

AC2000 AMPLIFIER PLATFORM



The AC2000 is a dual active output amplifier with 2 x 39 dB of gain. The input and output amplifier stages are both based on high performance solutions, that makes the used gain range especially wide. The amplifier can be used in distribution purposes by having 2 high gain and high level outputs. An other way of using this product is to have a lower level trunk output with ALSC function and 1 or 2 high level bridger outputs.

All essential return path elements like ingress switches are fixed built on the mother board but for example return amplifier module can be chosen after the needed performance.

Features

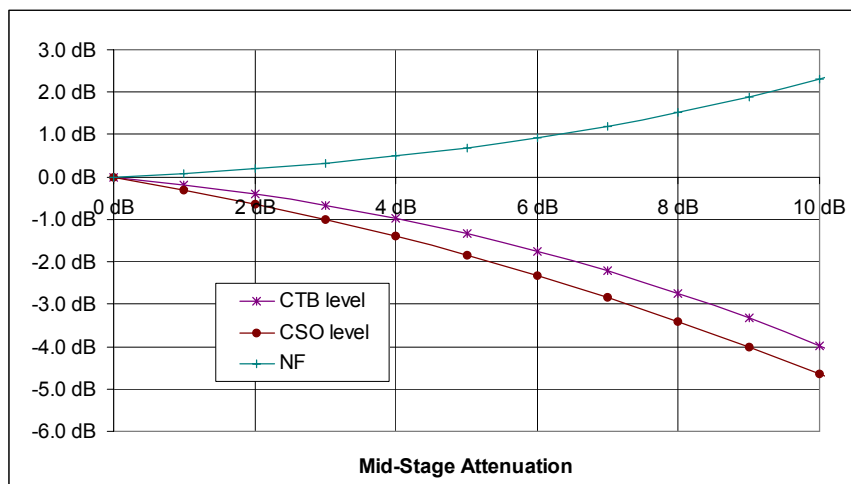
- US ingress monitoring option
- 3 outputs by internal splitting
- Improved ESD and surge protection
- Spectrum analyser function
- Plug-in module adjustments
- Return path ingress switches built-in
- HMS compatible EMT module available
- Fixed station memory for electrical identification
- Electrical gain & slope control modules
- Optional high performance return amplifier
- Improved US noise figure

Technical specifications

Parameter	Specification	Note
Downstream signal path (values with diplex filters)		
Frequency range	47 / 54 / 70 / 85...862 MHz	
Return loss	20 dB	1
Gain	2 x 30...39 dB	2
Input attenuator control range	20 dB	3
Input equaliser control range	25 dB	3
Mid-stage slope	8 dB	4
Flatness	± 0.4 dB	5
Group delay	2 ns	6
Test point	- 20 dB	7
Transponder connection	- 19 dB	8
Input by-pass attenuation	- 2 dB	
Noise figure	6.5 dB	9
Output level, DIN 45004B	129.0 dBμV	10
CTB 42 channels	115.0 dBμV	11
CSO 42 channels	116.0 dBμV	11
XMOD 42 channels	114.5 dBμV	11
CTB 110 / 77 channels	72.0 / 82.0 dBc	12
CSO 110 / 77 channels	71.0 / 80.0 dBc	12
XMOD 110 / 77 channels	68.0 / 75.0 dBc	12
Upstream signal path (values with diplex filters)		
Frequency range	5...30 / 42 / 50 / 65 MHz	
Return loss	18 dB	13
Gain	2 x 18.0 / - 8.5 dB	14
Ingress switching	0 / - 6 / < - 50 dB	
Gain control range	20 dB	15
Equaliser control range	7 dB	16
Flatness	± 0.5 dB	17
Transponder connection	- 26 dB	18
Noise figure	10.0 dB	19
Output level, DIN 45004B	113.0 dBμV	19
General		
Power consumption	28 W	20
Supply voltage	27...65 Vac , ±33...90Vdc / 205...255 Vac	
Supply current	see note	21
Maximum current feed through	8.0 A / port	22
Hum modulation	70 dB	22
Resistance for remote current	25 mΩ / port	
Input / Output connectors	PG11	
Test point connectors	F- female	
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	23
EMC	EN50083-2	
ESD	4 kV	24
Surge	6 kV	25

