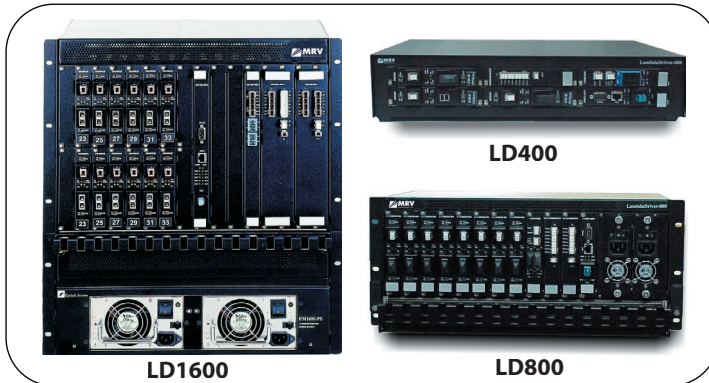


Datasheet

Lambda Driver Series



Overview

The Lambda Driver series consists of multi-functional, compact modular Wavelength Division Multiplexing (WDM) systems that can create up to 32 independent virtual fiber optic links over a single pair of fibers over distance of up to 100 km. The Lambda Driver systems are targeted for Carriers' Central Offices or multi-tenant office buildings and are ideally suited for MAN networks as well as large enterprise and Access networks.

The product supports different network topologies such as PTP, Linear OADM and Ring.

The Lambda Driver family operates in a DWDM (ITU Grid channels spacing) and CWDM (20nm channels spacing) technology. Each data stream can handle rates from 10 Mbps up to 2.5 Gbps. The systems support future upgrade to 10 Gbps services.

Chassis

LD400/LD800/1600 are 19-inch rack mountable chassis with modular architecture hosting different Mux/DeMux modules with 4, 8, 16 and 32 channels or OADM modules starting from single channel up to any number and mix of channels. Such flexibility offers a lower initial cost to service providers, allowing for fewer channels units at start, and ensuring simple system upgrades or future network re-configurations.

In order to provide maximum system reliability, the systems have a dual redundant power supplies option.

LD1600 is 11.5U Height unit with 16 general slots for transponders, OADMs, Muxs and 1+1 redundancy modules and 6 general slots for 16/32 channels Muxs

LD800 is 4.5U Height unit with 11 general slots for transponders, OADMs, Muxs and 1+1 redundancy modules.

LD400 is 2U Height unit with 5 general slots for transponders, OADMs Muxs and 1+1 redundancy modules.

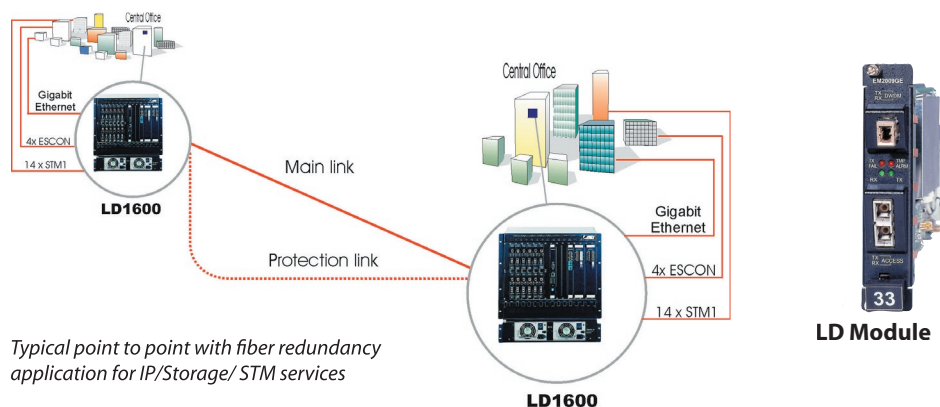
Transponders

The transponders are single slot modules that provide an interface between the WDM system and single channel access port. Transponders are fully independent of the other channels and transparently support all data centric protocols, enabling service providers to mix different protocols such as SONET/SDH, Fast Ethernet, Gigabit Ethernet, Fiber Channel, ESCON, etc. in the same chassis. LD400/LD800/1600 transponders possess the "data rate selection" functionality, allowing service provider the ability for remote rate provisioning.

The transponders are hot swappable, allowing scalable in-service expansion or channel maintenance without interruption of service on other channels. The same transponder modules can be used in all Lambda Driver family chassis.

