

# DSWM CzechLight Variable Multiplexer + 2-Channel OCM

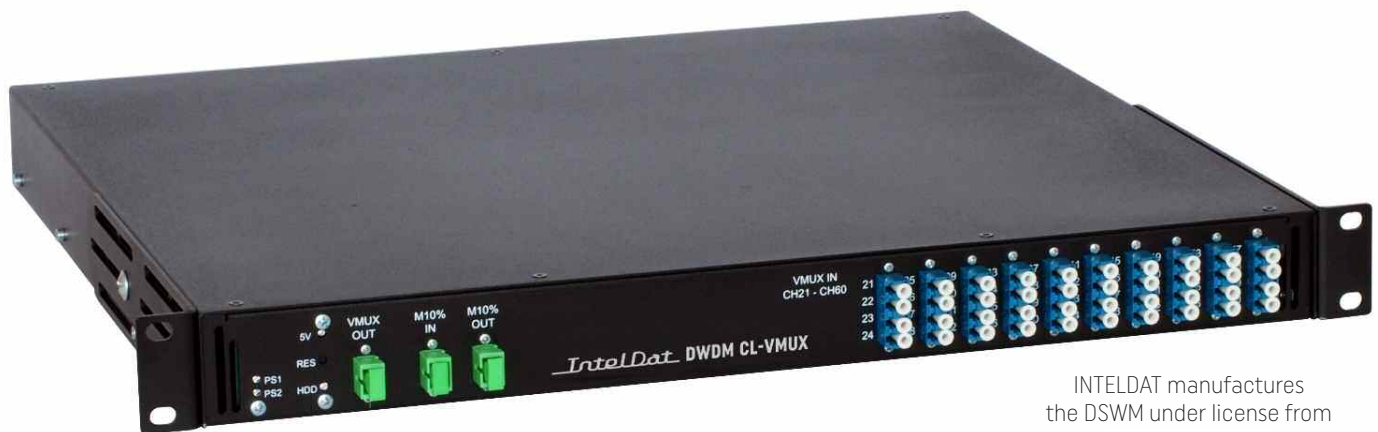
The DSWM is designed for multiplexing optical signals in DWDM networks.

A Variable Optical Attenuator (VOA), DWDM Multiplexer, or VMUX, combines 40 individually controllable VOAs with a 40 Channel AWG Multiplexer in a single system. The VMUX is ideal for power leveling prior to amplification in DWDM systems, and can be used also in optical add/drop multiplexer configurations.

The Optical Channel Monitor (OCM) is an advanced optical

subsystem that scans DWDM networks and reports the power of each 10/40/100G channel in real time. Feedback from the OCM can be used to optimize optical power levels, identify performance drift, and verify system functionality. An integrated switch allows 2 separate input ports to be monitored sequentially.

The built-in splitter for the second OCM port allows a user to monitor through external signals such as a DWDM demultiplexer or EDFAs.



INTELDAT manufactures the DSWM under license from

**cesnet**

## Features

- Multiplexing 40 channels in C band DWDM with variable attenuator VOA for each channel
- Accurate VOA control enables managed network nodes 40-channel capability 100 GHz channel spacing
- Low insertion loss and high isolation increases system margin
- High dynamic range, low PDL VOA
- Performance available in Mux and Demux configurations
- OCM is based on excellent MEMS durability, thermal stability, and repeatability
- 10/40/100 Gbit-capable (modulation is format independent)
- 100 GHz channel spacing within C band
- OCM 30 dB dynamic range
- Integrated 2-channel Optical Channel Monitor (OCM) for scanning DWDM signals of each 10/40/100 Gbit channel in real time
- The first port of OCM is used for VMUX monitoring, the second port is for optional monitoring of the power levels of EDFAs, DEMUXs, etc.
- Two integrated splitters 90 / 10 % connected to OCM ports
- Redundant power supply 230 V AC and or 48 V DC
- Microprocessor based control board with Linux Operation System
- Remote management
  - CLI via SSH
  - SNMP package
  - E-mail critical warning messages
  - WEB based CL VMUX+OCM control and monitoring
  - Optional remote-control GSM/GPRS/UMTS/Wi-Fi
- Management control of all important parameters
  - Setting of VOA attenuator for each channel
  - Output power in each channel
  - Second OCM input pro optional monitoring DEMUX or EDFAs by 10 % splitter
  - Temperature monitoring
  - Power supply and FAN speeds monitoring
- 40 input VMUX channels, ch 21 to 60 by ITU-T
- 2x OCM monitor 10 % splitter

