

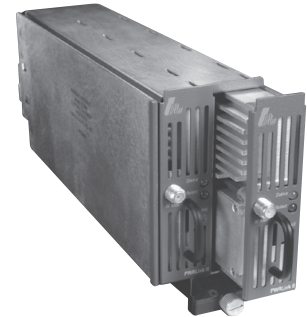
HIGHLIGHTS

- Automatic or manual gain control simplifies operation
- Auto-setup feature simplifies installation
- Integrated RF pre-amplifier reduces transmitter drive level requirements
- Compact size enables 10 DFB transmitters to fit in a 3-RU platform
- Advanced predistortion circuitry and algorithm for both CTB and CSO provide state-of-the-art distortion cancellation over a wide temperature range
- Integrated element management with SNMP compatibility
- Microprocessor control of all key parameters provides consistent for optimum product performance and monitoring
- Offers a wide range of performance levels to meet specific system requirements
- 1 GHz bandwidth provides flexibility in delivery of signals and services with 78 System M (NTSC) channels to 550 MHz with additional digital information
- Unparalleled flat frequency response provides high performance and efficient system integration
- DFB-1550 nm hybrid cascades for trunking, supertrunking and interconnects
- High performance transport of a 1 GHz bandwidth signal over links of up to 45 km
- Analog and digital narrowcasting

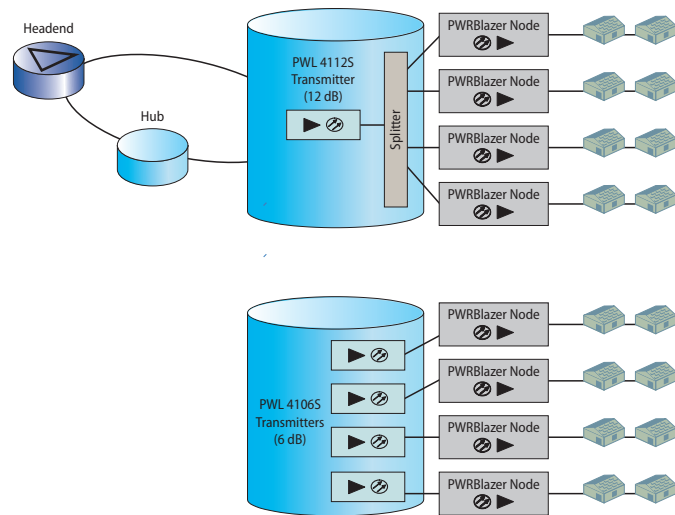
Harmonic's PWRLink™ family of 1310 nm DFB laser transmitter modules is designed for advanced broadband networks. PWRLink II transmitters can operate alone in local distribution or narrowcasting applications and in combination with Harmonic's externally modulated transmitter family for complete system solutions.

The PWL 4100S transmitter modules are very compact with 10 transmitter modules fitting into a single three rack-unit high HLP 4200 platform via the HMC 4001 module carrier adapter. They are intelligent and can be set up in a matter of minutes by means of the user-friendly interface. Configuration can be done in three different ways: via the HLP 4200WD platform front panel menu, the RF adjustment on the module front panel or the NETWatch™ Element Management System.

Advanced predistortion circuitry enables the state-of-the-art PWRLink 1GHz transmitter to deliver high performance with RF distortion suppression. As a result, system designers can achieve very high carrier-to-noise performance while avoiding receiver overdrive problems. Continuous high performance and reliability of the transmitters are assured by a microprocessor and associated firmware which control and monitor all vital functions. Monitored functions include laser temperature and operating point, optical power and module temperature. The transmitter's flat frequency response and wide operating temperature range maximize overall broadband network performance.



The optical components within the PWRLink 1GHz transmitter module have been designed for ease-of-use and maintenance. The optical connector is mounted on a removable plate on the back of the unit. This feature facilitates simple cleaning of the connector, ensuring consistently high picture quality.



Typical Application

MODELS AVAILABLE

PWL 41xxS-zz
xx = Model Number (02 to 15)
zz = Connector Type (AS, AF, US, UF or AE)

LINK PERFORMANCE

Carrier-to-noise (CNR)	Shown in figure above.
Carrier-to-CSO ^{1,3}	> 64 dB
Carrier-to-CTB ^{1,3}	> 69 dB
When link includes optical splitter loss add 0.15 dB to CNR for every 1 dB of splitter loss.	

