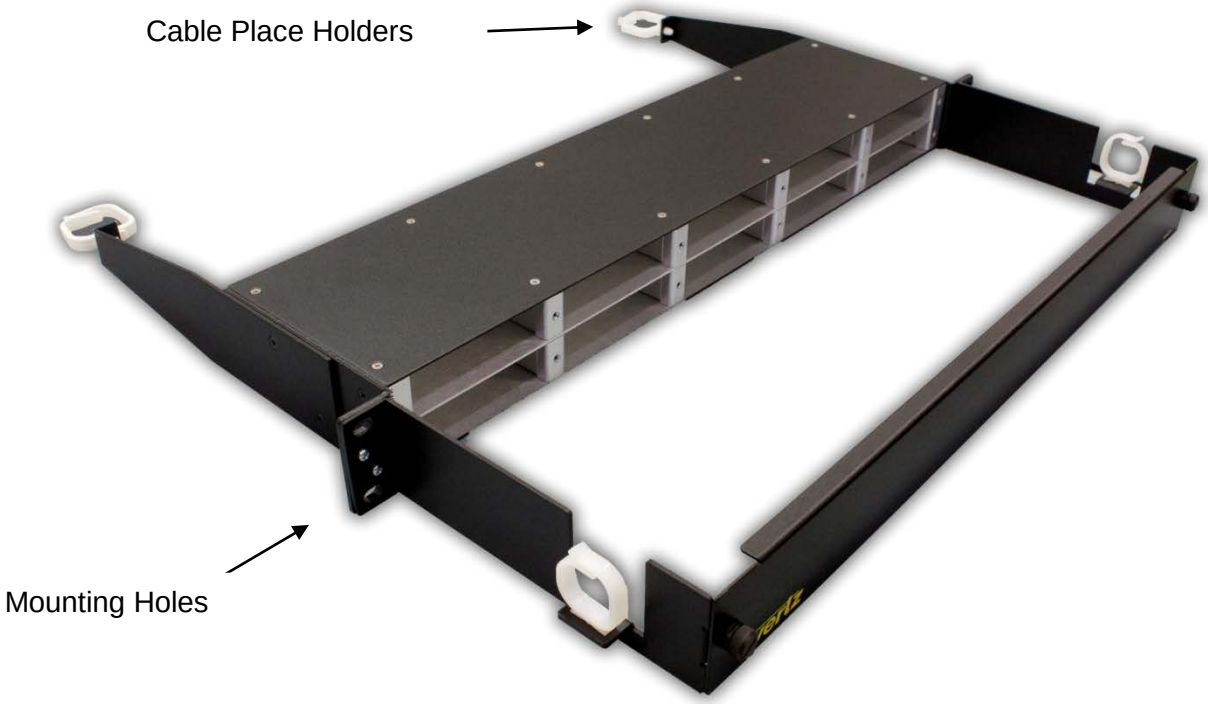

Figure 2-1- Fiber Optics Cable Place Holders

2.2. MOUNTING THE STANDALONE FORM FACTOR

3400 series passive optical units are also available in the standalone form factor. Flanges with slotted holes spaced 37mm apart can be used to mount the 3400 standalone module.

Figure 3-2: Mounting the 3400 Standalone Form Factor

3. INSTALLATION OF 3400 SERIES MODULES

The 3400 series passive optical module is designed to be housed in the 3400FR 1RU frame or 3400FR standalone. In the 3400FR, up to ten 3400 series passive optical modules can be securely housed in a 3400FR frame via a thumb screw. In the 3400 standalone form factor only one can be installed.

When mounting a module, take care to align the thumb screw with the screw hole. The 3400FR has 10 slots and allows for bidirectional insertion of the modules. This convience is very useful when organizing your setup and fiber cables. Locate the slot and insert module. Tighten the thumb screw by hand only. Do not overtighten thumb screw.

Fiber optics must be given enough slack to be able to remove and install modules. The frame has four cable place holders, that allow for proper care, handling and organization of fiber cables see Figure 2-1.

Figure 2-1: 3400 Series Passive Optical Modules

3.1. INSTALLING THE 3400CWDM

The 3400CWDM 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. Note that the 3400CWDM modules are bi-directional.

