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**AC8710 INTELLIGENT 1.2 GHZ OPTICAL NODE**

The AC8710 is an intelligent dual active output node for deep fibre solutions. It is based on fixed receiver but modular return path transmitter. Output amplifier stages use high performance GaN hybrids, which makes the usable output level range especially wide.

AC8710 has a USB connector for local configuration with a PC or mobile device. It has a slot for transponder module, which allows full remote monitoring and control of all node parameters. The transponder unit measures the forward and return path signal levels and enables the automatic forward and return path alignment function.

Node's dual power supplies are monitored by the transponder and increase the reliability of the node. Fully user configurable automatic level control (ALC) keeps output levels constant and automatic ingress blocking reacts to unwanted return path signals.

**Features**

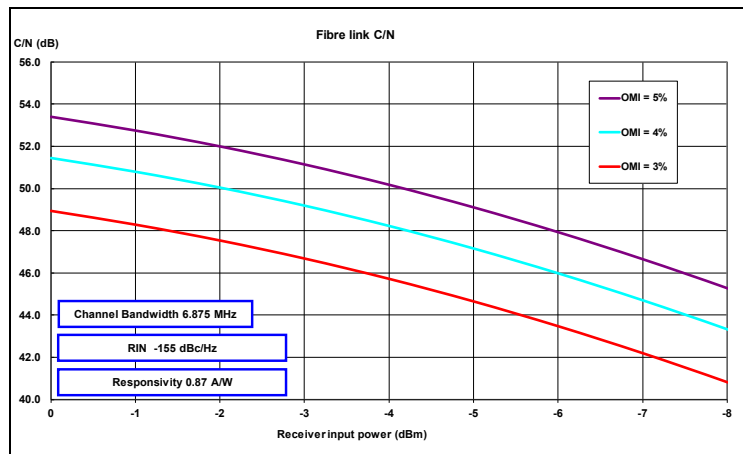
- 1.2 GHz GaN HEMT technology
- 204 MHz US band
- Improved power handling capacity in housing
- Automatic alignment of both forward and return path
- Efficient surge and ESD protection
- Redundant power supply
- Electrical level and slope controls
- With AC6992/AC6981 transponder plug-in:
  - CATVisor / 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>Forward 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	0...-26 dB	3)
Interstage gain control	0...-15 dB	4)
Slope control	0...20 dB	5)
Flatness	$\pm$ 0.5 dB	6)
Group delay	2 ns	7)
Test point	-20 dB	8)
Transponder connection	-19 dB	9)
Noise current density	6.0 pA/ $\sqrt$ Hz	10)
$U_{\max}$ (112 x QAM channels) @ 1 GHz	114.0 dB $\mu$ V	11)
$U_{\max}$ (138 x QAM channels) @ 1.2 GHz	111.5 dB $\mu$ V	
CTB 41 channels	118.5 dB $\mu$ V	12)
CSO 41 channels	119.0 dB $\mu$ V	12)
<b>Return path</b>		
Frequency range	5... 204 MHz	
Return loss	18 dB	13)
Flatness	$\pm$ 0.5 dB	13)
Ingress switching	0 / -6 / < -45 dB	
Input level	57.0 dB $\mu$ V	14)
CINR	See curves	15)
OMI adjustment	0...-20 dB	
OMI test point	-5 dB	16)
Transponder connection	-37 dB	17)
<b>General</b>		
Power consumption	44 W	18)
Current need	see note	19)
Supply voltage	27...65 VAC (sine or square wave) 45...90 VAC (square wave) 230 VAC	
Maximum current feed through	12.0 A / port	
Hum modulation	70 dB	20)
Optical connectors	SC/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	IEC 60728-2	
ESD	4 kV	21)
Surge	6 kV (EN 60728-3)	

