LUMENTUM

WaveReady® Intelligent Line Amplifiers (ILAs) with OSC

WRA-L20C1001B and WRA-L20C2H01B

WaveReady ILAs are rugged, compact 1- and 2-rack unit (RU) optical amplification nodes that reduce the complexity of optical amplifier deployment, management, and operation, especially in harsh environments. Deployable as a pre-amp, post-amp, or in-line, the WaveReady ILA is self -optimizing, auto-adjusting, and easy to use.

Extended Temperature Operation
Supporting extended operating temperature up to 65°C, the WaveReady 2RU ILA supports outside plant deployment, and can dramatically reduce operating cost by eliminating or reducing cooling requirements.

Compact Configuration, Low Maintenance
These WaveReady east/west bidirectional ILAs are compact, space-saving, front-access units. Requiring only 1- or 2-RU of rack space for bidirectional amplification, WaveReady ILAs can reduce space requirements up to 90 percent compared to similar solutions. Also, front access may allow for lowering costs in physical plants by reducing the number of costly equipment racks.

The hardened design of the 2-RU ILA eliminates the need for an air filter, further reducing operating costs related to basic maintenance, even in areas of poor air quality.

Easy, Flexible OSC
The optical supervisory channel (OSC) of the WaveReady ILA reduces management complexity. Both OSC channels are data agnostic, support data rates up to 125 Mbps, and do not consume traffic wavelengths.

Built-in WaveReady and third-party OSC channels allow for easy in-line amplification and terminal equipment management without imposing overlay network penalties.

Key Benefits
- Reduces cost and complexity of amplifier deployment, especially in harsh environments
- Eliminates or reduces cooling requirements in remote locations
- Reduces complexity with integrated filtering and termination and two optional OSC channels for either WaveReady or third parties
- Minimizes footprint by up to 85% compared to conventional solutions
- Exceeds standards for conduction of emissions immunity; ideal for deployment in electrical utility substations or other industrial networks

Key Features
- 20 dBm output power
- Full C-band 88 channels at 50 GHz capacity
- Fully configurable constant gain of 20 to 29 dB across all channels
- Tilt control for extended amplifier cascades
- Operating temperature up to 65°C
- Automatically accommodates span loss for temperature dependent loss

Applications
- Router-to-router interconnect; long-distance amplification; multi-vendor networks; utility substation deployments

Compliance
- Telcordia NEBS Level 3; FDA Class 1M laser device; FCC Class A device; UL 60950-1 First Edition; CAN/CSA C22.2 No. 60950 01; CE; RoHS; IEC 61850-3 Section 5.7 and IEEE 1613 Section 7 and 8 (EMI Immunity)

Applications for WaveReady ILAs

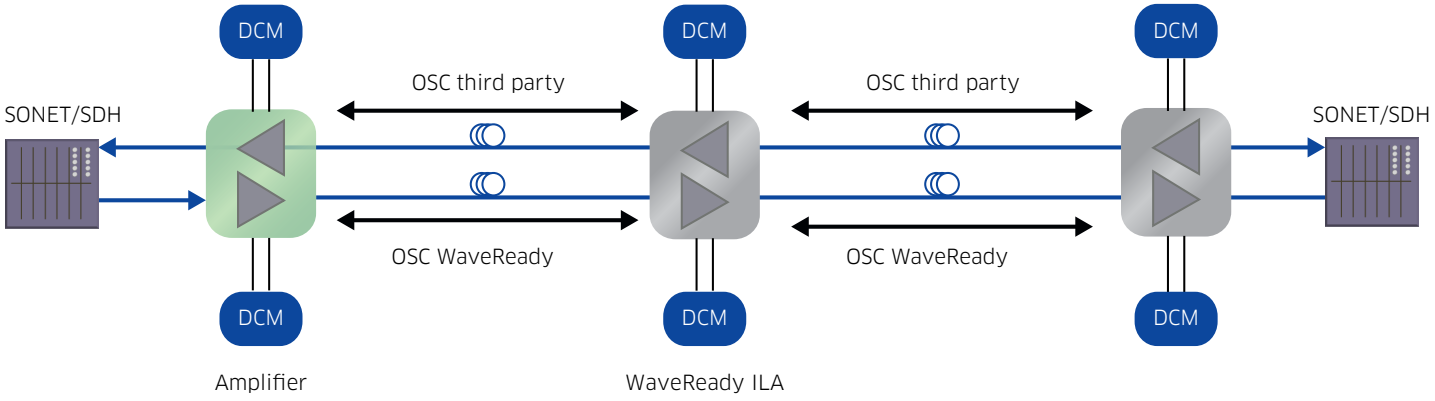

Figure 1. WaveReady ILA OSC and interoperability deployment

Specifications[1]

