

## AC8810 INTELLIGENT FIBRE OPTIC PLATFORM



The AC8810 is a dual active output intelligent optical node. It is based on 2 fixed receivers but modular upstream transmitters. The upstream signal path can also be fully redundant with double transmitter modules. When more segmentation is needed, both optical transmitters can be fed with separate individual return path signals. The amplifier stages are based on high performance GaN hybrids, which makes the usable output level range especially wide. Node's dual power supplies increase the reliability of the node.

AC8810 has a USB connector for local configuration with a Windows PC/tablet or Android smartphone/tablet and supports wireless connectivity with AC6901 Bluetooth adapter. It is equipped with a plug-in module slot for transponder module. The transponder unit allows full remote monitoring and control of all node parameters. It can measure the levels of both forward and return path signals and enables the automatic forward and return path alignment functionality.

Fully user configurable automatic level control (ALC) keeps output level constant, while forward path spectrum analyser and return path ingress analyser features aid in network monitoring and troubleshooting.

### Features

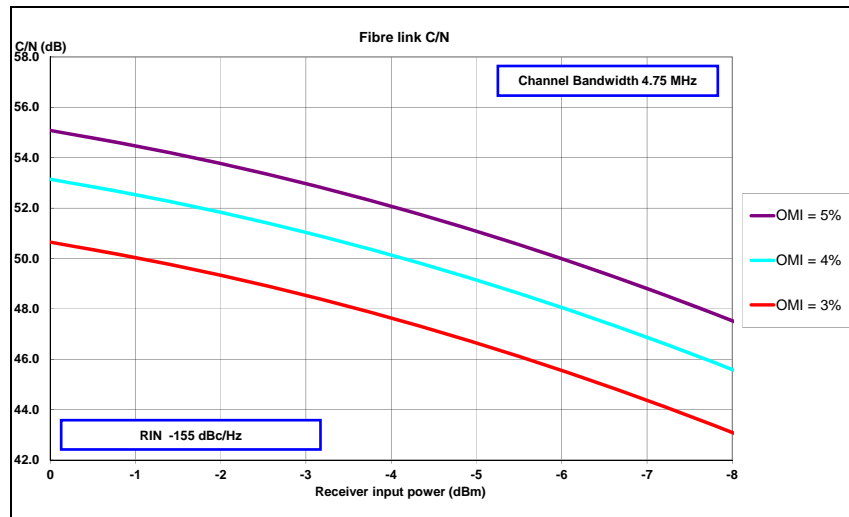
- 1.2 GHz GaN amplifiers
- Return path supports 204 MHz bandwidth
- Local push button user interface and LED display
- Automatic alignment of both forward and return path
- Redundant power supply
- Electrical control of return path signal combining
- Efficient surge and ESD protection
- Redundant power supply
- Electrical level and slope controls
- With AC6992/AC6981 transponder plug-in:
  - CATVvisor / HMS (AC6992) or DOCSIS (AC6981) remote connection
  - ALC with fully user programmable pilots
  - Forward path spectrum analyser
  - Return path signal quality monitoring with automatic ingress control
  - True plug-and-play with single pushbutton alignment
  - Return path pilot generator (AC6992)

Technical specifications

Parameter	Specification	
<b>Downstream signal path</b>		
Light wavelength	1290...1610 nm	
Optical input power range	-8...0 dBm	
Frequency range	85...1218 MHz	
Return loss	18 dB	1)
Gain limited output level	2 x 118 dB $\mu$ V	2)
Input gain control (OLC)	0...-26 dB	
Mid-stage gain control	0...-30 dB	3)
Mid-stage slope control	0...20 dB	4)
Flatness	$\pm$ 0.5 dB	5)
Group delay	2 ns	6)
Test point	-20 dB	7)
Transponder connection	-19 dB	8)
Noise current density	6.0 pA/ $\sqrt$ Hz	9)
U <sub>max</sub> (112 x QAM channels) @ 1 GHz	113.0 dB $\mu$ V	10)
U <sub>max</sub> (138 x QAM channels) @ 1.2 GHz	111.5 dB $\mu$ V	
CTB 41 channels	116.0 dB $\mu$ V	11)
CSO 41 channels	117.0 dB $\mu$ V	11)
<b>Upstream signal path</b>		
Frequency range	5...204 MHz	
Return loss	18 dB	
Ingress switching	0 / -6 / < -45 dB	
Input level	57 dB $\mu$ V	12)
CINR	> 52 dBc	13)
OMI adjustment	0...-20 dB	
OMI test point	-5 dB	14)
Transponder connection	-38 dB	15)
Isolation between US paths	> 55 dB	
<b>General</b>		
Power consumption	44 W	16)
Current need	see note	16)17)
Supply voltage	27...65 VAC (sinus or square wave) 45...90 VAC (square wave) 230 VAC	
Maximum current feed through	8.0 A / port	
Hum modulation	70 dB	18)
Optical connectors	SC/APC, FC/APC, E-2000	
Output connectors	PG11	
Test point connectors	F female	
Dimensions	245 x 255 x 155 mm	h x w x d
Weight	5.0 kg	
Operating temperature	-40...+55 °C	
Class of enclosure	IP 54	
EMC	EN50083-2	
ESD	4 kV	19)
Surge	6 kV (EN 60728-3)	