Features

- Metro, Access, and Campus applications
- Maximizes fiber efficiency while simplifying network design and costs
- Multi-protocol support
- Scalable design up to 32 protected services per ring
- Data rates of up to 2.5 Gbps, upgradable to 10Gbps
- DWDM - ITU - T - G.694.1 grid 100 or 200 GHz spaced
- CWDM - ITU - T - G.694.2 20 nm spaced
- Error and configuration monitoring via SNMP or CLI
- Redundant power supply
- 1+1 link protection – optional
- O-BPSR ring protection option
- Built-in Optical Amplifier (EDFA) - option



TDM Sub-rate Multiplexer

By multiplexing multiple channels via TDM into DWDM or CWDM the number of ports in a single fiber can be multiplied by a factor of TDM implementation, thus increasing the efficiency of fiber use as well as saving precious physical space. The first TDM product in LD series is 4x ESCON multiplexer module. The ultra compact design is ideally suited for ESCON applications, which often require many parallel links. A combination of the 4x ESCON Mux in the LD400/LD800/1600 chassis achieves extremely high levels of density - 128 ESCON services can be run over one fiber pair (with 32 wavelengths). The electrically based multiplexing allows for a significant cost reduction and higher fiber utilization when compared to a pure optical multiplexing solution. The ESCON Mux link fiber interface can be 850nm/1310nm or CWDM grid for direct connection to the CWDM Mux.

Protection options

An optional 1+1 protection module provides survivability in case of a main fiber break in Point-to-Point configurations. When the module discovers a fiber break condition in the main link, it automatically switches the WDM traffic to the secondary link within less than 10 ms.

For Ring topologies O-BPSR (Optical Bi-directional Path Switched Ring) protection is provided by use of two transponders for each channel (full hardware redundancy) or 1+1 module per channel (Fiber redundancy).

Management

The Lambda Driver LD series of products are SNMP and Web manageable (with MegaVision Web™) for configuration and fault monitoring. Local element management interface is provided for connecting to the VT100™ style text terminal (RS-232 DB9 connector) or 10/100 Mbps (RJ45 Ethernet connector). 100BaseFX port is provided for remote fiber access to the element manager. LD1600 has an option for redundant Management module.

Remote login via TELNET is also supported.

Optical Supervisory Channel (OSC) which runs together with the WDM data over the same fibers is optional. This option is included on the 1+1 redundancy module or special SRV module. SRV module combines the WDM traffic with 1310nm Management stream and can be used also for other traffic combination (like STMn 1310nm).

WDM Link distances

The link budget of the product allows distances up to 100 Km with regular SM fibers (0.25db/km or better). But for fiber spans with large attenuation, integrated Optical Amplifier (EDFA) modules can be used. 3 different types are supported:

Booster – for amplification of the signal at the starting point of the link.

In-Line - for amplification of the signal at the middle point of the link.

Pre-Amp - for amplification of the signal at the end point of the link.

The link distance limitation of 100Km for standard products, even with Optical Amplifiers, is due to the dispersion. This limit can be eliminated by use of a DCU (dispersion compensation unit) along the link or transponders with low dispersion feature.