EDFA Performance		Minimum	Typical	Maximum
Operating wavelength (C-band)		1528.4 nm	—	1564.3 nm
Module temperature range	WRA-L20C1001B	–5	—	55
	WRA-L20C2H01B	–5	—	65
Optical damage threshold[2]		23 dBm	—	—
Input power range		–30 dBm	—	7 dBm
Maximum output power		20 dBm	—	—
Input LOS threshold (minimum input signal power)		–32 dBm	—	—
Maximum per-channel power at stage 1 output		—	—	–2 dBm
Flat gain range (tilt control available)[3]		13 dB	—	26 dB
Extended gain range (no tilt control, some tilt)[3]		26 dB	—	29 dB
Gain accuracy[4]	Full channel load	–0.5 dB	—	0.5 dB
	Gain variation at 0 dB tilt	—	—	1.2 dB
	Gain Variation at –3 dB Tilt	—	—	2.0 dB
Provisional tilt range in flat gain range[5]		–3 dB	—	0.7 dB
Steady-state gain stability[6]		–0.25 dB	—	0.25 dB
Polarization-dependent gain		—	—	0.55 dB
Polarization mode dispersion		—	< 0.1 ps	0.5 ps
Backward ASE at input		—	—	–20 dBm
Return loss[7]		40 dB	—	—
Monitor tap ratio		–21.5 dB	—	–18.5 dB
Transient settling time[8]		—	—	1 ms

Physical		
Size (H x W x D)	WRA-L20C1001B	1.75 x 11 x 17.2 inches
	WRA-L20C2H01B	3.5 x 11 x 17.2 inches
Air Filter	WRA-L20C1001B	Replaceable filter on fan module
	WRA-L20C2H01B	No filter required
Ambient temperature rating	WRA-L20C1001B	Short term: –5 to 55°C; long term: –5 to 40°C
	WRA-L20C2H01B	Long term: –5 to 65°C

Interfaces	
Optical	LC/UPC SMF
Alarms and Sense	15-pin micro DSub connector • Three dry alarm inputs (Critical, Major, Minor) • Six sense inputs
Craft	SB mini B
Ethernet	Three 10/100 BaseT

Electrical		
Input power supply		Redundant –48 VDC (nominal)
Input operating voltage		–40 to –57.5 VDC
Fusing		Two GMT indicating
Grounding		Redundant –48 V returns via connector, isolated from one another as well as from frame ground
Power consumption	WRA-L20C1001B	80 W worst case; 70 W at room temperature
	WRA-L20C2H01B	95 W worst case; 80 W at room temperature
Bulkhead adapter		Replaceable GMT indicating fuses in proximity to the power connections

Noise Performance	Maximum
Noise figure, beginning of life (BoL)	
P_{in} = –6 dBm, G = 26 dB (P_{out} = 20 dBm)	6.5 dB
P_{in} = 0 dBm, G = 20 dB (P_{out} = 0 dBm)	9.2 dB
P_{in} = 7 dBm, G = 13 dB (P_{out} = 20 dBm)	16.5 dB
P_{in} = –26 dBm, G = 26 dB (P_{out} = 0 dBm)	7 dB
P_{in} = –20 dBm, G = 20 dB (P_{out} = 0 dBm)	9.5 dB
P_{in} = –13 dBm, G = 13 dB (P_{out} = 0 dBm)	15.3 dB
P_{in} = –30 dBm, G = 26 dB (P_{out} = –4 dBm)	7.0 dB
P_{in} = –24 dBm, G = 20 dB (P_{out} = –4 dBm)	9.5 dB
P_{in} –17 dBm, G = 13 dB (P_{out} = –4 dBm)	15.3 dB
P_{in} –9 dBm, G = 29 dB (P_{out} = 20 dBm)	6.5 dB
P_{in} –13 dBm, G = 33 dB (P_{out} = 20 dBm)	6.5 dB
P_{in} –30 dBm, G = 33 dB (P_{out} = +3 dBm)	6.7 dB
P_{in} –30 dBm, G = 29 dBm (P_{out} = –1 dBm)	6.7 dB
Noise figure, end of life (EoL)	
Maximum degradation at EoL	0.3 dB

OSC Performance		Minimum	Typical	Maximum
OSC wavelength	Low-Band OSC	1500 nm	1510 nm	1520 nm
	High-Band OSC	1570 nm	1610 nm	1630 nm
OSC drop loss with respect to line in		—	—	2.2 dB
OSC add loss with respect to line out		—	—	1.6 dB

1. All specifications are guaranteed over the lifetime, temperature, wavelength range, and operating voltages unless otherwise specified.
2. All optical ports.
3. User configurable with resolution of 0.1 dB.
4. 13 – 26 dB gain.
5. Full-range only available [13, 26] dB gain range.
6. Over 1 ms, 2 µs sampling rate with 64 times averaging.
7. Input or output port.
8. Gain ≥ 17 dB with 16.4 dB change, maximum gain excursion of 1 dB.

Ordering Information

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at customer.service@lumentum.com.

Description	Product Code
Compact in-line amplifier with OSC, 1 RU	WRA-L20C1001B
Compact in-line amplifier with OSC, 2 RU, extended temperature range	WRA-L20C2H01B

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