*IntelDat*

## Specifications

| Parameters            | Units | Specifications                                      |
|-----------------------|-------|---|
| Management interfaces |       | 2x Ethernet 10/100 Mbit RJ45 ports                  |
|                       |       | 1 x RS 232 port, 2x USB port                        |
| Monitor ports         |       | SC/APC 1 % of power output                          |
| Power supply          | W     | dual PSU 100 V-230 V AC and or 48 V DC (max 150 W)  |
| Dimension             | mm    | chassis 1U 19", 435 x 415 x 44 (W x D x H)          |
|                       | mm    | chassis 1U max 4 x EDFA: 435 x 460 x 44 (W x D x H) |
| Working Temperature   | °C    | +5 to +60   |
| Optical Connectors    |       | SC/APC for inputs/outputs, LC/UPC for VMUX channels |

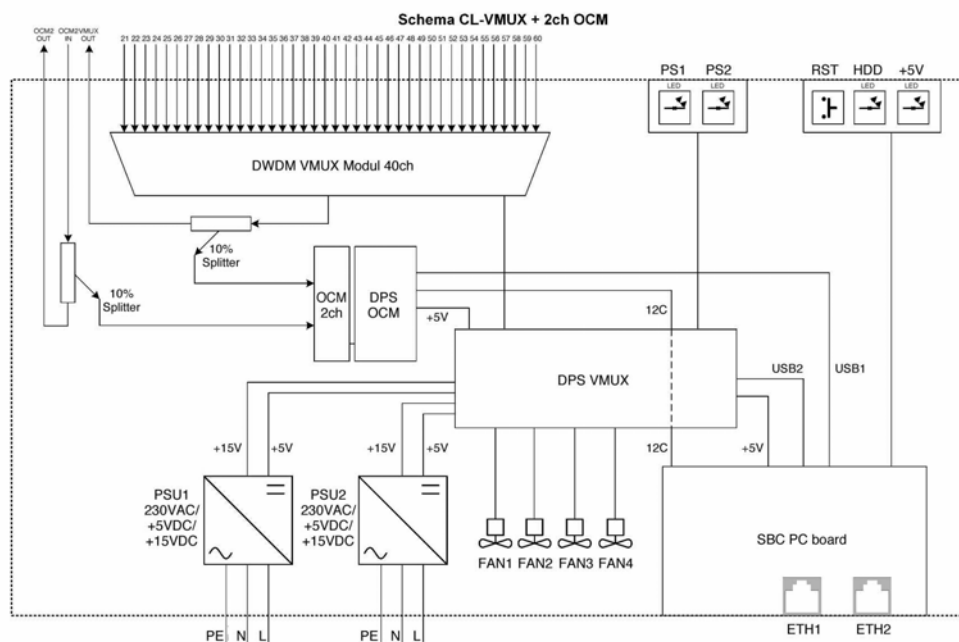
## Optical Characteristic of VMUX

| Parameters   | Units | Specifications |      |             |
|--|-------|----------------|------|-------------|
|  |       | Min            | Type | Max         |
| Signal Wavelength (40 channels, ch 21 - 60)                            | THz   | 192.100        |      | 196.000     |
| Center Wavelength Accuracy (3dB passband)                              | nm    | -0.06          |      | 0.06        |
| 0.5dB Passband Width (25 GHz)  | nm    | 0.20           |      |             |
| 1.0dB Passband Width (50 GHz)  | nm    | 0.40           |      |             |
| 3.0dB Passband Width (75 GHz)  | nm    | 0.6            |      |             |
| Insertion Loss (Including both VOA and MUX at 0dB attenuation)         | dB    |                |      | 6.5         |
| Uniformity (VOA at 0dB attenuation)                                    | dB    |                |      | 1.5         |
| Ripple (VOA at 0 dB attenuation)                                       | dB    |                |      | 0.75        |
| Return Loss  | dB    | 40             |      |             |
| Attenuation Range  | dB    |                |      | 15          |
| Attenuation resolution   | dB    | 0.1            |      |             |
| Attenuation Accuracy (VOA 0 – 10 dB)                                   | dB    |                |      | 0.5         |
| Attenuation Accuracy (VOA 0 – 10 dB)                                   | dB    |                |      | 1.2         |
| Polarization Dependent Loss (PDL)(VOA 0 – 5 dB, 5 – 10 dB, 10 – 15 dB) | dB    |                |      | 0.7/0.9/1.4 |
| Adjacent Channel Isolation(VOA at 0dB attenuation)                     | dB    | 25             |      |             |
| Total Channel Isolation(VOA at dB attenuation)                         | dB    | 22             |      |             |
| Chromatic Dispersion (CD)  | ps/nm | -20            |      | 20          |
