AC3210 1.2 GHZ INTELLIGENT BROADBAND AMPLIFIER

The AC3210 is a dual active output amplifier with 48 dB maximum gain. The amplifier stages are based on extreme high performance GaN solution that makes the usable gain range especially wide and allows high output level. Integrated interstage gain and slope controls optimise the flatness performance.

AC3210 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.

For upgrading return path to 85 MHz or 204 MHz there is no need to change the return amplifier, but only diplex filters and the return output module.

Features

- 1.2 GHz bandwidth
- Electrical adjustments
- Forward amplifiers use the newest GaN HEMT technology
- GaAs push-pull return amplifier on motherboard
- Temperature compensated forward and return path
- Excellent ESD and surge protection
- Remote power supply with PFC
- PC and Android user interface
- With a transponder plug-in module:
  - CATVisor, HMS or DOCSIS remote connection
  - Remote ingress switch control
  - ALSC with fully user programmable pilots
  - Downstream spectrum analyser
  - Upstream signal monitoring with automatic plug-in and ingress control
  - True plug-and-play with single pushbutton alignment
  - Return path pilot generator

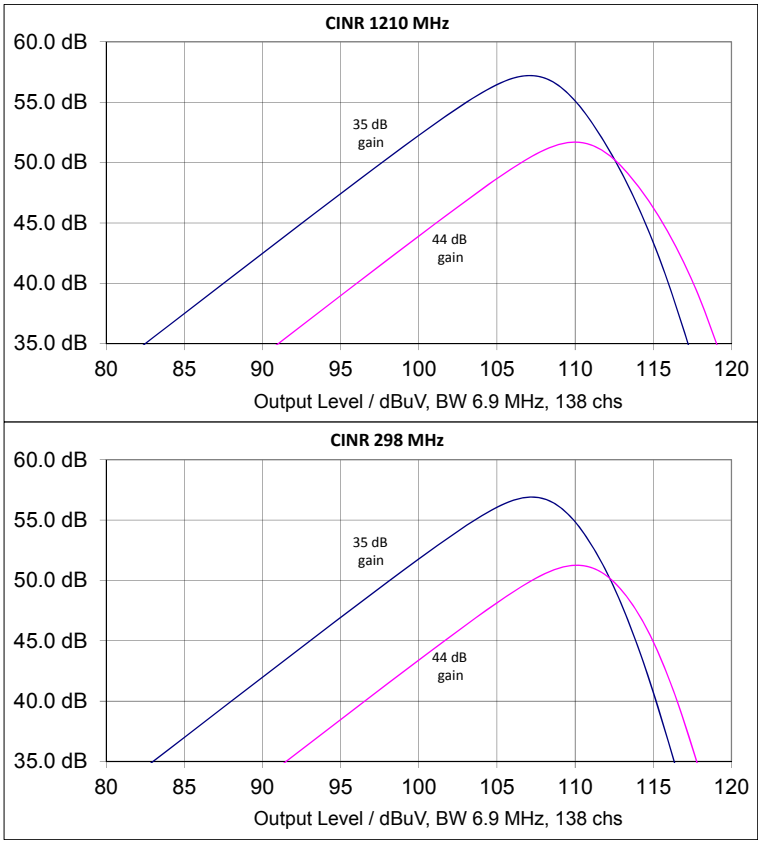
Technical specifications

Parameter	Specification	Note
Downstream signal path (values with diplex filters)		
Frequency range	85...1218 MHz	
Return loss	20 dB	1)
Maximum gain	2 x 48 dB	2)
Nominal interstage slope, distribution mode	13 dB	3)
Nominal interstage slope, trunk mode	7 dB	4)
Input gain control	-20…0 dB	5)
Input slope control	0…20 dB	5)
Interstage gain control, ALC	-10…0 dB	6)
Interstage gain control, output	-10…0 dB	5)
Interstage slope control	3…19 dB	6) 7)
Flatness	±0.5 dB	8)
Group delay	2 ns	9)
Test point	-20 dB	10)
Transponder connection	-19 dB	11)
Input by-pass attenuation	-2.5 dB	
Noise figure	8.5 dB	12)
$U_{max(112 \times QAM\ channels)}$ @ 1.0 GHz	115.0 dBµV	13)
$U_{max(138 \times QAM\ channels)}$ @ 1.2 GHz	112.0 dBµV	14)
CINR	See curves	15)
CTB 41 channels	118.0 dBµV	16)
CSO 41 channels	119.0 dBµV	16)
Upstream signal path (values with diplex filters)		
Frequency range	5…204 MHz	
Return loss	18 dB	17)
Maximum gain	2 x 28	18)
Ingress switching	0 / -6 / < -45 dB	
Gain control	0…28 dB	19)
Slope control	0…15 dB	20)
Flatness	±0.5 dB	
Transponder connection	-37 dB	21)
Noise figure	9.5 dB	22)
CINR	See curve	23)
General		
Power consumption (65 & 90 / 230 V_{AC})	39 / 41 W	24)
Supply voltage	27...65 / 40…90 / 205…255 VAC	25)
Maximum current feed through	7.0 A / port	26)
Hum modulation	70 dB	26)
Resistance for remote current	25 mΩ / port	
