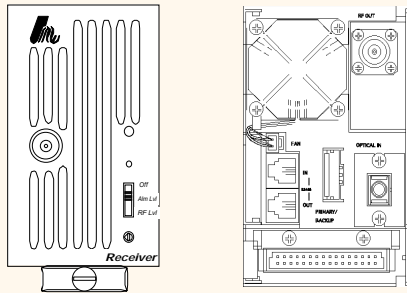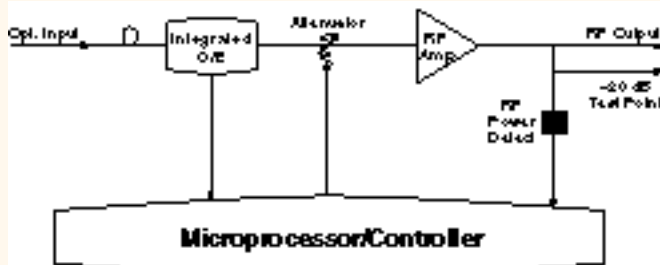## Optical Receiver Module

Product Description

The HRM 3810 is an optical receiver module for the HLP 4000/4200 Platform. This module complements Harmonic's PWRLink™ and MAXLink™ transmitters which also mount in this platform. The receiver's features make it ideal for supertrunk links and hub interconnects.

The HRM 3810 uses state-of-the-art GaAs amplifiers for low noise, excellent distortion levels, and superior flatness. These amplifiers allow for output levels in excess of 38 dBmV, while achieving the performance required for supertrunk links and headend to hub interconnections.

Reliable networks require redundant architectures. The HRM 3810 has been designed to support primary and backup links. The unit can monitor the total RF output power and generate an alarm when the output falls below a user-defined threshold. Alarms are also generated from low optical input power and failure of critical internal circuits. Alarm messages can be viewed via the alphanumeric display on the front panel of the HLP 4000/4200 WD, or via Harmonic's NETWatch™ Element Management System (EMS). All alarms light a red LED on the front panel.

Standard Configuration

Each unit is defined during installation to have either a primary or backup personality. A primary receiver module will control both a backup module and an RF switch. If the RF output level of the primary receiver drops below the set threshold, the RF path is automatically switched to the backup receiver via the RF switch. When the primary route is restored, the path will switch back. The RF path can also be forced to either primary or backup via the HLP 4000/4200 or the NETWatch system.

A limitation of complex architectures is the possibility of inadvertently breaking status monitoring communications by switching of the RF path. Restoring service would normally require sending a service technician into the field to switch the network to restore communications. The HRM 3810 includes intelligent EMS communications switching between primary and backup receiver modules. Both units will negotiate EMS communications between themselves, independent of the RF path in use. The chosen communication route will then be used to monitor and control all devices connected via the RS-485 bus. This allows remote changes to reactivate with the RF path, even if the network is unintentionally switched into a state which obstructs the RF path.

Advantages

The design and operation of the HRM 3810 optical receiver module provide users with many advantages:

- 15 to 870 MHz bandwidth allows use for forward and return in a wide variety of systems.
- Optical inputs up to +5 dBm provide high performance for supertrunk links.
- Full use of the alphanumeric display on the HLP 4000/4200 WD to assist in set up, for alarm message display and for status indication.
- Interstage pad to set RF output provides control via the front panel, the HLP 4000/4200 WD, or the NETWatch system.
- Outstanding noise, distortion and flatness levels for high-performance supertrunk optical links.
- Output levels of over 40 dBmV eliminate the need for post amplifiers.
- RF power detector on the output with power indicated on the HLP 4000/4200 WD and via the NETWatch system allows for redundant switching.
- Automatic negotiation of EMS communications between primary and backup receivers. If either unit loses EMS communication, the other will take over. This switching is independent of the RF path.
- Can be used as either a forward path or a return path receiver.
- Full interface to Harmonic's NETWatch system.

Applications

- AM supertrunking
- Headend interconnections
- Redundant architectures

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Models Available

Standard:
HRM 3810-AS: SC/APC connector
Also available:
HRM 3810-US: SC/UPC connector
HRM 3810-UF: FC/UPC connector
HRM 3810-AF: FC/APC connector
HRM 3810-AE: E-2000 connector

Optical Input

Optical input range: +5 dBm
Wavelength: 1250 to 1600 nm
Return loss: > 40 dB
Noise: 6 pA/ Hz
Responsivity: 0.85 A/W minimum

RF Output

Output level: > 41 dBmV/channel[1]
C/N: > 59 dB[2, 3]

	Optical Input, dBm			
	+5	+3	0	–3
C/CSO[2, 3]	62	73	78	>80
C/CTB[2, 3]	75	>85	>85	>85

Operational bandwidth: 15 to 870 MHz
Flatness: ±0.7 dB
Slope: < 0.5 dB
Output stability: ±1.5 dB
Impedance: 75
Connector: F-Type (accepts 0.51 to 1.07 mm center conductor diameter)
Return loss: > 16 dB
Gain control range: > 10 dB
Monitor point:
Level: –20 dB +1/–2 dB
Connector: Male GSK

User Interface

Front panel: Three position switch and a control to set RF output level and RF alarm threshold (used only for HLP 4000/4200 ND platform), status LED, and alarm LED.
Top panel: Switches to set primary backup personality and forward/return path.
Rear panel: Optical input, RF output, connector for backup switching, RS-485 in, and RS-485 out.

HLP 4000/4200WD and NETWatch Interface

Status: Model, serial number, firmware version, optical input level in dBm, RF output detector level, mode (auto/force RF to primary/force RF to backup), in (not in) RF path, EMS communications (not) through unit, primary/backup personality, forward/return path, RF pad, RF alarm threshold.
Diagnostics: Power supply voltages, unit temperature, and fan speed.
Adjustments: Set mode (auto/force RF to primary/force RF to backup), set RF alarm threshold, set RF pad, set wavelength, and return to factory settings.
Alarms: As appropriate — received optical power, RF output level below threshold, temperature alarm, fan alarm, and power supply voltages.

Power Requirements

24 VDC obtained from HLP 4000/4200 platform
Consumption: < 25 W

Environmental

Operating temperature range: –20° to 60° C / –4° to 140° F
Relative humidity: 85% non-condensing

Physical

Dimensions: 11.7″ L x 4.37″ H x 2.616″ W / 29.7 cm L x 11.1 cm H x 6.64 cm W
Weight: 3.6 lbs./1.7 kg
Mounting: HLP 4000 or HLP 4200

Notes:
1. *0 dBm optical input at 3.7% modulation index per channel. RF pad at 0 dB.*
2. *77 System M channels.*
3. *At 38 dBmV/ch output, receiver only. Link performance is dependent on both the transmitter and receiver. See the appropriate transmitter data sheet for optical link performance.*