

AC3000 INTELLIGENT BROADBAND AMPLIFIER



AC3000, the most advanced amplifier on the market, is the latest leading-edge addition to AC family with extended frequency and gain ranges and integrated electrical controls in both up- and downstream.

AC3000 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 the transponder unit AC6990.

Both signal paths are equipped with universal plug-in slots which are protected against service interruptions with automatic bypass feature.

Upstream signal path has many advantages over other products on the market. It has extremely high gain with 2 independent interstage gain controls. Signal levels and unwanted disturbances like CPD or ingress can be monitored even when upstream signal path is cut off with ingress switch.

The USB service interface enables local control with a PC or PDA. Remote monitoring and control is possible via either CATVisor or HMS protocol.

Features

- 1 GHz bandwidth
- Intelligent continuous adjustments with huge gain control range
- Automatic SNR optimisation
- Local control with a PC or PDA through USB connection
- Amplifier can be ordered with customer specific settings
- 2 gain modes in one product
- GaAs FET amplifier technology
- Excellent ESD and surge protection
- With AC6990 transponder plug-in:
 - CATVisor or HMS compatible transponder with wide frequency ranges
 - ALSC with fully user programmable pilots
 - Downstream spectrum analyser
 - Upstream signal quality monitoring with automatic ingress control
 - True plug-and-play with single pushbutton alignment

Technical specifications

Parameter	Specification	Note
Downstream signal path (values with diplex filters)		
Frequency range	47...1000 MHz	1)
Return loss	18 dB	2)
Maximum gain	40 dB	
Operational gain	19...40 dB	3)
Input gain control	0...-20 dB	
1 st interstage gain control	0 / -5 dB	
2 nd interstage gain control	0...-13 dB	4)
Input equaliser slope	0...20 dB	5)
Interstage slope	0...13 dB	4)
Nominal slope	8 dB	6)
Flatness	±0.5 dB	7)
Group delay	2 ns	8)
Test point	-20 dB	9)
Input by-pass attenuation	-3 dB	
Noise figure	6.4 dB	10)
CTB 41 channels	114.5 dB μ V	11)
CSO 41 channels	117.0 dB μ V	11)
XMOD 41 channels	112.0 dB μ V	11)
CTB 110 / 77 channels	74.0 / 82.0 dBc	12)
CSO 110 / 77 channels	73.0 / 79.0 dBc	12)
XMOD 110 / 77 channels	68.0 / 73.0 dBc	12)
Upstream signal path (values with diplex filters)		
Frequency range	5...85MHz	1)
Return loss	18 dB	13)
Maximum gain	30 dB	
Ingress switching	0 / -6 / < -50 dB	
Output gain control	0...-20 dB	14)
Interstage gain control	0...-10 dB	14)
Output equaliser slope	0...10 dB	15)
Flatness	±0.3 dB	16)
Test point	-2 dB	17)
Test injection	-39 dB	18)
Transponder connection	-27 dB	19)
Noise figure	5.8 dB	20)
Output level, DIN 45004B	118.0 dB μ V	20)
CINR	> 58 dBc	21)
Internal measurements		
AC voltage measurement inaccuracy	< 5 % + 1 V	22)
DC voltage measurement inaccuracy	< 0.2 V	
Temperature measurement inaccuracy	< 2 °C	23)

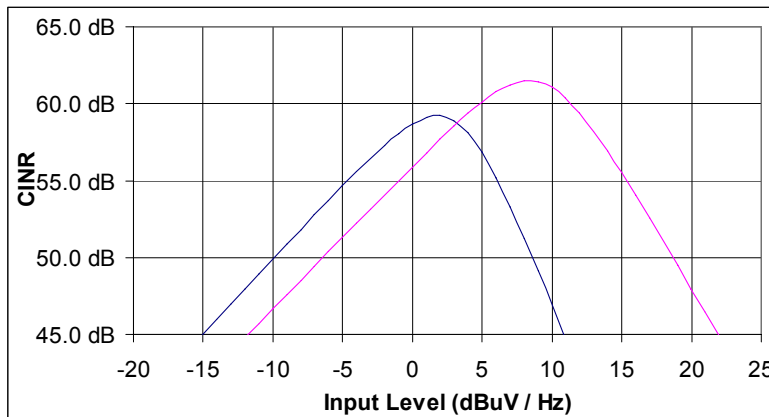
General

Power consumption	27 W	24)
Supply voltage	27...65 Vac, ±33...90Vdc / 205...255 Vac	
Supply current @ 65 VAC	600 mA	25)
Maximum current feed through	8.0 A / port	26)
Hum modulation	70 dB	26)
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	245 x 255 x 100 mm	h x w x d
Weight	3.0 kg	
Operating temperature	-40...+55 °C	
Class of enclosure	IP67	27)
EMC compatibility	EN 50083-2 (IEC 60728-2)	
Safety	EN 60728-11	
ESD	4 kV	28)
Surge	6 kV	29)