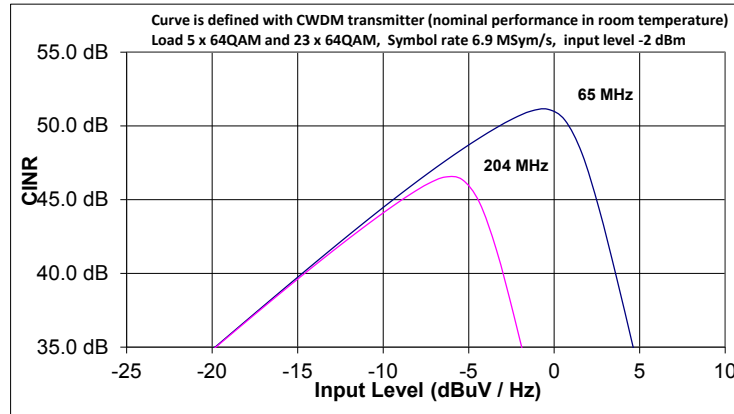
**Notes**

- 1) The limiting curve is defined at 40 MHz -1.5 dB / octave. Return loss is always > 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 0.5 dB. This control is used by OLC.
- 4) Step size is 0.2 dB. This control is used by ALC. Flatness spec is guaranteed when attenuation is less than 13 dB.
- 5) Step size is 0.5 dB. Slope is defined between 85...1218 MHz. Flatness specification is not valid for >15 dB slope values and accuracy may be worse.
- 6) Typical value in room temperature with closed lid and installed US transmitter. Guaranteed value is ±0.85 dB.
- 7) Typical value for 4.43 MHz band. Measured at channel S2 when 65 or 85 MHz return path is in use. At higher frequencies the performance is better.
- 8) TP has a tolerance of ±0.75 dB between 85...862 MHz and ±1.0 dB between 862...1218 MHz.
- 9) Level difference between transponder connection and output 1. Tolerance ±0.5 dB.
- 10) Typical C/N curves can be seen in the graph below.

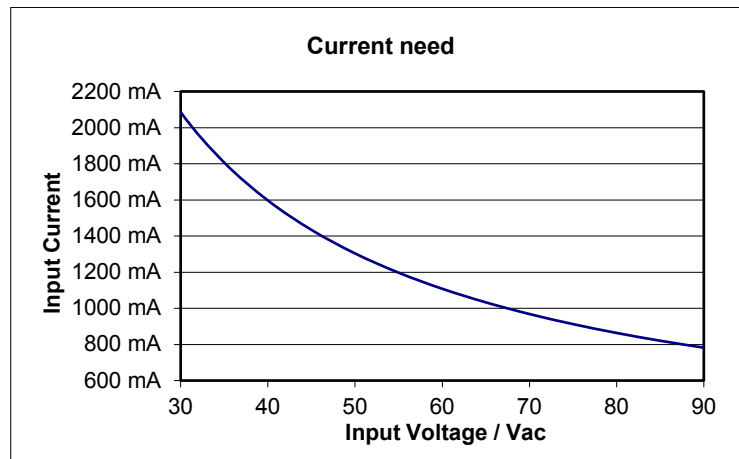


- 11) Typical value according to IEC60728-3-1. Channels have 13 dB cable equivalent slope between 110...1218 MHz and signal level defined at 1002 MHz. BER measurement on the worst channel between 110...1006 MHz. Umax values can be met also when power save is activated.
- 12) EN50083-3. Node output 10 dB cable equivalent sloped and optical input level -2 dBm. All results are typical values in room temperature.
- 13) Valid after 8 MHz.
- 14) Nominal input level for 4.0 % OMI. Defined at the output connector of the node.

15)



- 16) -5 dB is valid with 0 dB ingress switch and 0 dB input attenuator.  
The nominal value at this TP is 52 dBμV when OMI is set to 4 %. Tested at 20 MHz.
- 17) 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.
- 18) Power consumption is given with transponder (AC6992 and with optical CWDM transmitter. Single PSU was used.  
Power save function reduces power consumption 2 W. It is recommended to use Power Save function always when calculated CTB is better than 67 dB and/or operational level is -3 dBuV lower than Umax.
- 19)



- 20) 70 dB hum value is valid at any frequency from 10 to 1218 MHz, when the remote current is less than 10 A/ port. Hum modulation is 60 dB, if 12.0 A is fed.  
16.0 A is the maximum current, which can be locally injected into both ports together.
- 21) EN61000-4-2, contact discharge to enclosure and RF-ports.