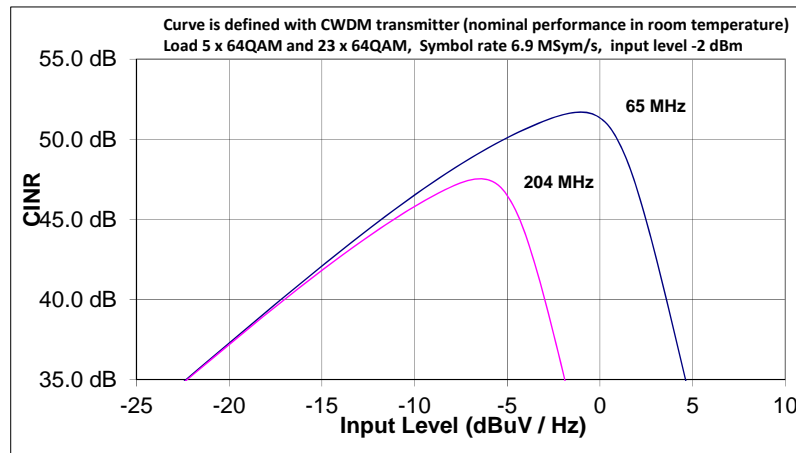
Notes

- 1) The limiting curve is defined at 40 MHz -1.5 dB / octave. Return loss is always better than 13 dB.
- 2) This is the gain limited output level when OMI is 4.0 %. The level is available with the optical input power of -8 dBm . The used wavelength is 1310 nm.
- 3) Step size is 0.1 dB. This control range consists of ALC adjustment and mid-stage gain control. Maximum level difference between outputs can be 10 dB.
- 4) Step size is 0.5 dB. Slope is defined between 85...1218 MHz. Flatness spec is guaranteed when slope is less than 16 dB..
- 5) Typical value in room temperature. Guaranteed value is  $\pm 0.75$  dB.
- 6) Typical value for 4.43 MHz band,  $f > 120$  MHz. CXF065 diplex filters are in use.
- 7) TP has a tolerance of  $\pm 0.75$  dB between 85...862 MHz and  $\pm 1.0$  dB between 862...1218 MHz.
- 8) Level difference between transponder connection and output 1. Tolerance  $\pm 0.5$  dB.
- 9) This is a typical value. Corresponding C/N curves can be seen in the picture.

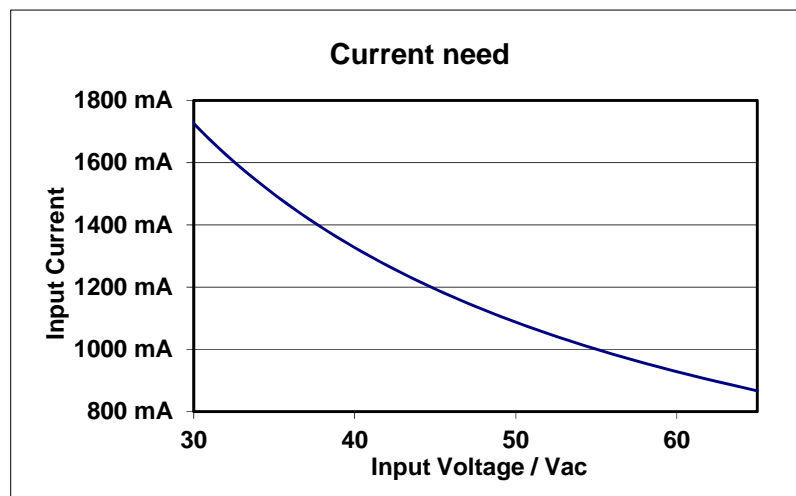


- 10) Typical value according to IEC60728-3-1. Channels have 13 dB cable equivalent slope between 110...1218 MHz and signal level has been defined at 1002 MHz. BER measurement has been done on the worst channel between 110...1006 MHz.
- 11) EN50083-3. Node output was 8 dB cable equivalent sloped and optical level was -7 dBm. All results are typical values in room temperature.
- 12) Nominal input level for 4.0 % OMI. Defined at the output connector of the node.