| Polarization Mode Dispersion (PMD)                                     | ps    |                |      | 0.5         |
| Maximum Optical Power  | dBm   |                |      | 24          |

## Optical Characteristic of OCM

| Parameters                               | Units | Specifications |                  |      |
|--|-------|----------------|------------------|------|
|  |       | Min            | Type             | Max  |
| Wavelength Range C-Band                  | nm    | 1529           |                  | 1564 |
| Channel Spacing                          | GHz   |                | 100              |      |
| Signal Data Rate                         |       |                | 10/40/100 Gbit   |      |
| Per Channel Input Optical Power          | dBm   | -40            |                  | -10  |
| Aggregate Input Optical Power            | dBm   | -40            |                  | 10   |
| Absolute Power Accuracy                  | dB    |                |                  | ± 1  |
| Aggregate Power Accuracy                 | dB    |                |                  | ± 1  |
| Channel Power Uniformity                 | dB    |                |                  | 15   |
| Optical Return Loss                      | dB    |                |                  | -40  |
| Per Port Scanning Time                   | ms    |                |                  | 500  |
| Durability                               |       |                | 1 billion cycles |      |
| Operating Temp                           | °C    | -5             |                  | 75   |
| Fiber Type                               | µm SM |                | 9/125            |      |
| PORT1 OCM VMUX monitor, 10% splitter     | dBm   | -21            |                  | 9    |
| PORT2 OCM ext. monitor, 10% splitter     | dBm   | -29            |                  | 1    |
| Insertion Loss – splitter 90 %, SC/APC   | dB    |                |                  | 1.0  |
| Insertion Loss – splitter 10 %, SC/APC   | dB    |                |                  | 11.2 |
| Insertion Loss – VMUX + Splitter monitor | dB    |                |                  | 7.2  |

## Functional Block Diagram



## ORDERING CODES

### DSWM: CzechLight Variable Multiplexer + 2-Channel OCM

| DS      | WM | ✓        | - | 21 | - | 60 | - | 20CM | - | PS1 | - | PS2 |  |
|---------|----|----------|---|----|---|----|---|------|---|-----|---|-----|--|
|         |    | CLVMUX   |   |    |   |    |   | 20CM |   |     |   |     | 40-Channel Mux + 2-Channel OCM   |
|         |    | CLVDEMUX |   |    |   |    |   |      |   |     |   |     | 40-Channel Demux   |
| Example |    |          |   |    |   |    |   |      |   |     |   |     |  |
| DS      | WM | CLVMUX   | - | 21 | - | 60 | - | 20CM | - | PS1 | - | PS2 | INTELDAT CzechLight 40-channel multiplexer + 2-channel OCM, 21-60, 100 GHz |