

AC810 1.2 GHZ OPTICAL NODE



AC810 is a dual active output node designed for FTTLA solutions.

The output amplifier stages are based on high performance 1.2 GHz GaN hybrids, which ensures highest possible signal quality and high output level. Interstage gain can be controlled in two positions, which results in wide operational dynamic range. The first stage is adjusted by OLC function. The second slot(s) can be controlled with plug-in attenuator and equaliser modules.

The integrated microcontroller takes care of OLC and monitors RF levels, laser bias current, temperature and supply voltages and transmits alarm data to the head end. Status leds for optical power and RF levels provide status information for true plug-and-play installation.

Fibre organizing is made in the lid, which includes splice organizer with 12 holders, connector holders and fibre in/out ports.

Features

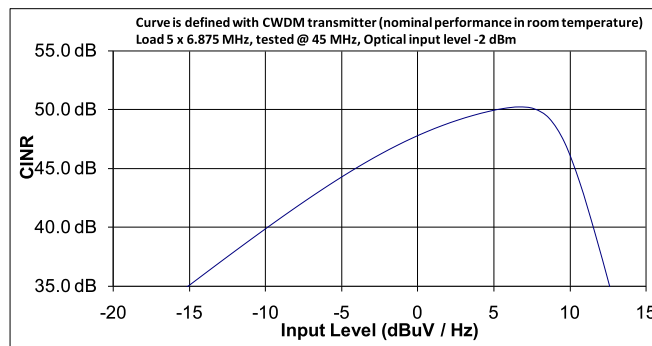
- Docsis 3.1 ready: 204/1218 MHz
- GaN HEMT and GaAs pHEMT technology in use
- Remote power supply with PFC
- Optional 3rd output port
- Optimised fibre and splice organizer in the lid
- Efficient surge and ESD protection
- FP, DFB and CWDM upstream laser options
- Integrated performance monitoring
- Integrated microcontroller enabling true plug-and-play installation:
 - OLC function with temperature compensation
 - Optical input power measurement and local alarm with led
 - RF power measurement for both outputs and local alarm with led
 - Optical transmitter laser current measurement
 - Supply voltage measurement
 - Temperature measurement
 - All alarms and & measurement values are transmitted to headend

Technical specifications

Parameter	Specification	Note
Downstream signal path		
Light wavelength	1290...1600 nm	
Optical input power range	-8...-2 dBm	1)
Frequency range	85...1218 MHz	
Return loss	18 dB	2)
Gain limited output level	2 x 117.5 dB μ V	3)
OLC control range	12 dB	4)
Gain adjustment	20 dB	5)
Mid-stage slope	14 dB	6)
Flatness	\pm 0.4 dB	7)
Test points	-20 dB	8)
Noise current density	6 pA / \sqrt Hz	9)
$U_{\max(112 \text{ QAM channels})}$ @1 GHz	111.5 dB μ V	10)
$U_{\max(138 \text{ QAM channels})}$ @1.2 GHz	108.5 dB μ V	
CTB 41 channels	116.0 dB μ V	11)
CSO 41 channels	116.0 dB μ V	11)
Upstream signal path		
Frequency range	15...204 MHz	
Return loss	18 dB @ f > 15 MHz	
Input level	70.0 dB μ V	12)
OMI TP	-10 dB	13)
CINR	> 48 dB	14)
Filtering, high pass	15 MHz	15)
Data transmitter		
Data carrier frequency	10.7 MHz	
Modulation method	FSK, 38400 bps	
Channel bandwidth	0.4 MHz	16)
Transmit level	60 dB μ V	17)
Measurements		
Optical power measurement inaccuracy	< 0.5 dBm	18)
RF output power measurement inaccuracy	< 2 dB	
Temperature measurement inaccuracy	< 2 °C	19)
General		
Power consumption (65 & 90 / 230 V _{AC})	36.0 / 38 W	
Supply voltage	27...65 / 40...90 / 205...255 VAC	20)
Maximum current feed through	7.0 A / port	
Hum modulation	70 dB	21)
Optical connectors	SC/APC 8 degrees	
Output connectors	5/8" or 3.5/12" (PG11 hole at housing)	
Test point connectors	F female	
Dimensions	245 x 255 x 145 mm	h x w x d
Weight	4.5 kg	
Operating temperature	-40...+55 °C	
Class of enclosure	IP 54	
EMC	EN50083-2	
ESD	4 kV	22)
Surge	6 kV (EN 60728-3)	