13) CINR



- 14) - 5 dB is valid if ingress switch and US input attenuator are set to 0 dB. The nominal value at this TP is 52 dB $\mu$ V when OMI is set to 4 %. Tested at 20 MHz.
- 15) This is the level difference between return path input and transponder transmit pin when return path attenuation is 0 dB. This value increases linearly with increasing return path attenuation.
- 16) Power consumption and current are given with AC6992 transponder and with 2 pcs of optical TX.
- 17)



- 18) 70 dB hum value is valid at any frequency from 10 to 1218 MHz, when the remote current is less than 7.0 A/ port. With 8 A current hum is 60 dB. 16.0 A is the maximum current, which can be locally injected into both ports together.
- 19) EN61000-4-2, contact discharge to enclosure and RF-ports.

Compatibility

All accessories that will be used together with this product should use the latest generation available. By using only up-to-date accessories a proper operation can be ensured.

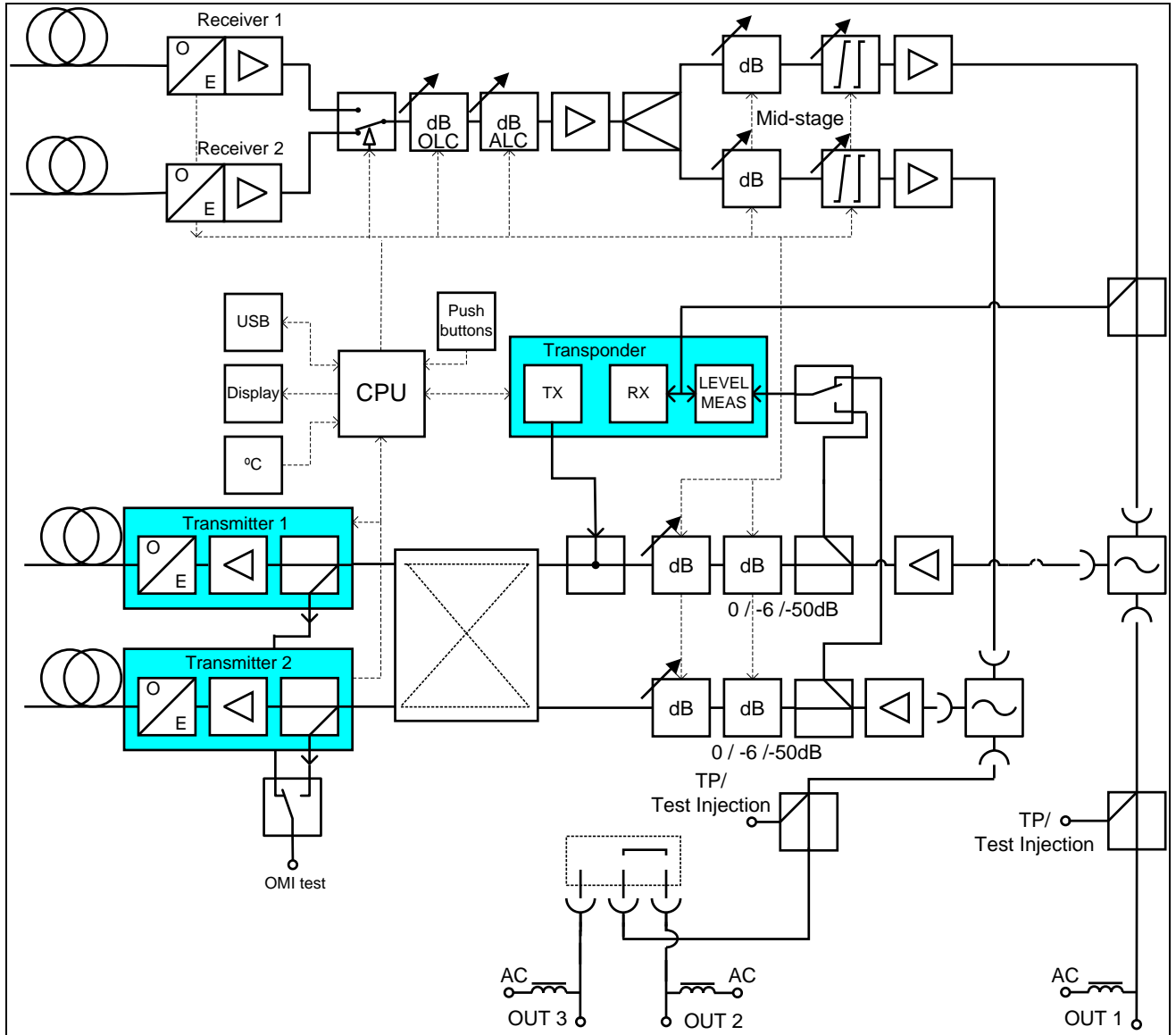
## Monitoring functions

- Status LED for alarm indication
- Return path ingress switches on / attenuated / off control
- Remote AC voltage measurement with alarms
- Local voltage measurements with alarms
- Internal temperature measurement with alarms
- Full electrical control of all forward and return path alignments
- OMI based forward path automatic alignment
- OMI based return path automatic alignment
- Uptime, total uptime and reset counters for power outage statistics
- Fully user configurable alarm limits, severities and enabling
- User notes can be stored into non-volatile memory
- Alarm log stored into non-volatile memory for easy troubleshooting
- Node configuration and accessory information stored in non-volatile memory