Input / output connectors	PG11 thread, other types available	
Test point connectors	F female	
Dimensions	245 x 255 x 107 mm	h x w x d
Weight	3.9 kg	
Operating temperature	-40...+55 °C	
Class of enclosure	IP67	27)
Environmental (salt mist, cyclic)	IEC 60068-2-52, severity 1	
Safety	EN60728-11 / EN60065	
EMC	EN50083-2	
ESD	4 kV	28)
Surge	6 kV (EN 60728-3)	

Notes

1) The limiting curve is defined at 40 MHz -1.5 dB / octave.
2) This is gain in room temperature at highest frequency. Gain is defined with 2 diplex filters. All other used plug-in modules and settings have 0 dB value. Nominal gain is 2 x 44 dB.
3) Slope is defined between 85 MHz and 1218 MHz.
4) Maximum gain and slope are 6 dB lower when OUT1 line has trunk mode in use.
5) Electrical control with 1 dB step.
6) Electrical control with 0.1 dB step, used by ALSC and temperature compensation. This adjustment is common for both outputs.
7) Output 1 trunk mode is switched off.
   More version information at the end of this document.
8) Typical value. The guaranteed value is ±0.8 dB. Flatness is with nominal settings and 2 diplex filters. All other used plug-in modules are 0 dB jumpers. The specification is valid 5 MHz after the starting frequency of the selected diplex filter.
9) Typical value for 4.43 MHz band, f > 120 MHz. CXF065 diplex filters are in use.
10) Output TP has a tolerance of ±0.8 dB between 85…1006 MHz and ±1.0 dB between 1006…1218 MHz. The TP is defined with 0 dB plug-in as output module 1. This connection can be used also as an injection point for a test signal of return channel. Input TP is a transformer type with ±1.5 dB tolerance between 5…1006 MHz. At higher frequency tolerance is ±2.0 dB. Input TP tolerance is defined with 3 dB input attenuator.
11) Level difference between transponder connection and output 1. Tolerance ±0.5 dB.
12) Typical value with full gain and 12 dB slope. Guaranteed value is 1.0 dB worse.
13) Typical value according to IEC60728-3. 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.
14) Typical value according to IEC60728-3. 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…1218 MHz.

15) CINR according to IEC60728-3. Full digital loading up to 1218 MHz.



16) According to IEC60728-3. Tested with full gain and 13 dB slope between 85…1006 MHz. Signal level is defined at 862 MHz. All results are typical values in room temperature.

17) 8 < f < 80 MHz, f > 80 MHz -1.5 dB / octave.

18) 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.

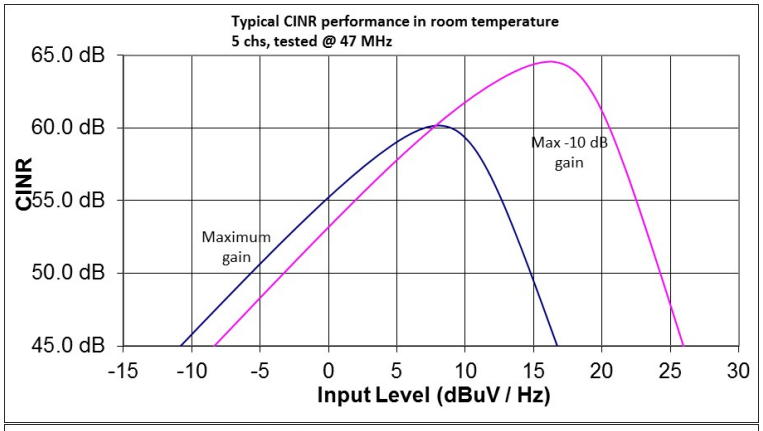
19) Electrical control with 1 dB step. This control is automatically divided between interstage and output attenuators.