Notes

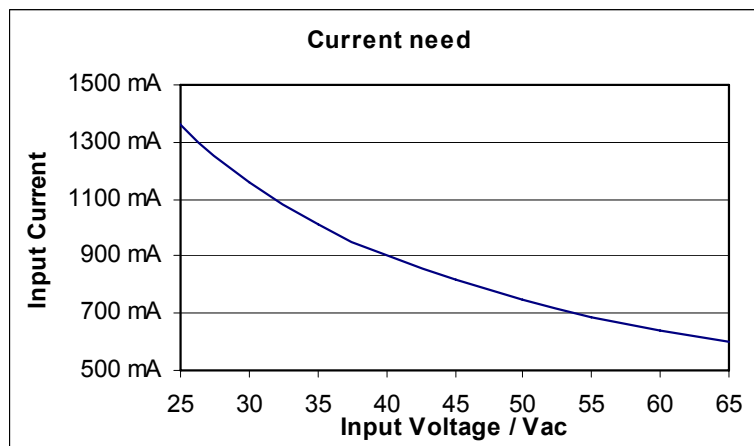
- 1) Diplex filter from the split of 30/47 MHz to 85/108 MHz are useable. See detailed specification from the spec sheet of CXF0xx filters.
- 2) The limiting curve is defined at 40 MHz -1.5 dB / octave.
- 3) Amplifier performance is automatically optimised in this gain range. When lower gain is used, adjustment is done only at amplifier input.
- 4) Step size is 0.2 dB. This interstage control is used in ALSC operation. It typically works up to 15 dB, but range between 13...15 dB has no guaranteed performance.
- 5) Between 47...862/1000 MHz. Step size is 1 dB. Pivot frequency can be selected electrically. This control works up to 23 dB, but the flatness is not specified in 20...23 dB range.
- 6) Between 47...862/1000 MHz. Pivot frequency can be selected electrically.
- 7) Typical value. The guaranteed value is ±0.75 dB. Flatness is defined with 65/86 MHz diplex filters, maximum gain and nominal slope. All other used plug modules are 0 dB pads. Spec is valid 2 MHz after the starting frequency of the selected diplex filter.
- 8) Typical value for 4.43 MHz band. Measured at channel S2.
- 9) Output TP is from a directional coupler with ± 0.75 dB tolerance. The TP is defined with 0 dB plug as OUTPUT MODULE 1. Input TP is transformer type with ±1.5 dB tolerance.
- 10) Typical value at 862 MHz with maximum gain. The guaranteed worst case value is 1.0 dB worse.
- 11) EN50083-3. Amplifier output was 8 dB cable equivalent sloped and full gain was used. All results are typical values in room temperature. XMOD is measured at the lowest channel. The highest recommended output level for the amplifier is 114.0 dBμV with 42 channels.
- 12) Measured with 77 and 110 NTSC channels. Amplifier output was 12 dB linearly sloped and the used levels were at 55 / 550 / 750 / 862 MHz 35.0 / 42.5 / 45.5 / 47.0 dBmV. All results are typical values in room temperature. XMOD is measured at 55.25 MHz. The high end of the frequency band up to 862 MHz was fulfilled with QAM channels with -6 dB level relative to analogue CW carriers. The highest recommended output level for the amplifier is 52 dBmV with 110 channels and 54 dBmV with 77 channels.
- 13) Valid over the band 7...85 MHz.
- 14) The return path level controls work together providing total control range of 0...-30. The interstage control adjusts 0...-10 dB range and output control adjusts -10...-30 dB range.
- 15) Between 5...65 / 85 MHz. Step size is 1 dB. Pivot frequency is 65 or 85 MHz, which can be selected electrically.
- 16) Typical value. The worst case value is ±0.6 dB. Flatness is defined with 65/85 MHz diplex filters.