- Local software update and settings transfer via USB also without powering
- Optical receiver input power measurement with alarms
- Optical transmitter laser bias current measurement with alarms
- Automatic or manual optical receiver selection
- Optical transmitter pilot generator enabling and frequency control
- Return path signal combining / separation control with automatic backup

### **Additional features available with AC6992 / AC6981 transponder:**

- Remote access to all AC8810 settings and monitored parameters
- ALSC and modem LEDs for alarm indication
- CATVisor and HMS compatible remote connection (AC6992)
- DOCSIS compatible remote connection (AC6981)
- Interstage gain control by ALC mode with saturation alarm
- ALC pilot frequencies, types, back-offs and decision levels are user programmable
- Automatic reserve pilot switching
- Pilot based forward path automatic alignment
- Full forward and return path automatic alignment with single button
- Lid status monitoring with alarm
- Service terminal connection monitoring with alarm
- Node configuration change monitoring with alarm
- Spectrum analyser for forward path level measurement with alarm
- Ingress analyser for return path level measurement with alarms
- Automatic ingress switch activation and deactivation based on detected ingress with alarms and user configurable delays
- Modem receive and transmit signal level monitoring with alarms (AC6992)
- Remote software update to multiple units simultaneously
- Return path pilot generator with 4 user programmable pilot frequencies and levels (AC6992)

Block diagram



Ordering information

Selection of optical passives (8-1) is defined detailed in separate specification document.

