ACE8 1.2 GHZ INTELLIGENT OPTICAL NODE

ACE8 is a single active output intelligent node. The node is based on a fixed receiver but modular upstream transmitter. The output amplifier stage uses high performance GaN hybrid, making the usable output level range especially wide.

DOCSIS 3.1 and DVB-C2 requirements have been taken in account in this product. The downstream frequency band reaches 1.2 GHz which ensures fulfilment of all future bandwidth needs. The upstream signal path is flexible and it can be updated to 204 MHz.

The external USB port enables local control with PC or an Android mobile device. Remote monitoring and control is possible via either DOCSIS or HMS/CATVisor protocol, and remote ingress switch control via RIS protocol.

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

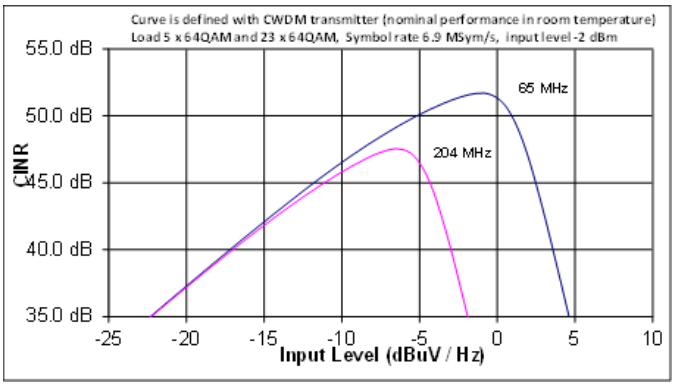
- Automatic alignment of both forward and return path
- 1.2 GHz GaN hybrid technology
- 204 MHz return path
- Wide range of upstream laser technologies available
- Efficient surge and ESD protection
- Electrical level and slope controls
- 862 MHz operation mode
- Power supply with PFC
- With a transponder plug-in module:
  - CATVisor / HMS or DOCSIS remote connection
  - Remote ingress switch control
  - ALC with fully user programmable pilots
  - Downstream spectrum analyser
  - Upstream signal quality monitoring with automatic ingress control
  - True plug-and-play with single pushbutton alignment
  - Return path pilot generator (AC6992)

Technical specifications

Parameter	Specification	
Downstream signal path		1)
Light wavelength	1290…1610 nm	
Optical input power range	-7…0 dBm	
Frequency range	85...1218 MHz	
Return loss	18 dB	2)
Gain limited output level	118 dBµV	3)
Input gain control	0…-20 dB	
Interstage gain control	0…-19 dB	4)
Slope control	0…18 dB	5)
Flatness	±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/√Hz	10)
$U_{max(112\ QAM\ channels)}$ @1.0 GHz	111.5 dBµV	11)
$U_{max(138\ QAM\ channels)}$ @1.2 GHz	108.5 dBµV	12)
CTB 41 channels	116.0 dBµV	13)
CSO 41 channels	117.0 dBµV	13)
Upstream signal path		1)
Frequency range	5... 204 MHz	
Return loss	18 dB	
Ingress switching	0 / -6 / < -45 dB	
Input level	57 dBµV	14)
CINR	See curves	15)
OMI adjustment	0…-20 dB	
OMI test point	-5 dB	16)
Transponder connection	-37 dB	17)
General		
Power consumption	23 W	18)
Supply voltage	27...65 Vac / 205…255 Vac	
Maximum current feed through	7 A / port	
Hum modulation	70 dB	19)
Optical connectors	SC/APC, FC/APC, E-2000	
Output connectors	PG11	
Test point connectors	F female	
Dimensions	17 (20) x 23 x 9 cm	h x w x d
Weight	2.3 kg	
Operating temperature	-40...+55 °C	
Class of enclosure	IP54	20)
EMC	EN50083-2	
ESD	4 kV	21)
Surge	6 kV (EN 60728-3)	