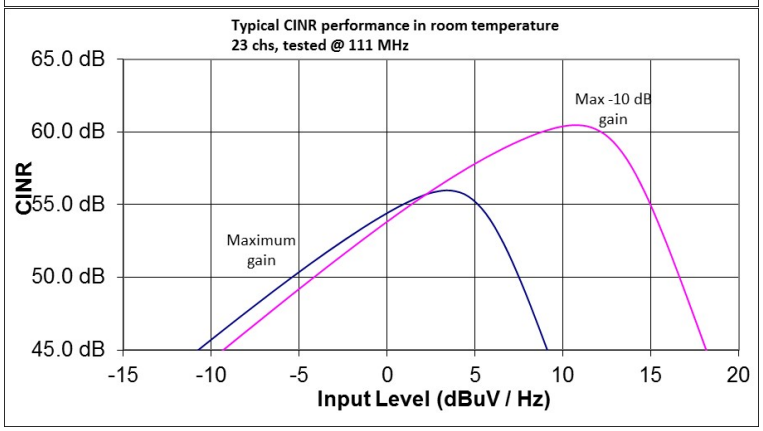
20) Electrical control with 1 dB step. Pivot point of slope control can be changed by changing return path output module. Slope adjustment range depends on installed return path output module:
AC6254 (65 MHz): 0…15 dB
AC6255 (85 MHz): 0…15 dB
AC6256 (204 MHz): 3…18 dB
AC6257 (204 MHz): 0…18 dB (flatness spec not guaranteed in 15…18 dB range)

21) Level difference between return path input and transponder transmit pin when return path gain is 28/29 dB. This value increases linearly to -25 dB when return path gain decreases to 16/17 dB, after that it stays at -25 dB. Tolerance ±1 dB.

22) Typical value.

23) CINR according to IEC60728-3.





24) Without transponder unit.

25) 40…90 VAC power supply is purposed only for quasi-square wave form supply voltage.

26) 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. 15 A is the maximum total current which can be locally injected into all ports simultaneously.

27) The housing is tested to be class of IP67. However, in standard delivery condition the lowest side wall is equipped with a 1 mm ventilation hole. Then the practical enclosure class is IP54.

28) 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 diplex filter type detection
- Indication of universal plug-in module presence
- Electrical control of forward path plug-in usage
- Individual electrical control of return path plug-in usage
- 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