Notes

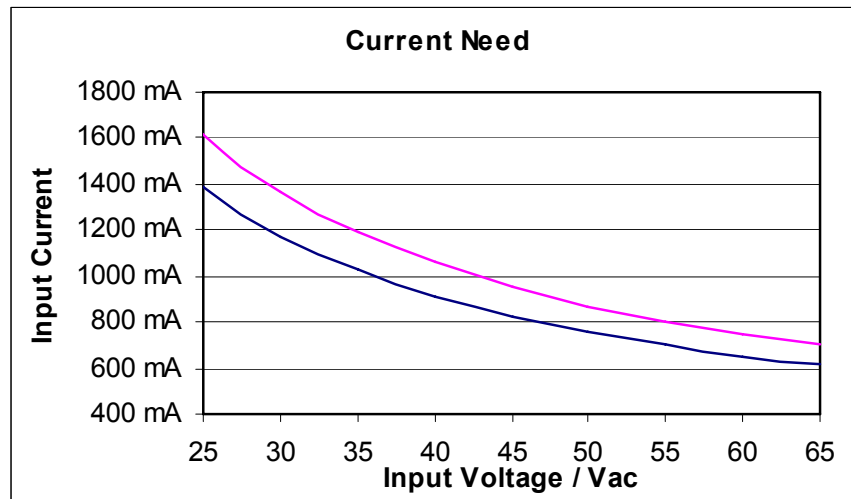
- 1) The limiting curve is defined at 40 MHz -1.5 dB / octave.
- 2) Guaranteed maximum gain is always 2 x 38 dB. With mid-stage gain control possibility the outputs can be used in low gain mode. Gain is defined with mid-stage equaliser and diplex filters. All other used plug modules are 0 dB jumpers.



The picture shows how the NF and distortion performance is changing if mid-stage gain control is used. Valid with 8 dB sloped CENELEC 42 chs loading.

- 3) Fixed value attenuators and equalisers are available.
- 4) The amplifier is defined with 8 dB tilted output. However, it is possible to use the amplifier with other slopes by changing the mid-stage equaliser plug.
- 5) Typical value. The guaranteed value is ± 0.75 dB. Flatness is defined with mid-stage equaliser and 2 pcs of diplex filters. All other used plug modules are 0 dB jumpers. Spec is valid 2 MHz after the starting frequency of the selected diplex filter.
- 6) Typical value for 4.43 MHz band. Measured at channel S2. At higher frequencies the specification is better.
- 7) Output TP is from a directional coupler and has a ± 0.75 dB tolerance. This connection can be used also as an injection point for a test signal of return channel. Input TP is a transformer type and it is having an accuracy of ± 1.5 . It can be used as the output test point for the return signal.
- 8) This is the level difference between output 1 and transponder connection pin on the motherboard.
- 9) Typical value at 862 MHz with the maximum gain. The guaranteed worst case value is 1.0 dB worse. Defined in conditions described in NOTE 2.
- 10) DIN 45004B, typical value at 862 MHz with maximum gain.
- 11) EN50083-3. Amplifier output was 8 dB cable equivalent sloped. All results are typical values in room temperature, which can be used in system calculations. XMOD is measured at the lowest channel. The highest recommended output level for the amplifier is 114.0 dBuV 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, which can be used in system calculations. XMOD is measured at 55.25 MHz. The high end of the frequency band up to 862 MHz was fulfilled with QAM channels having a level of -6 dB 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...65 MHz.
- 14) Active (AC6144)/ passive (AC6140) return module.

- 15) There are plug-in positions at the input and output of the upstream channel. Both positions are using the attenuators of JDA9xx series.
The attenuator at the return input is always selected by default in factory to be JDA900. When the station is working as a node, the equipment is automatically delivered with the plug-in low pass filter of correct frequency.
The wanted output attenuator plug has to be defined in the ordering code.
- 16) The pivot point is at 65 MHz. In 30 MHz operation the control range is 3.5 dB lower. This means that the reached maximum gain in 30 MHz operation is 3.5 dB lower if maximum slope is used
- 17) Valid with active return module AC6144. With plugs AC6140 and AC6147 the spec is 0.3 dB worse.
- 18) This is the theoretical level difference between the input connector of the return signal path and the injection pin of the up-stream signal of the transponder. It can be used when adjusting the transmitter of the modem. The input attenuator of the return path is 0 dB.
- 19) Typical values, which can be used in network design. Valid with the active module AC6144.
- 20) With the passive return path. With the active return path (AC6144) and transponder (AC6910) module the value is 4 W higher.
- 21)