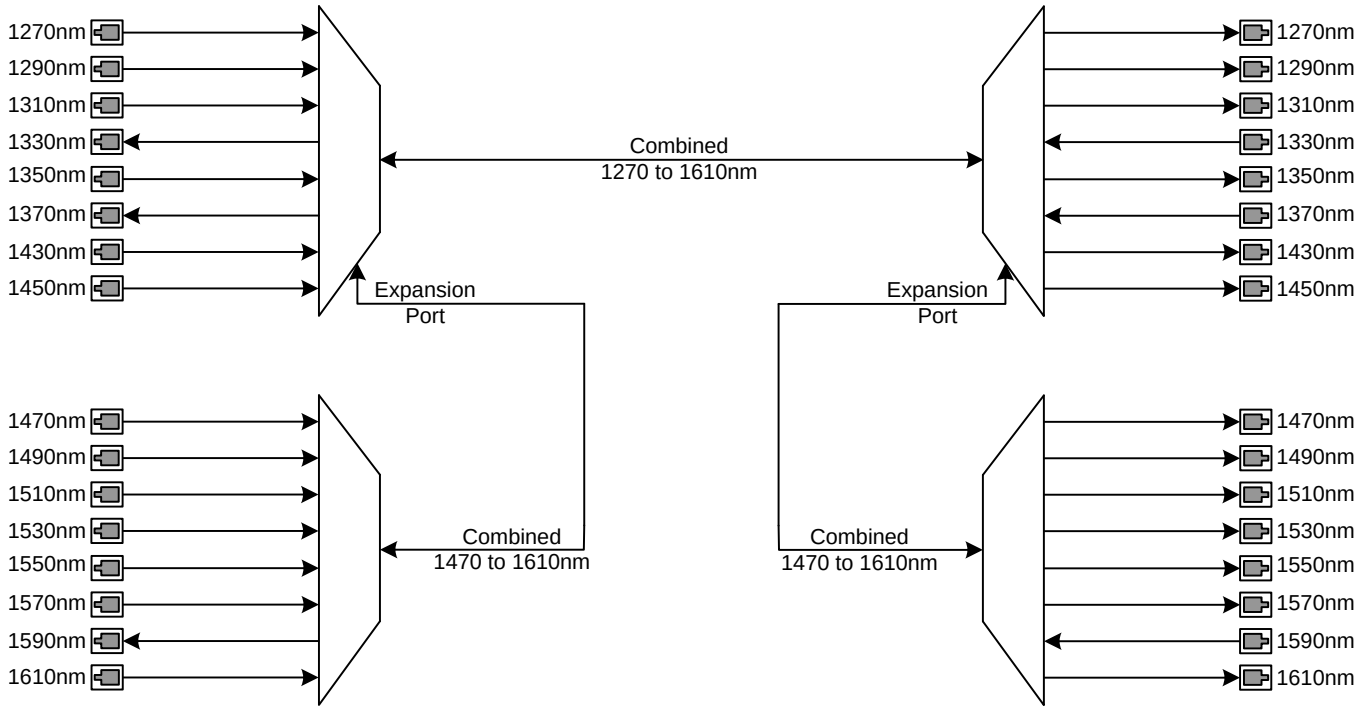

Figure 3-2: 3400CWDM Typical Connection

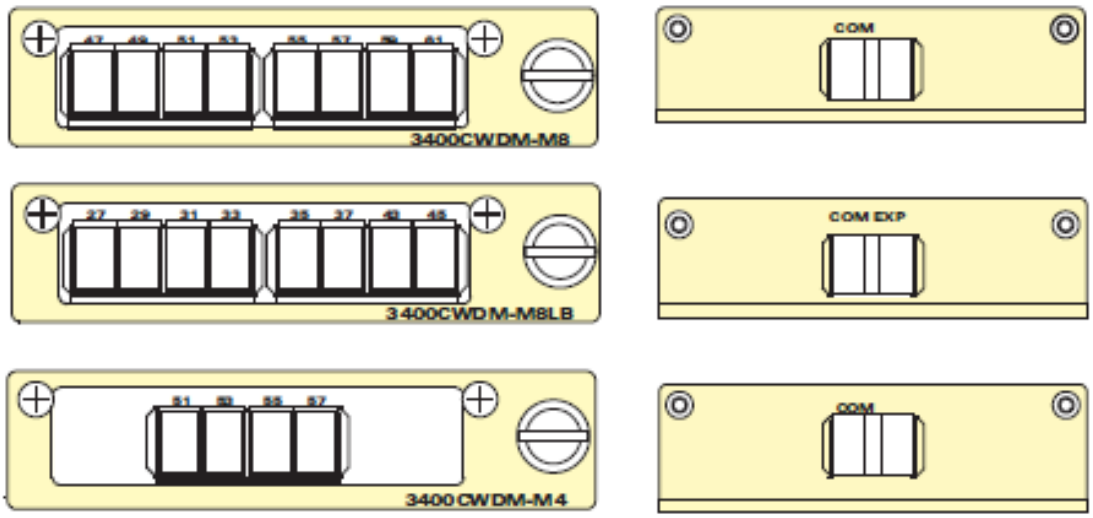

Figure 3-3: 3400CWDM Rear Panel Options

4. SPECIFICATIONS

4.1. OPTICAL INPUT/OUTPUT

Connector: LC/PC or LC/APC
Wavelength:
3400DS2-4 1260 to 1610 nm
3400DS4-2 1260 to 1610 nm
3400DS8 1260 to 1610 nm
3400MS2-4 1260 to 1610 nm
3400DS4-2 1260 to 1610 nm
3400CWDM-4 1510 nm to 1570 nm
3400CWDM-8 1470 nm to 1610 nm
3400CWDM-8LB 1270 nm to 1370 nm and 1430 nm to 1470nm

Fiber Size: 9 μm core / 125 μm overall

Insertion Loss:

Module	Port	Insertion Loss
3400DS2-4		< 4.0dB
3400DS4-2		< 8.0dB
3400DS-8		< 11dB
3400MS2-4	95 %	< 1dB
	5 %	< 15dB
3400MS2-4-9010	90%	<2
	10%	<16dB
3400MS4-2	30 %	< 6dB
	10 %	< 12dB
7705CWDM-4		< 4.8dB
7705CWDM-8		< 5.8dB
7705CWDM-8LB		< 5.8dB
7705CWDM-4 + 7705CWDM-8LB		< 10.6dB
7705CWDM-8 + 7705CWDM-8LB		<11.6dB

Table 3-1: Insertion Loss Specifications

Isolation:
3400CWDM > 30dB to adjacent channel

Channel Uniformity:
3400DS-8 < 0.9 dB
3400CWDM < 1.5 dB with mux/demux combination

4.2. PHYSICAL

3400FR mounting:

Number of slots: 10