AC8810 configuration map

1-			2-				3-	4-	5-	6-			7-			8-	9-		10-	11-		
1	2	3	1	2	3	4	1	1	1	1	2	3	1	3	1	1	2	1	1	2	3	
AC8810																						
<b>1-1 Platform type</b> A Standard 1.2 GHz											<b>7-1 Return path transmitter TX2</b> 40 +1dBm FP 1310 nm (AC6740) 41 +3 dBm CWDM 1430 nm (AC6741) 42 +6 dBm CWDM 1430 nm (AC6742) 43 +3 dBm CWDM 1450 nm (AC6743) 44 +6 dBm CWDM 1450 nm (AC6744) 45 +3 dBm DFB 1310 nm (AC6745) 46 +6 dBm DFB 1310 nm (AC6746) 47 +3 dBm CWDM 1470 nm (AC6747) 48 +6 dBm CWDM 1470 nm (AC6748) 49 +3 dBm CWDM 1490 nm (AC6749) 50 +6 dBm CWDM 1490 nm (AC6750) 51 +3 dBm CWDM 1510 nm (AC6751) 52 +6 dBm CWDM 1510 nm (AC6752) 53 +3 dBm CWDM 1530 nm (AC6753) 54 +6 dBm CWDM 1530 nm (AC6754) 55 +3 dBm CWDM 1550 nm (AC6755) 56 +6 dBm CWDM 1550 nm (AC6756) 57 +3 dBm CWDM 1570 nm (AC6757) 58 +6 dBm CWDM 1570 nm (AC6758) 59 +3 dBm CWDM 1590 nm (AC6759) 60 +6 dBm CWDM 1590 nm (AC6760) 61 +3 dBm CWDM 1610 nm (AC6761) 62 +6 dBm CWDM 1610 nm (AC6762) XX None											
<b>1-2 Power supply</b> A Single PSU, 65 VAC (1x AC6310) B Double PSUs, 65 VAC (2 x AC6310) C Local powering, euro plug (230 VAC) D Customer specific option E Single PSU, 90 VAC F Double PSUs, 90 VAC											<b>7-3 Optical connector for transmitter TX2</b> A SC/APC, 9 deg. C E-2000 D SC/APC, 8 deg. X None											
<b>1-3 Fiber organizing</b> A Standard fibre organiser											<b>8-1 Optical passive (see detailed spec)</b> F1 WDM with 8 deg. SC/APC connectors F2 WDM with 8 deg. SC/APC connectors F3 2 x WDM with 8 deg. SC/APC connectors F4 2 x WDM with 9 deg. SC/APC connectors F7 WDM with 8 deg. E-2000 connectors F8 WDM with 8 deg. E-2000 connectors F9 WDM with 8 deg. E-2000 connectors XX None											
<b>2-1 Fibre feed-through adapter</b> E 5/8 Adapter (KDC316) G 1-4 fibres (KDO900) X None											<b>9-1 Accessories</b> X None											
<b>2-2 Output 3 connection</b> A PG11 B 5/8" C IEC D 3.5/12 E F X None (PG11 sealing plug)											<b>9-2 Reserved for future</b> X None											
<b>2-3 Output 2 connection</b> A PG11 B 5/8" C IEC D 3.5/12 E F											<b>10-1 Transponder module</b> E Transponder and ALSC module (AC6992) G DOCSIS transponder (AC6991) X None											
<b>2-4 Output 1 connection (first from right)</b> A PG11 B 5/8" C IEC D 3.5/12 E F											<b>11-1 Transponder communication protocol</b> A CAT/visor compatible B HMS/SNMP compatible											
<b>3-1 Optical connector for receiver RX1</b> A SC/APC, 9 deg. C E-2000 D SC/APC, 8 deg.											<b>11-2 Settings</b> X Factory default A Customer specified (ECML file)											
<b>4-1 Optical connector for receiver RX2</b> A SC/APC, 9 deg. C E-2000 D SC/APC, 8 deg.											<b>11-3 Product keys (software features)</b> X None A Auto alignment, spectrum and ingress analyzer, pilot generator B Optical receiver 2 activation C A + B											
<b>5-1 Diplexer filter</b> D 65/85 MHz (2 x CXF065) G 65/85 MHz (2 x CXF065 19) H 85/105 MHz (2 x CXF085) I 85/105 MHz (2 x CXF085 18) NA J 204/258 MHz (2 x CXF204) X None																						
<b>6-1 Return path transmitter TX1</b> 40 +1dBm FP 1310 nm (AC6740) 41 +3 dBm CWDM 1430 nm (AC6741) 42 +6 dBm CWDM 1430 nm (AC6742) 43 +3 dBm CWDM 1450 nm (AC6743) 44 +6 dBm CWDM 1450 nm (AC6744) 45 +3 dBm DFB 1310 nm (AC6745) 46 +6 dBm DFB 1310 nm (AC6746) 47 +3 dBm CWDM 1470 nm (AC6747) 48 +6 dBm CWDM 1470 nm (AC6748) 49 +3 dBm CWDM 1490 nm (AC6749) 50 +6 dBm CWDM 1490 nm (AC6750) 51 +3 dBm CWDM 1510 nm (AC6751) 52 +6 dBm CWDM 1510 nm (AC6752) 53 +3 dBm CWDM 1530 nm (AC6753) 54 +6 dBm CWDM 1530 nm (AC6754) 55 +3 dBm CWDM 1550 nm (AC6755) 56 +6 dBm CWDM 1550 nm (AC6756) 57 +3 dBm CWDM 1570 nm (AC6757) 58 +6 dBm CWDM 1570 nm (AC6758) 59 +3 dBm CWDM 1590 nm (AC6759) 60 +6 dBm CWDM 1590 nm (AC6760) 61 +3 dBm CWDM 1610 nm (AC6761) 62 +6 dBm CWDM 1610 nm (AC6762) XX None											<b>6-3 Optical connector for transmitter TX1</b> A SC/APC, 9 deg. C E-2000 D SC/APC, 8 deg. X None											