LD 1600 / 800 / 400 –Technical Specifications

| | | | | |
|---|--|-----------------------|-------------------------|--------------------------|
| Physical Dimensions | LD1600: Height: 11.5 U Size (W x D x H) 445.5 x 299 x 510.4 mm (17.54x 11.77 x 20.09 inch) LD800: Height: 4.5 U Size (W x D x H) 445.5 x 267 x 199.2 mm (17.54 x 10.51 x 7.84 inch) LD400: Height: 2 U Size (W x D x H) 443 x 324 x 88.01 mm (17.44 x 12.76 x 3.47 inch) | | | |
| Mounting | 19-inch rack mount - EIA RS-310C standard | | | |
| Weight | LD400: 10 kg (22.04 lb) LD800: 20 kg (44.09 lb) LD1600: 30 kg (66.14 lb) | | | |
| Optical Connectors | SC - WDM, MU - Internal connection | | | |
| Power Input Voltage | AC: 90 - 240 V, 50 - 60 Hz DC: 36 - 72 V | | | |
| Power Consumption | LD400: 60 W max LD800: 90 W max. LD1600: 200 W max. (at full capacity of 16 channels) | | | |
| Standard Compliance | Safety, EMC; UL - 1950; CSA - 22.2 No. 950; FCC part 15 Class A; CE - 89/336/EEC, 73/23/EEC | | | |
| System Performance | Data rate: 2 Mbps to 2.5 Gbps per channel Capacity: 8 or 16 channels Link protection switching time: - 10 ms | | | |
| WDM grid | DWDM: ITU - T - G.694.1 CWDM: ITU - T - G.694.2 | | | |
| Management | SNMP MegaVision™ software network management or other SNMP manager Craf interface: BT100 style text interface via RS - 232 (DB9) connector and remote login via TELNET 10/100 Ethernet (RJ45) + 100Base-Fx local port Optical Supervisory channel: at 1310 nm | | | |
| Applications | Fast Ethernet, Gigabit Ethernet, ATM or SONETH/SDH at OC1, OC3, OC12 or OC48, STM1, STM4, STM16 Fiber Channel, ESCON and other proprietary protocols | | | |
| OADM maximum Attenuation (db) | Type | In - Out loss Dual | In - Out loss Single | In - Drop/Add - Out loss |
| | 1 channel OADM | 0.9 | 1.3 | 1.3 |
| | 2 channel OADM | 1.3 | 2.1 | 1.3 / 1.7 |
| | 3 channel OADM | 1.7 | 2.9 | 1.3 / 1.8 / 2.1 |
| | 4 channel OADM | 2.1 | 3.7 | 1.3 / 1.7 / 2.1 / 2.5 |
| | 8 channel Mux | | | 3 |
| | 8 channel DMux | | | 3.3 |
| | 16 channel Mux | | | 5.4 |
| | 16 channel DMux | | | 5.7 |
| Optional Modules | | | | |
| Attenuation | Tx | 3db | | |
| 1+1 Redundant Module | Rx | 2db | | |
| | OSC module | 1.5db | | |
| Transponder Optical Specifications | | | | |
| Transmitter Power | DWDM | +3.5dbm +/- 0.5 dBm | | |
| | CWDM | +1.5dbm +/- 0.5 dBm | | |
| Receiver Sensitivity | 1.25Gbps | -32dbm +/- 1 dBm | | |
| | 2.5Gbps | -27dbm +/- 1 dBm | | |
| Maximum Receiver Power | | -3dbm +/- 1 dBm | | |
| Optical Amplifier Specifications | Output Power +16dBm max. Signal Gain 10 - 26dB Input Power: Pre-amplifier -24dBm - -5dBm Line / Booster -14dBm - +5dBm | | | |

