

**ACE3 INTELLIGENT BROADBAND AMPLIFIER**

ACE3 is the most advanced compact amplifier on the market. It has 1.2 GHz frequency range and integrated electrical controls in both up- and downstream.

ACE3 has automatic alignment feature, which takes care of optimized SNR performance of both signal directions. ALSC circuits are built-in and they can be activated easily by adding a transponder unit.

Upstream signal path has many advantages over other products on the market. It has extremely high gain. Signal levels and unwanted disturbances like CPD or ingress can be monitored even when upstream signal path is cut off with ingress switch.

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/CATVvisor protocol, and remote ingress switch control via RIS protocol.

**Features**

- 1.2 GHz GaN technology
- Return path supports 204 MHz bandwidth
- Remote power supply with active PFC
- Intelligent continuous adjustments
- External access to output test point
- Local control through external USB connection
- Intelligent cable simulator at input
- Excellent ESD and surge protection
- With a transponder plug-in module:
  - CATVvisor / HMS or DOCSIS remote connection
  - Remote ingress switch control
  - ALSC with fully user programmable pilots
  - Downstream spectrum analyser
  - Upstream signal monitoring with automatic ingress control
  - True plug-and-play with single pushbutton alignment
  - Return path pilot generator

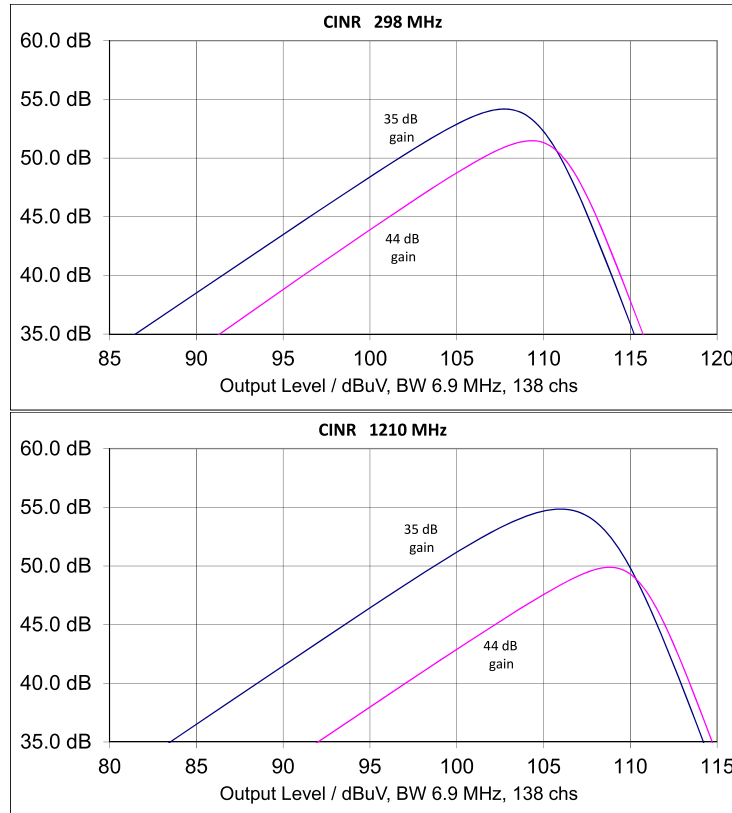
**Technical specifications**

Parameter	Specification	Note
<b>Downstream signal path</b> (values with duplex filters)		
Frequency range	85...1218 MHz	
Return loss	18 dB	1)
Maximum gain	44 dB	2)
Input gain control	-20...0 dB	3)
Input slope control	-13...20 dB	4)
Input cable simulator	-13 dB	4)
Interstage gain control	-15...0 dB	5)
Nominal interstage slope	13 dB	6)
Interstage slope control	8...18 dB	5)
Pivot frequency selection	1.0 / 1.2 GHz	
Flatness	±0.5 dB	7)
Group delay	2 ns	8)
Test point	-20 dB	9)
Transponder connection	-19 dB	10)
Noise figure	8.5 dB	11)
U <sub>max</sub> (112 QAM channels) @1.0 GHz	111.5 dBμV	12)
U <sub>max</sub> (138 QAM channels) @1.2 GHz	108.5 dBμV	13)
CINR	see curves	14)
CTB 41 channels	116.5 dBμV	15)
CSO 41 channels	118.0 dBμV	15)
<b>Upstream signal path</b> (values with duplex filters)		
Frequency range	5...204 MHz	
Return loss	18 dB	16)
Maximum gain	28 dB	17)
Ingress switching	0 / -6 / < -40 dB	
Gain control	0...28 dB	18)
Slope control	0...15 dB	19)
Flatness	±0.5 dB	
Transponder connection	-37 dB	20)
Noise figure	6.5 dB	21)
CINR	See curves	22)
<b>General</b>		