OPTICAL OUTPUT

Wavelength	1300 - 1320 nm
Model	Optical Power (dBm)
PWL 4102S	2.5 ± 0.5
PWL 4103S	3.5 ± 0.5
PWL 4104S	4.5 ± 0.5
PWL 4105S	5.5 ± 0.5
PWL 4106S	6.5 ± 0.5
PWL 4107S	7.5 ± 0.5
PWL 4108S	8.5 ± 0.5
PWL 4109S	9.5 ± 0.5
PWL 4110S	10.5 ± 0.5
PWL 4111S	11.5 ± 0.5
PWL 4112S	12.5 ± 0.5
PWL 4113S	13.5 ± 0.5
PWL 4114S	14.25 ± 0.75
PWL 4115S	15.25 ± 0.75

**Estimated PWL4100S CNR vs.Optical Fiber Loss
80 System M (NTSC) Channels^{1,2}**

Model #	Harmonic PWL41xxS CNR Specifications																
	Total Link loss, all fiber, dB																
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PWL4102S	51.2	50.6	49.9	49.1													
PWL4103S	51.7	51.2	50.6	49.9	49.1												
PWL4104S	52.2	51.7	51.2	50.6	49.9	49.1											
PWL4105S		52.2	51.7	51.2	50.6	49.9	49.1										
PWL4106S			52.2	51.7	51.2	50.6	49.9	49.1									
PWL4107S				52.2	51.7	51.2	50.6	49.9	49.1								
PWL4108S					52.2	51.7	51.2	50.6	49.9	49.1							
PWL4109S						52.2	51.7	51.2	50.6	49.9	49.1						
PWL4110S							52.2	51.7	51.2	50.6	49.9	49.1					
PWL4111S									52.3	51.7	51	50.2	49.4				
PWL4112S										52.1	51.5	50.8	50.1	49.3			
PWL4113S											52	51.4	50.7	50	49.2		
PWL4114S												51.8	51.2	50.6	49.9	49.1	
PWL4115S													51.6	51.1	50.5	49.8	49.1

RF INPUT

Input Level Range per Unmodulated Analog Channel	15 to 22 dBmV
Operational Bandwidth	50 to 1003 MHz
Frequency Response	<1 dB peak-to-valley
RF Attenuator Adjustment Range	10 dB
Impedance	75 Ω
Return Loss	> 16 dB (50 - 870MHz) > 14dB (870 - 1003 MHz)
Level Control	Manual (MGC) / Automatic (AGC) Auto set-up feature

USER INTERFACE

Front Panel	
Bi-state Status LED	Normal = Green, Alarm = Red
Module Selection Indicator	Yellow LED
RF Attenuation Adjustment	
Monitor Point	
Laser RF Drive Monitor	
Flatness	± 1.0 dB
Return Loss	> 16 dB
Connector Type	Female F
Level	-20 ± 1.5 dB below input

NETWATCH™ ELEMENT MANAGEMENT SYSTEM

HEM Interface	RS-485, RS-232C connectors (in HLP 4200)
Carrier	Externally generated

POWER REQUIREMENTS

Nominal	+24 VDC, supplied by HLP 4200 bus
Consumption	22 Watts maximum

ENVIRONMENTAL

Operating Temperature Range ³	0° to 50° C 32° to 122° F
Storage Temperature Range	-40° to 70° C -40° to 158° F
Relative Humidity	Maximum 85% non-condensing
Software over temperature laser protection	

PHYSICAL

Dimensions (WxHxD)	1.3" x 4.4" x 12.7" 3.3cm x 11.2cm x 32.2cm
Weight	2.1 lbs / 0.95 kg
Mounting	HLP 4200 platform; via HMC module carrier
Optical connector type	SC/APC ⁵
RF connector type	Standard F, RG-59 cable type (accepts 0.64-0.8 mm center conductor diameter)

Notes:

1. Channel loading: 78 unmodulated System M (NTSC) channels 55-550 MHz with 75 QAM256 (550-1003MHz) channel at -6 dBc.
2. Pre-FEC BER maximum 10^{-6}
3. Optical link defined as PWRLink II transmitter + 100% fiber link + HRM 3811 receiver.
4. For operation over entire temperature range, subtract 3 dB from CSO and 2dB CTB.
5. SC/APC is the connector type recommended by Harmonic. Other connector types available upon request.

AMERICAS

Americas Sales Headquarters

549 Baltic Way
Sunnyvale, CA 94089 U.S.A.
T 1 800 828 5521 inside the U.S.
+1 408 542 2559 outside the U.S.
F +1 408 490 6001

Harmonic - Latin America

T +1 760 751 3543
F +1 760 751 3508

ASIA-PACIFIC

Harmonic (Asia Pacific) Limited

Suite 703-704, Sun Life Tower
The Gateway, 15 Canton Road
Tsimshatsui, Kowloon Hong Kong
T +852 2116 1119
F +852 2116 0083

**Harmonic International Inc. Beijing
Representative**

Suite 912, East Wing Block 1, Office Tower
Beijing Capital Times Square
No. 88 West Chang'an Ave.
Beijing, China 100031 China
T +86 10 8391 3313
F +86 10 8391 3688

EMEA

**U.K., Northern/Central Europe,
Middle East and South Africa
Headquarters**

250 Fowler Avenue, Ground Floor
IQ Farnborough
Farnborough Hampshire GU14 7JP
United Kingdom
T +44 (0)1 252 555 400
F +44 (0)1 252 377 171

France, Benelux and Southern Europe

Continental Square, 4 Place de Londres
Saturne Building, 2nd Floor
Roissy CDG Cedex, 95727 France
T +33 1 49 19 57 70
F +33 1 49 19 57 90

Africa, India, Russia and CIS Countries

10 Haamel St
Park Afek
Rosh Ha'ayin, 48092 Israel
T +972.3.9007777
+972.3.9007800
F +972.3.9007766