**Compatibility**

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

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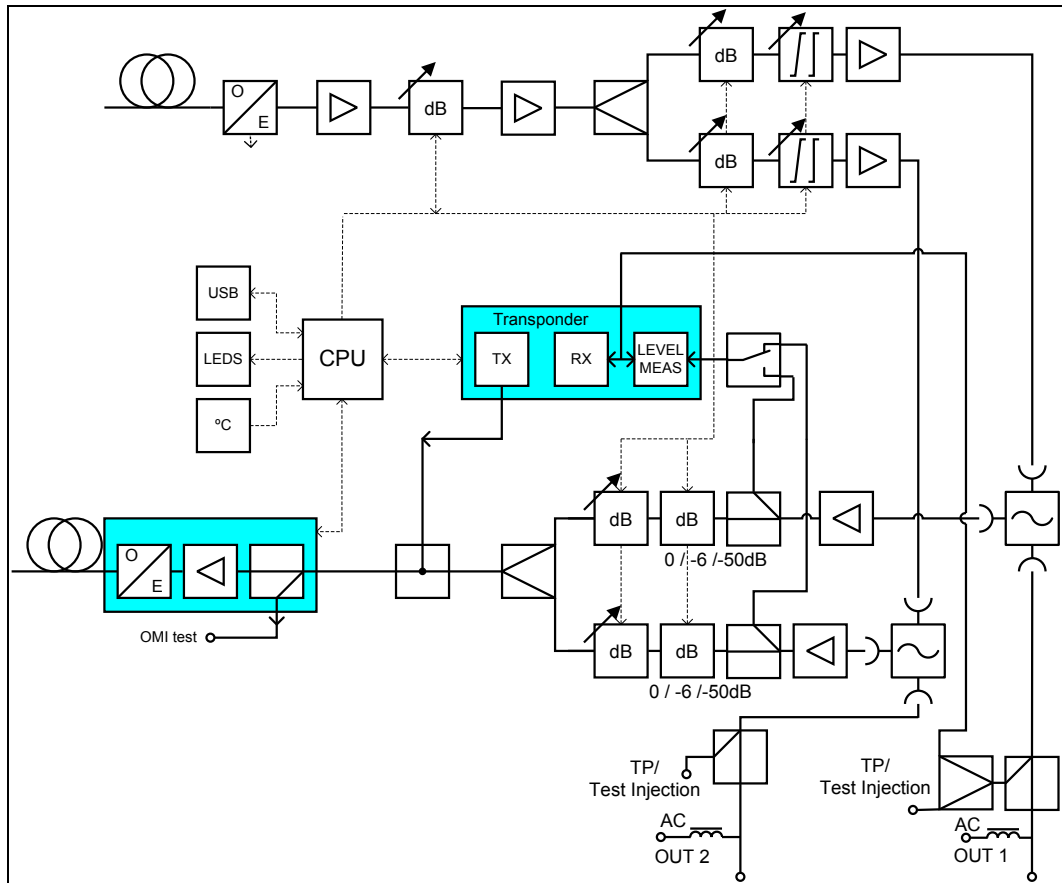
## Monitoring functions

- Status LED for alarm indication
- Return path ingress switches on / attenuated / off control
- Remote AC voltage measurement with alarms
- Local +12 V and +24 V 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
- User notes can be stored into amplifier memory
- Fully user configurable alarm limits, severities, enabling and delays
- Alarm log stored into non-volatile memory for easy troubleshooting
- Node configuration and accessory information stored in amplifier memory
- Local configuration via USB using PC, Windows tablet or Android smartphone or tablet
- Fast local software update via USB also without power supply
- Optical receiver input power measurement with alarms
- Optical transmitter laser bias current measurement with alarms
- Optical transmitter pilot generator enabling and frequency control

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

- Remote access to all AC8710 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 and decision levels are user programmable
- Automatic reserve pilot switching
- Pilot based forward path automatic alignment
- Full forward and return path automatic alignment with a single button
- Lid status monitoring with alarm
- Service terminal connection monitoring with alarm
- 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 independently for both inputs based on detected ingress with alarms and user configurable delays
- Modem receive and transmit signal level monitoring with alarms (AC6992)
- Remote software update also to multiple units simultaneously, without affecting operation
- Return path pilot generator with 4 user programmable pilot frequencies and levels (AC6992)

**Block diagram**



**Ordering information**

**AC8710 configuration map**

	1-			2-			3-	4-	5-			6-	7-	8-			9-
	1	2	3	1	2	3	1	1	1	3	1	1	1	1	2	3	1
<b>AC8710</b>				-			-	-				-	-				-