Power consumption (65 / 230 V <sub>AC</sub> )	23 W	23)
Supply voltage	27...65 / 40...90 / 205...255 Vac	24)
Maximum current feed through	7.0 A / port	25)
Hum modulation	70 dB	25)
Resistance for remote current	25 mΩ / port	
Input / Output connectors	PG11 (several adaptors available)	
Test point connectors	F- female	
Local service port connector	USB mini-B	
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	26)
Environmental (salt mist, cyclic)	IEC 60068-2-52, severity 1	
Safety	EN60728-11 / EN60065	
EMC	EN50083-2	
ESD	4 kV	27)
Surge	6 kV (EN 60728-3)	

**Notes**

- 1) The limiting curve is defined at 40 MHz -1.5 dB / octave.
- 2) Gain is defined with 2 diplex filters. All other used plug modules and settings have 0 dB value.
- 3) Electrical control with 1 dB step.
- 4) Slope is defined between 85...1218 MHz. Electrical control with 1 dB step. Input slope control includes a cable simulator which is automatically activated when negative slope values are selected. When the cable simulator is activated, the maximum gain is reduced by 13 dB.
- 5) Electrical control with analogue 0.1 dB step, used by ALSC and temperature compensation.
- 6) Slope is defined between 85...1218 MHz. Interstage slope has a selectable pivot frequency.
- 7) Typical value in room temperature. The guaranteed value is  $\pm 0.8$  dB. Flatness is defined with nominal settings and 2 diplex filters. All other used plug modules are 0 dB jumpers. The specification is valid 5 MHz after the starting frequency of the selected diplex filter.
- 8) Typical value for 4.43 MHz band,  $f > 120$  MHz. CXF065 diplex filters are in use.
- 9) Output TP has a tolerance of  $\pm 0.8$  dB between 85...1006 MHz and  $\pm 1.0$  dB between 1006...1218 MHz. The TP is defined with 0 dB plug as OUTPUT MODULE. Input TP is a transformer type with  $\pm 1.5$  dB tolerance between 5...1006 MHz. At higher frequency tolerance is  $\pm 2.0$  dB. Input TP tolerance is defined with 3 dB input attenuator.
- 10) Level difference between transponder connection and output. Tolerance  $\pm 0.5$  dB.
- 11) Typical value between 100... 1006 MHz with the maximum gain and nominal slope. Guaranteed value is 2 dB higher over the band 85...1218 MHz.
- 12) Typical value according to IEC60728-3-1. Channels have 13 dB cable equivalent slope between 85...1006 MHz and signal level has been defined at 1002 MHz. BER measurement has been done on the worst channel between 110...1006 MHz.
- 13) 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.

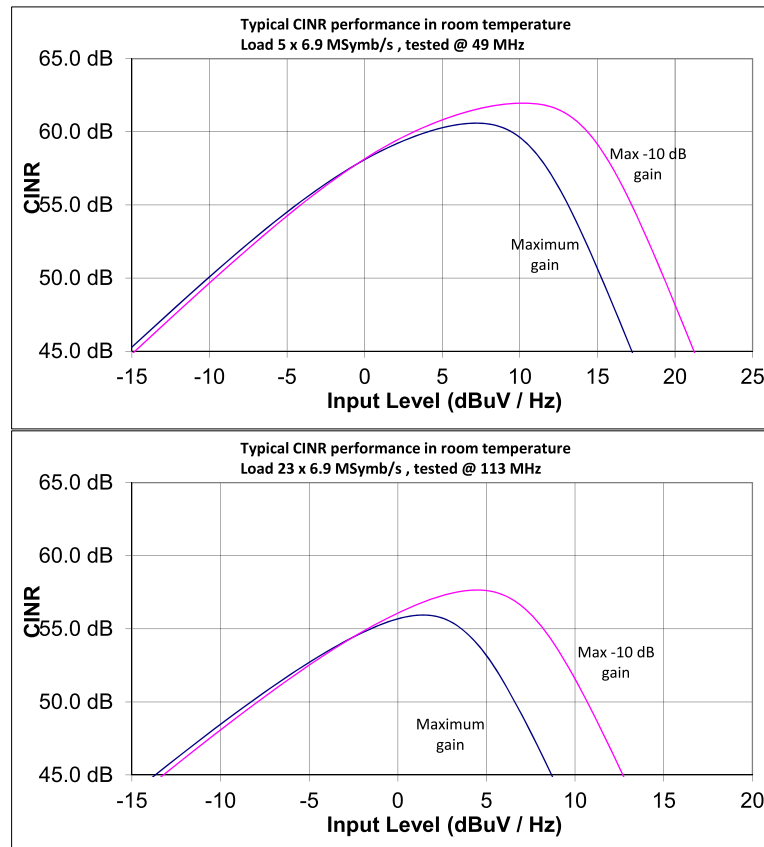
14) CINR (Downstream)