| Product | Description |
|--------------------------------------|--|
| LD1600 Platform | |
| LD1600 | Lambda Driver-1600, 16 channels, Chassis without power supply (EM2005 power supplies should be ordered separately) |
| EM2005-PS/AC | AC power supply for the LD1600 (90-240V AC) |
| EM2005-PS/DC | DC power supply for the LD1600 - (48V AC) |
| EM1600-MNG | MNG Management Module for the Lambda Driver-1600 |
| EM1600-RED | 1+1 redundant link module for LD1600 |
| EM1600-SRV | DWDM Service module for LD1600 |
| EM1600-OAI | Optical In Line Amplifier for the Lambda Driver-1600 |
| EM1600-OAP | Optical Pre-Amplifier for the Lambda Driver-1600 |
| EM1600-OAB | Optical Booster Amplifier for the Lambda Driver-1600 |
| LD800 Platform | |
| LD800/AC | Lambda Driver-800, 8 slot Chassis with single AC power supply (90-240V AC) |
| LD800/DC | Lambda Driver-800, 8 slot Chassis with single DC power supply (48V DC) |
| LD800/2AC | Lambda Driver-800, 8 slots Chassis with dual power AC supply (90-240V AC) |
| LD800/2DC | Lambda Driver-800, 8 slots Chassis with dual power DC supply (48V DC) |
| EM800-PS/AC | Redundant power supply for the LD800/AC (90-240V AC) |
| EM800-PS/DC | Redundant power supply for the LD800/DC (48V DC) |
| EM800-MNG | MNG Management Module for the Lambda Driver-800 |
| EM800-RED | 1+1 redundant link module for LD800 |
| EM800-SRV | CWDM Service module for LD800 |
| EM800-OAP | Optical Pre-Amplifier for the Lambda Driver-800 |
| EM800-OAB | Optical Booster Amplifier for the Lambda Driver-800 |
| EM800-OAI | Optical in line amplifier for the Lambda Driver-800 |
| LD400 Platform | |
| LD400/AC | Lambda Driver-400, 4 slot Chassis for WDM with single AC power supply (90-240V AC) |
| LD400/DC | Lambda Driver-400, 4 slot Chassis for WDM with single DC power supply (48V DC) |
| LD400/2AC | Lambda Driver-400, 4 slots Chassis for WDM with dual power AC supply (90-240V AC) |
| LD400/2DC | Lambda Driver-400, 4 slots Chassis for WDM with dual power DC supply (48V DC) |
| EM400-PS/AC | Redundant power supply for the LD400/AC (90-240V AC) |
| EM400-PS/DC | Redundant power supply for the LD400/DC (48V DC) |
| LD1600 CWDM Mux/DeMux modules | |
| EM1600-MUX16C | 16 wavelengths CWDM Multiplexer module for LD1600 |
| EM1600-DMUX16C | 16 wavelengths CWDM Demultiplexer module for LD1600 |
| EM1600-DMUX16CM | 16 wavelengths CWDM Multimode Demultiplexer module for LD1600 |
| EM1600-MUX8C | 8 wavelengths CWDM Multiplexer module for LD1600 |
| EM1600-DMUX8C | 8 wavelengths CWDM Demultiplexer module for LD1600 |
| LD1600 DWDM Mux/DeMux modules | |
| EM1600-MUX32 | 32 100G spacing wavelengths DWDM Multiplexer module for LD1600 |
| EM1600-DMUX32 | 32 100G spacing wavelengths DWDM Demultiplexer module for LD1600 |
| EM1600-MUX16 | 16 wavelengths DWDM Multiplexer module for LD1600 |
| EM1600-DMUX16 | 16 wavelengths DWDM Demultiplexer module for LD1600 |
| EM1600-MUX16R | 16 100G spacing Red band DWDM Multiplexer module for LD1600 |
| EM1600-DMUX16R | 16 100G spacing Red band DWDM Demultiplexer module for LD1600 |
| EM1600-MUX16B | 16 100G spacing Blue band DWDM Multiplexer with band splitter module for LD1600 |
| EM1600-DMUX16B | 16 100G spacing Blue band DWDM Demultiplexer with band splitter module for LD1600 |
| EM1600-MUX8R | 8 wavelengths DWDM Multiplexer module for LD1600 (ch#21 to ch#35) |
| EM1600-DMUX8R | 8 wavelengths DWDM Demultiplexer module for LD1600 (ch#21 to ch#35) |
| EM1600-MUX8B | 8 wavelengths DWDM Multiplexer module for LD1600 (ch#45 to ch#59) with band splitter |
| EM1600-DMUX8B | 8 wavelengths DWDM Demultiplexer module for LD1600 (ch#45 to ch#59) with band splitter |
| LD800 DWDM Mux/DeMux modules | |
| EM800-MUX8B | 8 wavelengths (#45 - #59) DWDM Multiplexer module for LD800 |
| EM800-DMUX8B | 8 wavelengths (#45 - #59) DWDM Demultiplexer module for LD800 |
| EM800-MUX8R | 8 wavelengths (#21 - #35) DWDM Multiplexer module for LD800 |
| EM800-DMUX8R | 8 wavelengths (#21 - #35) DWDM Demultiplexer module for LD800 |
| LD800 CWDM Mux/DeMux modules | |
| EM800-MUX8/CW | 8 wavelengths CWDM Multiplexer module for LD800 |
| EM800-DMUX8/CW | 8 wavelengths CWDM Demultiplexer module for LD800 |
| EM800-DMUX8/CWM | 8 wavelengths CWDM Multimode Demultiplexer module for LD800 |