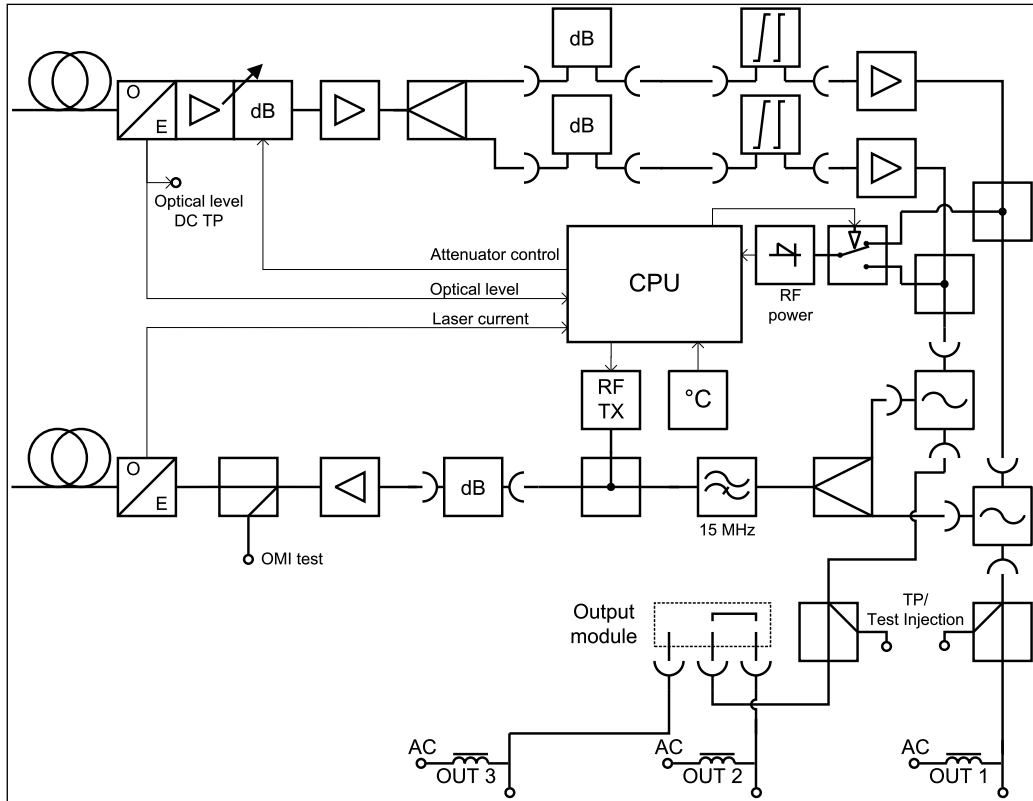
Notes

- 1) The OLC limited operation range. Higher optical input powers are possible, but all signal quality parameters are not verified in manufacturing.
- 2) The limiting curve is defined at 80 MHz -1.5 dB / octave.
- 3) This is the nominal output level when OMI is 4.0%. The level is available with -8 dBm optical input power. The used wavelength is 1310 nm.
- 4) OLC in the first mid-stage position can keep the RF level constant.
- 5) JDA type plug-in attenuators in use. Both outputs can be adjusted separately.
- 6) The slope is valid between 85...1218 MHz. TNE020 cable equalizer is in use.
- 7) Typical value. The guaranteed value is ± 0.75 dB. Flatness is defined with nominal slope, JDA900 and CXF065 plug-in modules.
- 8) Output TPs are from a directional coupler and has a ± 0.75 dB tolerance.
The output test point can be used as an injection point for return path test signal.
- 9) This is a typical value.
- 10) Typical value according to IEC60728-3-1. Channels have 10 dB cable equivalent slope between 110...1006 MHz and signal level has been defined at 1002 MHz. BER measurement has been done on the worst channel between 110...1006 MHz.
- 11) EN50083-3. Optical input power is -5 dBm and the OMI is 4.0%. The output was 8 dB cable equivalent sloped between 100...862 MHz. All results are typical values in room temperature.
- 12) 8% OMI is reached with the input level of 70.0 dB μ V.
- 13) 60 dBuV at TP equals 8% channel OMI.
- 14)