- 15) According to EN60728-3. Amplifier output is 13 dB cable equivalent sloped between 85...1006 MHz and signal level is defined at 862 MHz. All results are typical values in room temperature.
- 16)  $8 < f < 80$  MHz,  $f > 80$  MHz -1.5 dB / octave.
- 17) Upstream amplifier is built on the motherboard. 28 dB gain is available in 65 MHz (AC6254) and 85 MHz (AC6255) mode. In 204 MHz mode (AC6256) gain is 29 dB.
- 18) Electrical control with 1 dB step. This control is automatically divided between interstage and output attenuators.
- 19) Electrical control with 1 dB step. Pivot point of slope control can be changed by changing return path output module. Slope adjustment range depends on installed return path output module:  
 AC6254 (65 MHz): 0...15 dB  
 AC6255 (85 MHz): 0...15 dB  
 AC6256 (204 MHz): 3...18 dB  
 AC6257 (204 MHz): 0...18 dB (flatness spec not guaranteed in 15...18 dB range).
- 20) Level difference between return path input and transponder transmit pin when return path gain is 28 dB. This value increases linearly to -25 dB when return path gain decreases to 16 dB (65 MHz) / 17 dB (204 MHz), after that it stays at -25 dB. Tolerance  $\pm 1$  dB.

21) Guaranteed value is 1 dB worse.

22) CINR (Upstream)



23) Without transponder unit.

24) 40...90 VAC power supply is purposed only for quasi-square wave form supply voltage.

25) At any frequency from 15 to 1006 MHz when the remote current is less than 7 A. Hum is 65 dB between 10...15 MHz and 1006...1218 MHz. Value is valid for one signal port. 12 A is the maximum total current which can be locally injected into all ports simultaneously

26) 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.

27) EN61000-4-2, contact discharge to enclosure and RF-ports.

**Management 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
- Easy and fast intelligent gain control with manual override
- Automatic duplex filter type detection
- Electrical control of forward path frequency range
- Return path automatic alignment
- Configuration change monitoring with alarm
- Service terminal monitoring with alarm
- Uptime, total uptime and reset counters for power outage statistics
- User notes can be stored into amplifier memory
- Fully user configurable alarm limits and severities
- Alarm log stored into non-volatile memory for easy troubleshooting
- Amplifier configuration and accessory information stored in amplifier memory
- Fast local software update via USB also without power supply