- 17) The -2 dB attenuation is calculated from the return signal input port. 0 dB pads were used.
- 18) When the test point is used as an injection point, the injected signal must have 39 dB higher level than return path input signals to appear with equal levels at return path output.
- 19) This is the level difference between return path input and transponder transmit pin when return path is set to full 30 dB gain. This value increases linearly to -17 dB when return path gain decreases to 20 dB, after that it stays at -17 dB.
- 20) Typical value with full gain, which can be used in network design.
- 21)



Measurement is done at 49 MHz with full band noise loading. The left side curve is valid with maximum gain and the right side curve is tested with -10 dB interstage attenuation that equals 20 dB gain.

- 22) AC voltage is measured with averaging measurement. The accuracy specification applies only to constant waveform.
- 23) Internal temperature is typically 20...25 °C higher than ambient temperature, depending on installation and ventilation.
- 24) Without transponder. Transponder increases total power dissipation with 2 W.
- 25) Current defined in high gain mode without transponder.



- 26) At any frequency from 10 to 862 MHz when the remote current is less than 8 A. 12 A is the maximum current, which can be locally injected into all ports together (simultaneously).
- 27) The housing is tested to be class of IP67. However, in standard delivery conditions the lowest side wall is equipped with a ventilation hole of 1 mm. Then the practical enclosure class is IP54.
- 28) EN61000-4-2, contact discharge to enclosure and RF-ports.
- 29) EN61000-4-5, 1.2 / 50 μs pulse to RF-ports.

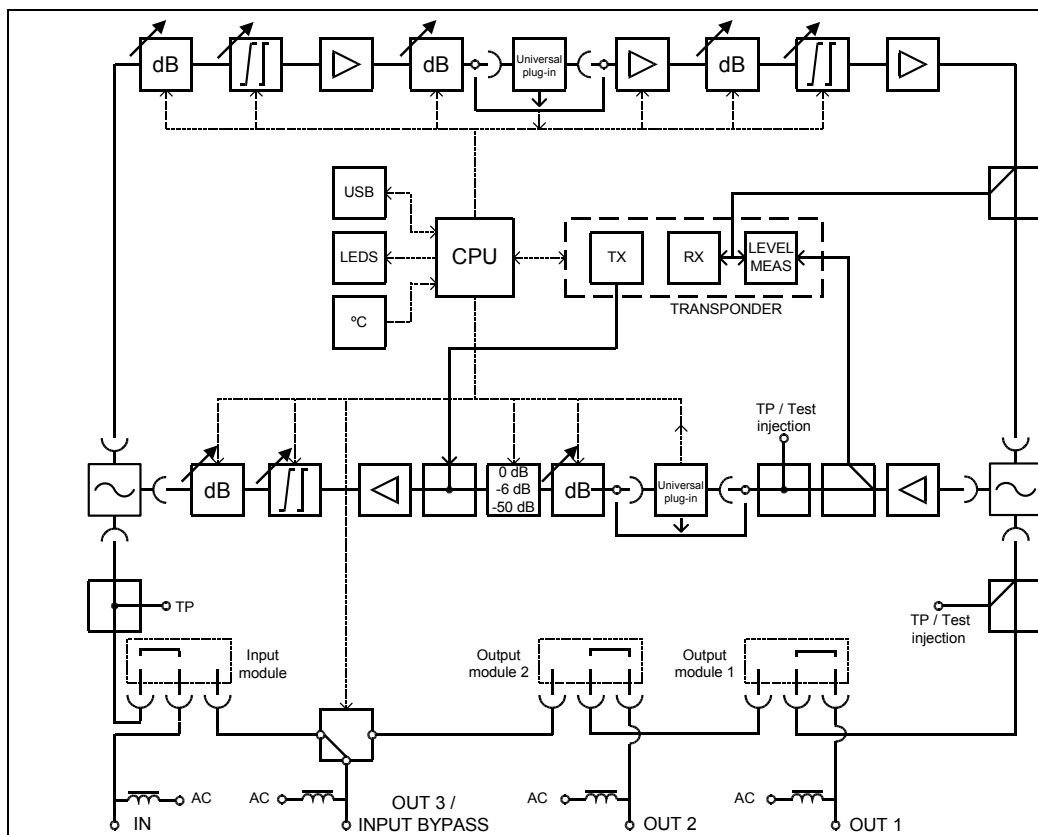
Monitoring functions

- Status LED for alarm indication
- Return path ingress switch on/ attenuated / off control
- 65 VAC 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
- Easy and fast intelligent control mode, and full-featured manual control mode
- Indication of universal plugs' presence
- Electrical control of return path plug usage
- Electrical control of forward path frequency range
- 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
- Amplifier configuration and accessory information stored in amplifier memory
- Fast local software update via USB also without power supply