- 15) High pass filter typically > -1 dB @ 15 MHz, < -20 dB @ 10.7 MHz.
- 16) Typically < -45 dBc @ channel edge.
- 17) This is equivalent to -10 dB offset to upstream signals with the level of 70 dB μ V. Transmit level inaccuracy is < 3 dB.
- 18) Between -8...+2 dBm. Defined with 1310 nm.
- 19) Internally measured temperature is typically 20...30 °C higher than ambient temperature, depending on installation.
- 20) 40...90 VAC power supply is purposed only for quasi-square wave form supply voltage.
- 21) At any frequency from 10 to 1218 MHz when the remote current is less than 6 A.
12 A is the maximum current, which can be locally injected through all 3 ports together.
- 22) EN61000-4-2, contact discharge to enclosure and RF-ports.

Block diagram



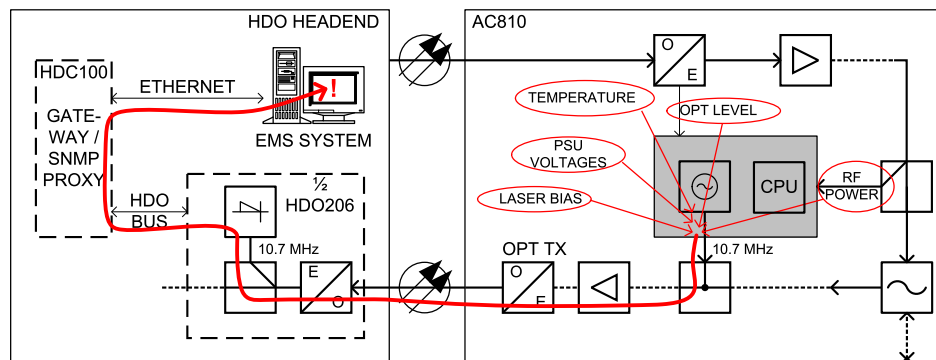
Local and remote monitoring

Monitoring principle

AC810 microcontroller continuously measures optical input power, RF level for both outputs, temperature, local PSU voltages and return transmitter laser bias current. If these values are outside allowed window, an alarm is displayed locally with leds and sent to head end using built-in FSK data transmitter operating at 10.7 MHz.

HDO206 return receiver module in the headend monitors the data carrier and extracts node status information from it. This status information, together with signal missing / corrupted data, is presented with HDO206's flags and can be accessed via HDO206 user interface. Alarm history is also stored by HDO206.

HDC100 controller module continuously monitors all HDO modules including HDO206 via HDO bus. It acts as a gateway between HDO bus and Ethernet, enabling alarm data transfer to CATVisor EMS system. HDC100 can also act as a SNMP proxy for HDO modules, allowing use of 3rd party EMS systems.



User interface

When AC810 is installed, optical power and RF output power status can be seen from front panel "Optical input" and "RF output" leds. "All green" indicates successful installation.

If needed, the RF output power alarm limits can be set to match measured RF output power with >2 s pushbutton press. Factory default alarm limits can be restored with >5 s pushbutton press. RF output measurement can be disabled with >10 s pushbutton press, which is indicated with dark "RF output" led.