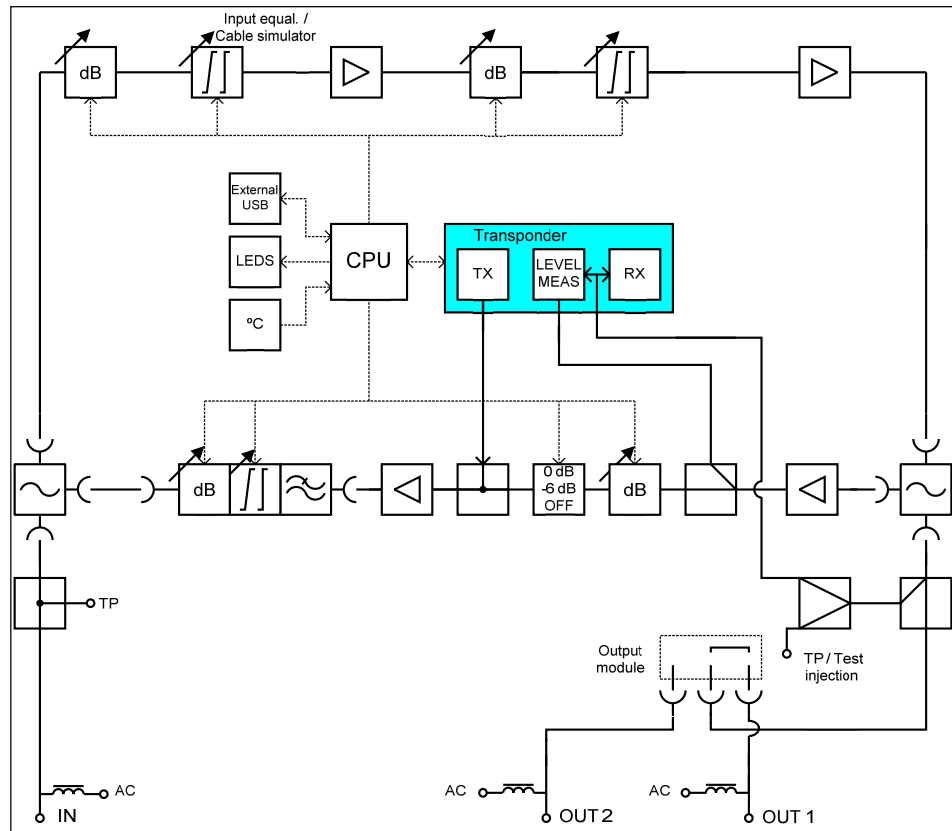
**Transponder units**

Functionality	AC6915 RIS receiver	AC6918 ALSC unit	AC6991/2 transponder	AC6981/1 transponder
Leds for remote connection and ALSC status	X	X	X	X
RIS receiver for remote ingress switch control	X	X	-	-
Full remote monitoring and control, CATVisor / HMS	-	-	X	-
Full remote monitoring and control, DOCSIS	-	-	-	X
ALSC for gain and slope control with user configurable pilot and reserve pilot frequencies, types and levels	-	X	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**

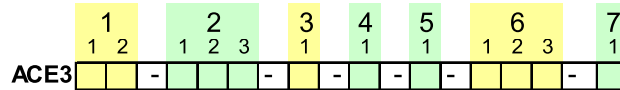
All accessories used with this product should be the newest generation available. Proper operation can guaranteed only with up-to-date accessories.

**Block diagram**



**Ordering**

**ACE3 configuration map**



<b>1-1 Gain and housing</b> A 44 dB intelligent amplifier, normal lid B 44 dB intelligent amplifier, TP access through lid C 44 dB intelligent amplifier, ventilation hole closed	<b>4-1 Output module</b> A 0 dB (AC6120) X None
<b>1-2 Power supply</b> 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)	<b>5-1 Transponder module</b> D ALSC+RIS module (AC6918) E Transponder and ALSC module (AC6992) F RIS module (AC6915) G DOCSIS transponder (AC6981) X None
<b>2-1 Input connection (first from left)</b> A PG11 B 5/8" C IEC D 3.5/12 E F	<b>6-1 Communication protocol / application software</b> X None A CATV/isor compatible B HMS/SNMP compatible C Customer specific
<b>2-2 Output 2 connection</b> A PG11 B 5/8" C IEC D 3.5/12 E F X None (PG11 sealing plug)	<b>6-2 Settings</b> X Factory default A Customer specified (ECML file)
<b>2-3 Output 1 connection (first from right)</b> A PG11 B 5/8" C IEC D 3.5/12 E F	<b>6-3 Product keys (software features)</b> X None C Auto alignment, spectrum and ingress analyser, pilot generator
<b>3-1 Diplexers</b> A 65/85 MHz (2 x CXF065 + AC6254) B 85/105 MHz (2 x CXF085 + AC6255) C 204/258 MHz (2 x CXF204 + AC6256) D 204/258 MHz (2 x CXF204 + AC6257) E 65/85 MHz (CXF065 19 + CXF065 + AC6254) F 65/85 MHz (CXF065 10 + CXF065 + AC6254) K 204/258 MHz (CXF204+CXF204 19 + AC6257) X None	<b>7-1 Customer specific selections</b> W Customer specific option X None

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