Additional features available with AC6990 transponder:

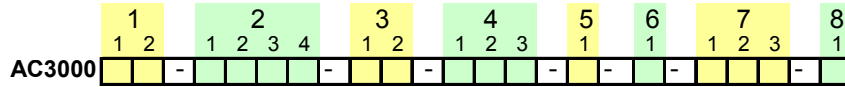
- Remote access to all AC3000 settings and monitored parameters
- ALSC and modem LEDs for alarm indication
- CATVisor and HMS compatible remote connection for monitoring and control
- Interstage gain and slope control by ALSC mode with saturation alarm
- ALSC pilot frequencies, detector types, backoffs and decision levels are user programmable
- Automatic reserve pilot switching and ALSC operation with only one pilot
- User configurable all pilots lost behaviour
- 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
- Amplifier 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 and return path plug activation and deactivation based on detected ingress with alarms and user configurable delays
- Modem receive and transmit signal level monitoring with alarms
- Remote software update to multiple units simultaneously

Block diagram



Ordering information

AC3000 configuration map



<p>1-1 Gain and housing</p> <p>A 40 dB universal amplifier, painted housing</p>	<p>4-1 Forward path universal plug</p> <p>X None</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 Local powering, UK plug (230 VAC)</p>	<p>4-2 Output module 1</p> <p>A 0 dB, 1 output in use (AC6120)</p> <p>B Splitter -3.7 dB, 2 outputs in use (AC6124)</p> <p>C Tap -8 dB, 2 outputs in use (AC6128)</p> <p>D Tap -12 dB, 2 outputs in use (AC6112)</p> <p>E Tap -16 dB, 2 outputs in use (AC6116)</p> <p>F Tap -20 dB, 2 outputs in use (AC6119)</p> <p>X None</p>
<p>2-1 Input 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>4-3 Output module 2</p> <p>A 0 dB, 2 outputs in use (AC6120)</p> <p>B Splitter -3.7 dB, 3 outputs in use (AC6124)</p> <p>C Tap -8 dB, 3 outputs in use (AC6128)</p> <p>D Tap -12 dB, 3 outputs in use (AC6112)</p> <p>E Tap -16 dB, 3 outputs in use (AC6116)</p> <p>F Tap -20 dB, 3 outputs in use (AC6119)</p> <p>X None</p>
<p>2-2 Input by-pass/output 3 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>X None (PG11 sealing plug)</p>	<p>5-1 Return path universal plug</p> <p>A Ingress blocker (AC6223)</p> <p>X None</p>
<p>2-3 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>X None (PG11 sealing plug)</p>	<p>6-1 Transponder module</p> <p>A Transponder and ALSC module (AC6990)</p> <p>X None</p>
<p>2-4 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 Application software</p> <p>A CATVisor compatible</p> <p>B HMS compatible, NA</p>
<p>3-1 Input module</p> <p>A 0 dB, no by-pass (AC6110)</p> <p>B Splitter -3.7 dB, by-pass in use (AC6124)</p> <p>C Tap -8 dB, by-pass in use (AC6128)</p> <p>D Tap -12 dB, by-pass in use (AC6112)</p> <p>E Tap -16 dB, by-pass in use (AC6116)</p> <p>F Tap -20 dB, by-pass in use (AC6119)</p> <p>X None</p>	<p>7-2 Settings</p> <p>X Standard factory default values</p> <p>A Customer specified values</p> <p>B Customer specified values + spectrum files, NA</p>
<p>3-2 Diplexer filters</p> <p>A 30/47 MHz (2 x CXF030)</p> <p>B 42/54 MHz (2 x CXF042)</p> <p>C 50/70 MHz (2 x CXF050)</p> <p>D 65/85 MHz (2 x CXF065)</p> <p>E 85/108 MHz (2 x CXF085) NA</p> <p>K Forward path jumper (2 x CXF000)</p> <p>X None</p>	<p>7-3 Product keys (software features)</p> <p>X None NA</p> <p>A Plug'n'play forward path alignment, NA</p> <p>B Spectrum and ingress analyser functionality, NA</p> <p>C Plug'n'play + spectrum and ingress functionality</p>
	<p>8-1 Reserved for future</p> <p>X None</p>

DOC0015056, Rev003