Notes

1) Specified with one out port in use and diplex filter included. Switching to dual output causes typically 4.0 dB attenuation.
2) The limiting curve is defined at 40 MHz -1.5 dB / octave. Return loss is always > 12 dB.
3) This is the gain limited output level when OMI is 4.0 %. The level is available with the optical input power of -7 dBm . The used wavelength is 1310 nm. Level is valid in single output mode.
4) Step size 0.2 dB. This adjustment is used in ALC operation.
5) Step size 0.5 dB. Hinge point 1218 MHz. Value defined between 85…1218 MHz. Flatness specification is not valid for >16 dB slope values. When "862 MHz pre-slope" feature (8 dB additional slope between 85…862 MHz) is activated, the slope control range is 0…11 dB.
6) Typical value in room temperature. Guaranteed value is ±0.75 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 value. CNR is typically > 46.5 dB when optical input level is -7.0 dBm and OMI is 4.0 %.
11) Typical value according to IEC60728-3-1. Channels have 13 dB cable equivalent slope between 85…1218 MHz and signal level has been defined at 1002 MHz. BER measurement has been done on the worst channel between 110…1006 MHz.
12) Typical value. Channels have 13 dB cable equivalent slope between 85…1218 MHz and signal level has been defined at 1210 MHz. BER measurement has been done on the worst channel between 110…1214 MHz.
13) IEC 60728-3. Channels have 8 dB cable equivalent slope between 85…862 MHz and signal level has been defined at 862 MHz. Optical input level -7 dBm. All results are typical values in room temperature.
14) Nominal input level for 4.0 % OMI. Defined at output port in single output mode.
15) CINR



16) Valid when ingress switch and level control are at 0 dB.
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 optical CWDM transmitter, but without transponder.
19) Valid between10 and 1218 MHz with <6 A per port. Reduced to 60 dB for >6 A per port.
12 A is the maximum total current which can be locally injected into both ports.
20) The housing is tested to be class of IP67 .Ventilation hole was closed.
However, in standard delivery condition a ventilation hole is open . Then the practical enclosure class is IP54.
21) EN61000-4-2, contact discharge to enclosure and RF-ports.

Monitoring functions

- Status LED for alarm indication
- Return path ingress switch on / attenuated / off control
- Remote and 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
- Automatic diplex filter type detection
- Optical receiver input power measurement with alarms
- Optical transmitter laser bias current measurement with alarms
- Optical transmitter pilot generator enabling and frequency control
- Configuration change monitoring with alarm
- Service terminal monitoring with alarm
- 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