Monitored parameters

Parameter	Value	Local indication	Remote alarm
Optical power	> +1.5 dBm	Blinking red	Optical power critical
	-1.5...+1.0 dBm	Yellow	Optical power high
	-8.0...-2.0 dBm	Green	-
	< -8.5 dBm	Red	Optical power low
RF output power (factory setting)	RF 1 & 2 power > ~+6 dBm	Green	-
	RF 1 or 2 power < ~+5 dBm	Red	RF 1/2 low
RF output power (user setting)	RF 1 & 2 within stored value ±3 dB	Green	-
	Otherwise	Red	RF 1/2 low/high
Laser current	> 95 mA	-	Laser current high
	10...90 mA	-	-
	< 5 mA	-	Laser current low
Temperature	> 85 °C	-	Temperature critical
	75...83 °C	-	Temperature high
	< 73 °C	-	-
Power supply	+12V@11-13 V, +24V@ 22-26 V	-	-
	Otherwise	-	Power supply alarm

Ordering information

AC810 configuration map

	1-	2-	3-	4-	5-	6-	7-	8-	9-
	1 2 3	1 2 3	1	1	1 3	1	1	1 2 3	1
AC810			-						

<p>1-1 Platform type</p> <p>B Standard 1.2 GHz</p>	<p>5-1 Return path transmitter (+ 3 dBm)</p> <p>40 FP 1310 nm (+1 dBm)</p> <p># DFB 1310 nm</p> <p># CWDM 1450 nm</p> <p>47 CWDM 1470 nm</p> <p>49 CWDM 1490 nm</p> <p>51 CWDM 1510 nm</p> <p>53 CWDM 1530 nm</p> <p># CWDM 1550 nm</p> <p>57 CWDM 1570 nm</p> <p>59 CWDM 1590 nm</p> <p>61 CWDM 1610 nm</p>
<p>1-2 Power supply</p> <p>A Local powering, euro plug (230 VAC)</p> <p>B Remote powering with cable clamp (65 VAC)</p> <p>C Remote powering with cable clamp (90 VAC)</p> <p>H Customer specific option 1</p>	<p>5-3 Optical connectors</p> <p>D SC/APC, 8 deg.</p>
<p>1-3 Fiber organizing</p> <p>C Standard fibre organiser (optical input at lid)</p> <p>D AC800 FTTLA Upgrade kit (No lid+fibre organizer incl.)</p>	<p>6-1 Optical filter</p> <p>F1 1551 add / drop filter, SC/APC 8 deg.</p> <p>XX None</p>
<p>2-1 Output 1 connection (first from right)</p> <p>A PG11</p> <p>B 5/8"</p> <p>C IEC</p> <p>D 3.5/12</p> <p>E F</p>	<p>7-1 Reserved for future</p> <p>X None</p>
<p>2-2 Output 2 connection</p> <p>A PG11</p> <p>B 5/8"</p> <p>C IEC</p> <p>D 3.5/12</p> <p>E F</p>	<p>8-1 Forward path mid-stage plugs</p> <p>A 2 x JDA903 + 2 x TNE020 (1.2GHz)</p> <p>B 2 x JDA901 + 2 x TFE820 (862MHz)</p> <p>C 2 x JDA901</p> <p>X None</p>
<p>2-3 Output 3 connection (first from left)</p> <p>A PG11</p> <p>B 5/8"</p> <p>C IEC</p> <p>D 3.5/12</p> <p>E F</p> <p>X None (closed port)</p>	<p>8-2 Return path input plug</p> <p>A JDA900</p>
<p>3-1 Reserved for future</p> <p>X None</p>	<p>8-3 Output 2 splitter</p> <p>A 0 dB (AC6120)</p> <p>B 2-way splitter (AC6124)</p> <p>X None</p>
<p>4-1 Diplexer filters</p> <p>A 65/85 MHz (2 x CXF065)</p> <p>B 85/105 MHz (2 x CXF085)</p> <p>C 204/258 MHz (2 x CXF204)</p> <p>X None</p>	<p>9-1 Reserved for future</p> <p>X None</p>