<p><b>1-1 Platform type</b></p> <p><b>A</b> Standard 1.2 GHz</p> <p><b>1-2 Power supply</b></p> <p><b>A</b> Single PSU, 65 VAC (1 x AC6310)</p> <p><b>B</b> Double PSUs, 65 VAC (2 x AC6310)</p> <p><b>C</b> Local powering, euro plug (230 VAC)</p> <p><b>D</b> Customer specific option</p> <p><b>E</b> Single PSU, 90 VAC</p> <p><b>F</b> Double PSUs, 90 VAC</p> <p><b>1-3 Fiber organizing</b></p> <p><b>A</b> Standard fibre organiser</p>
<p><b>2-1 Fibre feed-through adapter</b></p> <p><b>E</b> 5/8 Adapter (KDC316)</p> <p><b>G</b> 1-4 fibres (KDO900)</p> <p><b>X</b> None</p> <p><b>2-2 Output 2 connection</b></p> <p><b>A</b> PG11</p> <p><b>B</b> 5/8"</p> <p><b>C</b> IEC</p> <p><b>D</b> 3.5/12</p> <p><b>E</b> F</p> <p><b>2-3 Output 1 connection (first from right)</b></p> <p><b>A</b> PG11</p> <p><b>B</b> 5/8"</p> <p><b>C</b> IEC</p> <p><b>D</b> 3.5/12</p> <p><b>E</b> F</p>
<p><b>3-1 Optical connector for receiver</b></p> <p><b>A</b> SC/APC, 9 deg.</p> <p><b>C</b> E-2000</p> <p><b>D</b> SC/APC, 8 deg.</p>
<p><b>4-1 Diplexer filter</b></p> <p><b>D</b> 65/85 MHz (2 x CXF065)</p> <p><b>G</b> 65/85 MHz (2 x CXF065 19)</p> <p><b>H</b> 85/105 MHz (2 x CXF085)</p> <p><b>J</b> 204/258 MHz (2 x CXF204)</p> <p><b>X</b> None</p>

<p><b>5-1 Return path transmitter</b></p> <p><b>40</b> +1 dBm FP 1310 nm (AC67B40)</p> <p><b>41</b> +3 dBm CWDM 1430 nm (AC67B41)</p> <p><b>42</b> +6 dBm CWDM 1430 nm (AC67B42)</p> <p><b>43</b> +3 dBm CWDM 1450 nm (AC67B43)</p> <p><b>44</b> +6 dBm CWDM 1450 nm (AC67B44)</p> <p><b>45</b> +3 dBm DFB 1310 nm (AC67B45)</p> <p><b>46</b> +6 dBm DFB 1310 nm (AC67B46)</p> <p><b>47</b> +3 dBm CWDM 1470 nm (AC67B47)</p> <p><b>48</b> +6 dBm CWDM 1470 nm (AC67B48)</p> <p><b>49</b> +3 dBm CWDM 1490 nm (AC67B49)</p> <p><b>50</b> +6 dBm CWDM 1490 nm (AC67B50)</p> <p><b>51</b> +3 dBm CWDM 1510 nm (AC67B51)</p> <p><b>52</b> +6 dBm CWDM 1510 nm (AC67B52)</p> <p><b>53</b> +3 dBm CWDM 1530 nm (AC67B53)</p> <p><b>54</b> +6 dBm CWDM 1530 nm (AC67B54)</p> <p><b>55</b> +3 dBm CWDM 1550 nm (AC67B55)</p> <p><b>56</b> +6 dBm CWDM 1550 nm (AC67B56)</p> <p><b>57</b> +3 dBm CWDM 1570 nm (AC67B57)</p> <p><b>58</b> +6 dBm CWDM 1570 nm (AC67B58)</p> <p><b>59</b> +3 dBm CWDM 1590 nm (AC67B59)</p> <p><b>60</b> +6 dBm CWDM 1590 nm (AC67B60)</p> <p><b>61</b> +3 dBm CWDM 1610 nm (AC67B61)</p> <p><b>62</b> +6 dBm CWDM 1610 nm (AC67B62)</p> <p><b>XX</b> None</p> <p><b>5-3 Optical connector for transmitter</b></p> <p><b>A</b> SC/APC, 9 deg.</p> <p><b>C</b> E-2000</p> <p><b>D</b> SC/APC, 8 deg.</p> <p><b>X</b> None</p>
<p><b>6-1 Optical filter 1</b></p> <p><b>F1</b> WDM with 8 deg. SC/APC connectors</p> <p><b>F2</b> WDM with 9 deg. SC/APC connectors</p> <p><b>XX</b> None</p>
<p><b>7-1 Transponder module</b></p> <p><b>E</b> Transponder and ALSC module (AC6992)</p> <p><b>G</b> DOCSIS transponder (AC6981)</p> <p><b>X</b> None</p>
<p><b>8-1 Transponder communication protocol</b></p> <p><b>A</b> CAT/Visor compatible</p> <p><b>B</b> HMS/SNMP compatible</p> <p><b>8-2 Settings</b></p> <p><b>X</b> Factory default</p> <p><b>A</b> Customer specified</p> <p><b>8-3 Product keys (software features)</b></p> <p><b>X</b> None</p> <p><b>C</b> Auto alignment, spectrum and ingress analyser, pilot generator</p>
<p><b>9-1 Future reservation</b></p> <p><b>X</b> None</p> <p><b>9-2 Accessories</b></p> <p><b>A</b> USB extension cable</p> <p><b>X</b> None</p>