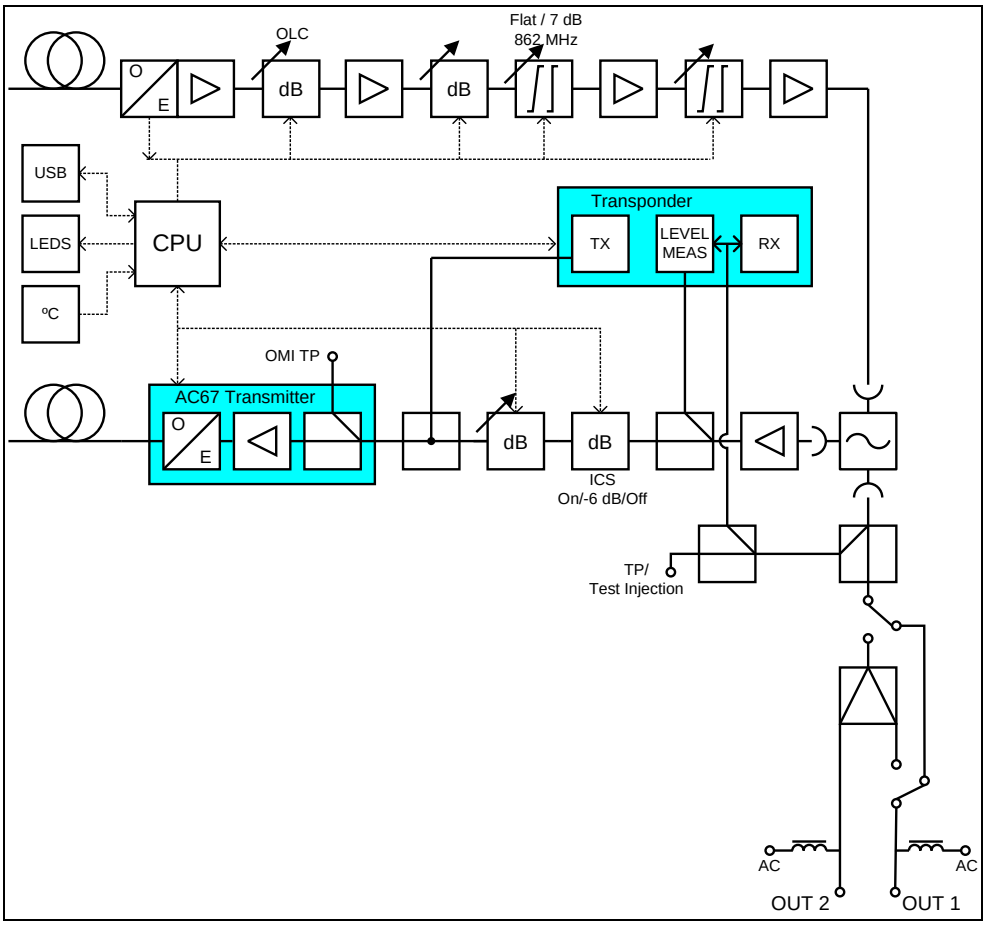
Transponder units

Functionality	**AC6915** RIS receiver	**AC6992** transponder	**AC6981** transponder
Leds for remote connection and ALSC status	X	X	X
RIS receiver for remote ingress switch control	X	-	-
Full remote monitoring and control, CATVisor / HMS	-	X	-
Full remote monitoring and control, DOCSIS	-	-	X
ALC for gain control with user configurable pilot and reserve pilot frequencies, types and levels	-	X	X
User configurable versatile automatic alignment	-	X	X
Full automatic alignment with single pushbutton	-	X	X
Lid status monitoring with alarm	-	X	X
Modem rx and tx signal level monitoring with alarms	-	X	-
Spectrum analyser for forward path level measurement with alarms	-	X	X
Ingress analyser for return path level measurement with alarms	-	X	X
Automatic ingress switch control based on ingress with alarms and configurable delays	-	X	X
Return path pilot generator with 4 user programmable pilot frequencies and levels	-	X	-

Compatibility

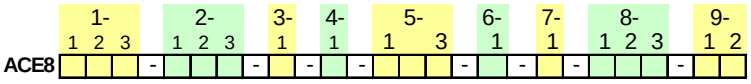
All accessories that will be used together with this product, should use the latest version available. By using only up-to-date accessories a proper operation can be ensured.

Block diagram



Ordering information

ACE8 configuration map



1-1 Platform type	
A	1.2 GHz GaN
C	1.2 GHz GaN, , ventilation hole closed

1-2 Power supply	
A	Local powering, euro plug (230 VAC)
B	Remote powering with cable clamp (65 VAC)
C	Local powering, UK plug (230 VAC)
D	Remote powering with cable clamp (90 VAC)

1-3 Fiber organicing	
A	Standard fibre organiser

2-1 Fibre feed-through adapter	
A	5/8 Adapter (KDC316)
B	1-2 fibres (KDO900)
X	None

2-2 Output 2 connection	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F
X	None (PG11 sealing plug)

2-3 Output 1 connection (first from right)	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F

3-1 Optical connector for receiver	
A	SC/APC, 9 deg.
C	E-2000
D	SC/APC, 8 deg.
F	FC/APC > SC/APC adapter

4-1 Diplexer	
A	65/85 MHz (CXF065)
B	85/105 MHz (CXF085)
C	204/258 MHz (CXF204)
X	None

5-1 Return path transmitter	
#	+1 dBm FP 1310 nm (AC6740)
41	+3 dBm CWDM 1430 nm (AC6741)
#	+6 dBm CWDM 1430 nm (AC6742)
#	+3 dBm CWDM 1450 nm (AC6743)
#	+6 dBm CWDM 1450 nm (AC6744)
45	+3 dBm DFB 1310 nm (AC6745)
#	+6 dBm DFB 1310 nm (AC6746)
47	+3 dBm CWDM 1470 nm (AC6747)
#	+6 dBm CWDM 1470 nm (AC6748)
#	+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)
#	+6 dBm CWDM 1590 nm (AC6760)
61	+3 dBm CWDM 1610 nm (AC6761)
#	+6 dBm CWDM 1610 nm (AC6762)
XX	None

5-3 Optical connector for transmitter	
A	SC/APC, 9 deg.
C	E-2000
D	SC/APC, 8 deg.
F	FC/APC > SC/APC adapter
X	None

6-1 Optical filter 1	
F1	WDM filter 1310 / 1550 nm with 8 deg. SC/APC connectors (AC6570D)
F2	WDM filter 1310 nm / CWDM with 8 deg. SC/APC connectors (AC6572D)
XX	None

7-1 Transponder module	
E	Transponder and ALSC module (AC6992)
F	RIS module (AC6915)
G	DOCSIS transponder (AC6981)
X	None

8-1 Communication protocol / application software	
X	None
A	CATVisor compatible
B	HMS/SNMP compatible
C	Customer specific

8-2 Settings	
X	Factory default
A	Customer specified (ECML file)

8-3 Product keys (software features)	
X	None
C	Auto alignment, spectrum and ingress analyser, pilot generator

9-1 Installation manual	
X	None
A	Manual

9-2 Customer specific selections	
B	Customer specific option
X	None

DOC0021942, Rev017