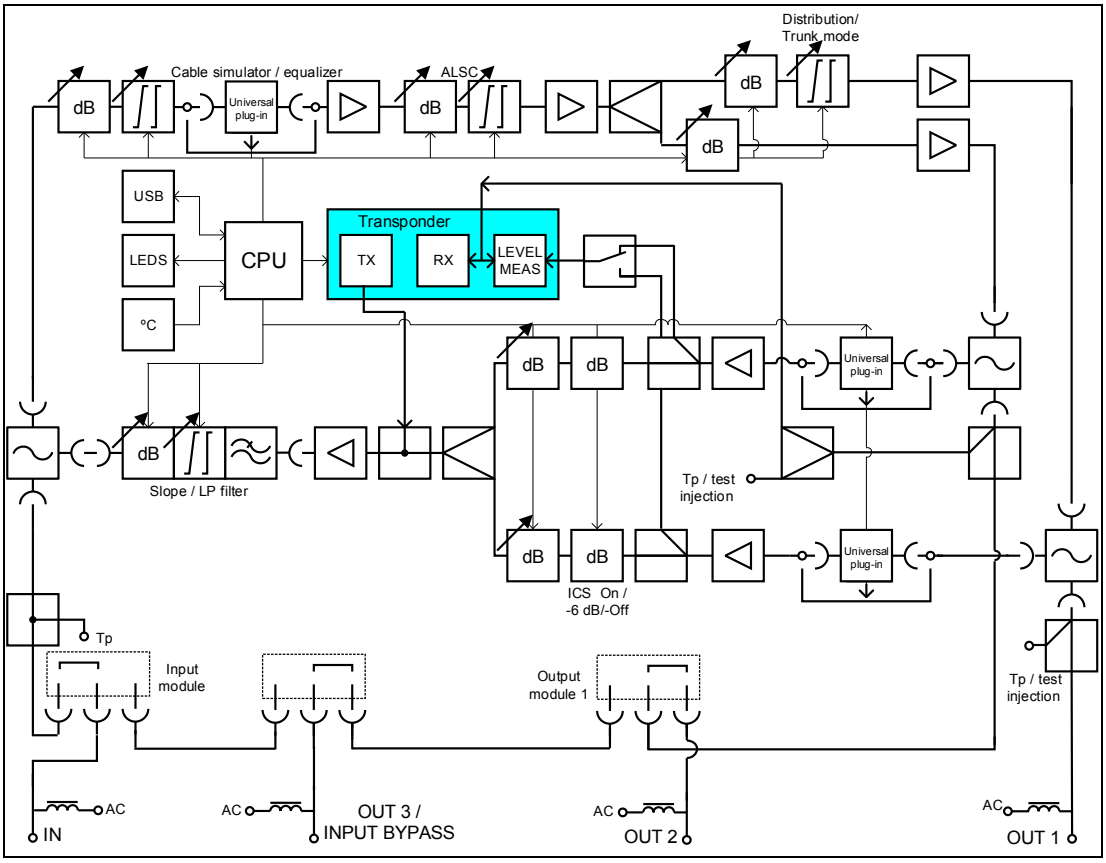
Transponder units

Functionality	**AC6915** RIS receiver	**AC6918** ALSC unit	**AC6980/1/3** transponder	**AC6991/2** 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	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 and return path plug 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

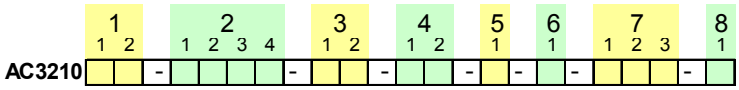
All accessories used with this product should be the newest generation available. Proper operation can guaranteed only with up-to-date accessories.

Block diagram



Ordering information

AC3210 configuration map



1-1 Gain and housing	
C	2 x 44 dB, 1.2 GHz, 2nd Gen.
D	2 x 44 dB, 1.2 GHz, 3rd Gen.
L	2 x 44 dB, 1.2 GHz, 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)

2-1 Input connection (first from left)	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F
K	Customer specific option

2-2 Input by-pass/output 3 connection	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F
K	Customer specific option
X	None (PG11 sealing plug)

2-3 Output 2 connection	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F
K	Customer specific option

2-4 Output 1 connection (first from right)	
A	PG11
B	5/8"
C	IEC
D	3.5/12
E	F
K	Customer specific option

3-1 Input module	
A	0 dB, no by-pass (AC6110)
X	None

3-2 Diplexer filters	
A	65/85 MHz (3 x CXF065 + AC6254)
B	85/105 MHz (3 x CXF085 + AC6255)
D	204/258 MHz (3 x CXF204 + AC6257)
G	65/85 MHz (CXF065+2xCXF065 19 + AC6254)
H	85/105 MHz (CXF085+2xCXF085 19 + AC6255)
K	204/258 MHz (CXF204+2xCXF204 19 + AC6257)
L	Customer specific option
X	None

4-1 Forward path universal plug	
X	None

4-2 Output module	
A	0 dB (AC6120)
B	Splitter - 3.7 dB, (AC6124)
X	None

5-1 Return path universal plugs	
A	Ingress blocker (2 x AC6223)
X	None

6-1 Transponder module	
D	ALSC+RIS module (AC6918)
E	Transponder and ALSC module (AC6992)
F	RIS module (AC6915)
G	DOCSIS transponder (AC6981)
H	DOCSIS transponder (AC6983)
X	None

7-1 Communication protocol / application software	
X	None
A	CATVisor compatible
B	HMS/SNMP compatible
C	Customer specific

7-2 Settings	
X	Factory default
A	Customer specified (ECML file)

7-3 Product keys (software features)	
X	None
C	Auto alignment, spectrum and ingress analyser, pilot generator

8-1 Customer specific selections	
B	Customer specific option
D	Mounting bracket AC6427
X	None

DOC0023041
Rev 026

Gain and housing selections (1-1) A&B (1st gen.) support mother board with 1 GHz mode and slope control range is 9…19 dB. Mother board in selection C (2nd gen.) doesn´t have 1 GHz mode, but slope range is 3…19 dB. Spec versions lower than 4.0 are valid for selections A&B.
Mother board D (3rd gen.) has a plug-in module for output3/by-pass selection, but selections A,B&C (1st and 2nd gen.) have a mother board with electrical selection.
Specification sheets lower than v50 are defining the 1st and 2nd gen. device.