| Ordering Info | Product | Description |
|---------------|--|--|
| | DWDM OADM modules | |
| | ADDxx/yy/zz/ww*** | 4 wavelengths DWDM OADM module |
| | ADDxx/yy/zz** | 3 wavelengths DWDM OADM module |
| | ADDxx/yy** | 2 wavelengths DWDM OADM module |
| | ADDxx** | 1 wavelengths DWDM OADM module |
| | CWDM OADM modules | |
| | ADCxx/yy/zz/ww*** | 4 wavelengths CWDM OADM module for LD800 |
| | ADCxx/yy/zz** | 3 wavelengths CWDM OADM module for LD800 |
| | ADCxx/yy** | 2 wavelengths CWDM OADM module for LD800 |
| | ADCxx** | 1 wavelengths CWDM OADM module for LD800 |
| | DWDM Transponder Modules | |
| | EM2009-M/LX/xx* | MM (1310nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder |
| | EM2009-M/SX/xx* | MM (850nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder |
| | EM2009-M/S1/xx* | SM(1310nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder |
| | EM2009-H/LX/xx* | MM (1310nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder |
| | EM2009-H/SX/xx* | MM (850nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder |
| | EM2009-H/S1/xx* | SM(1310nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder |
| | DWDM Low Dispersion (up to 400km) Transponder Modules | |
| | TM-L4M/LX/xx* | MM (1310nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder, long reach |
| | TM-L4M/SX/xx* | MM (850nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder, long reach |
| | TM-L4M/S1/xx* | SM(1310nm) Medium Rate (10M-1.25Gbps) access to DWDM ch #xx transponder, long reach |
| | TM-L4H/LX/xx* | MM (1310nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder, long reach |
| | TM-L4H/SX/xx* | MM (850nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder, long reach |
| | TM-L4H/S1/xx* | SM(1310nm) High Rate (0.1-2.5Gbps) access to DWDM ch #xx transponder, long reach |
| | CWDM Transponder Modules | |
| | EM2009-CM/LX/xx* | MM(1310nm) Medium Rate (10M-1.25Gbps) access to CWDM ch #xx transponder |
| | EM2009-CM/SX/xx* | MM(850nm) Medium Rate (10M-1.25Gbps) access to CWDM ch #xx transponder |
| | EM2009-CM/S1/xx* | SM(1310nm) Medium Rate (10M-1.25Gbps) access to CWDM ch #xx transponder |
| | EM2009-CH/LX/xx** | MM (1310nm) High Rate (0.1-2.5Gbps) access to CWDM ch #xx transponder |
| | EM2009-CH/SX/xx* | MM(850nm) High Rate (0.1-2.5Gbps) access to CWDM ch #xx transponder |
| | EM2009-CH/S1/xx* | SM(1310nm) High Rate (0.1-2.5Gbps) access to CWDM ch #xx transponder |
| | ESCON TDM module | |
| | EM2009-EM4/SX | 4 ESCON ports (1310nm MM) TDM Multiplexer channel card (MM, 850nm, 0-350m) |
| | EM2009-EM4/S1 | 4 ESCON ports (1310nm MM) TDM Multiplexer channel card (SM, 1310nm, 0-15km) |
| | EM2009-EM4/xx | 4 ESCON ports (1310nm MM) TDM Multiplexer channel card with CWDM ch#xx interface |
| | Accessories | |
| | LDP300 | 3 slot passive chassis for LD800 Mux's or OADM's |
| | CA-SMD-SC/SC-5 | Duplex SC-SC, 90°, 5m, 5m fiber cable |
| | CA-SMS-SC/SC-1 | Singlemode 90°, fiber cable with SC connectors, 1m. |
| | CA-SMS-MU/MU-1 | Singlemode 90°, fiber cable with MU connectors, 1m. |
| | CA-MMS-MU/MU-1 | Multimode 62.5/1250°, fiber cable with MU connectors, 1m. |

*Note1: xx represents ITU Grid channel number from 21 (1560.61nm) to 51 (1536.61nm) with 200Ghz spacing only odd channels are used - 21,23,25...

**Note2: xx represents the two middle digits of the wavelength: "47" - 1470nm, "49" - 1490nm, "51" - 1510nm, "53" - 1530nm, "55" - 1550nm, "57" - 1570nm, "59" - 1590nm, "61" - 1610nm

***Note3: xx,yy,zz,ww represents the two middle digits of the wavelength according to Notes 1&2

All statements, technical information and recommendations related to the products herein are based upon information believed to be reliable or accurate. However, the accuracy or completeness thereof is not guaranteed, and no responsibility is assumed for any inaccuracies. Please contact MRV Communications for more information. MRV Communications and the MRV Communications logo are trademarks of MRV Communications, Inc. Other trademarks are the property of their respective holders.