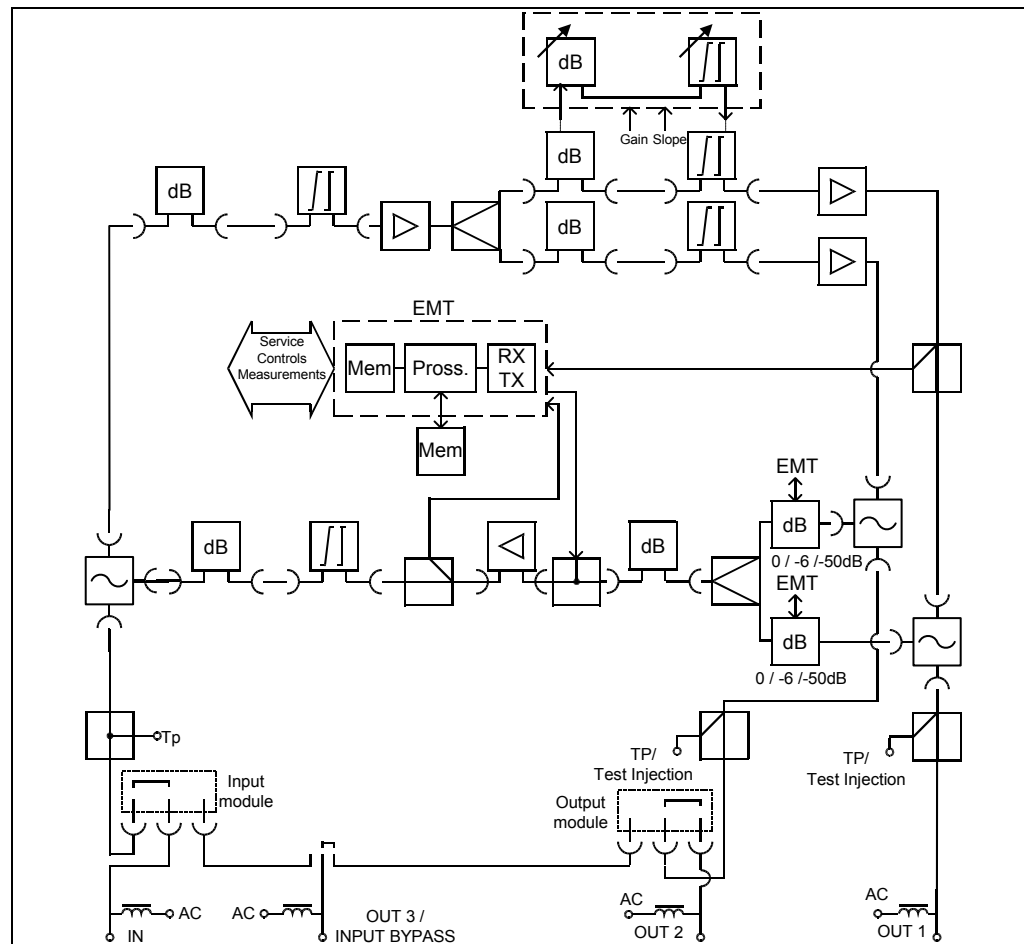
The lower curve is with passive return path. The higher curve is active return path and transponder.

- 22) At any frequency from 10 to 862 MHz when the remote current is less than 8 A. The hum modulation is defined to be $20 \lg(2U/U_{pp})$, where $2U$ is the peak-to-peak value of the carrier and U_{pp} the peak-to-peak value of the modulation signal (50 and 100 Hz). 12 A is the maximum current, which can be locally injected into all ports together. (Simultaneously)
- 23) The housing is tested to be class 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.
- 24) EN61000-4-2, contact discharge to enclosure and RF-ports.
- 25) EN61000-4-5, 1.2 / 50 μ s pulse to RF-ports.

Monitored Functions and Controlled Parameters

- US ingress monitoring
- Return path ingress switches ON/ -6 dB / OFF control
- 65 VAC voltage measurement
- Local DC voltages, 12 V and 24 V
- Temperature measurement
- Gain and slope controlling in ALSC mode
- Individual channel level measurement (AC6951)
- Spectrum analyser function
- Lid status monitoring
- Local connection indication at server
- Configuration data stored in main board eeprom (station memory)

Block Diagram



Ordering Information

AC2000 configuration map

		1-				2-			3-	4-		5-		6-	7-	8-	9-	
		1	2	3	4	1	2	3	1	1	2	1	2	1	1	1	1	2
AC2000																		
1-1 Input connection (first from left) A PG11 B 5/8" C IEC D 3.5/12 E F																		
1-2 Input by-pass/output 3 connection A PG11 B 5/8" C IEC D 3.5/12 E F X None (PG11 sealing plug)																		
1-3 Output 2 connection A PG11 B 5/8" C IEC D 3.5/12 E F																		
1-4 Output 1 connection (first from right) A PG11 B 5/8" C IEC D 3.5/12 E F																		
2-1 Input module A 0 dB, no by-pass (AC6110) B Splitter -3.7 dB, by-pass in use (AC6124) C Tap -8 dB, by-pass in use (AC6128) D Tap -12 dB, by-pass in use (AC6112) X None																		
2-2 Diplexer filters A 30/47 MHz (3 x CXF030) B 42/54 MHz (3 x CXF042) C 50/70 MHz (3 x CXF050) D 65/85 MHz (3 x CXF065) K Forward path jumper (3 x CXF000) X None																		
2-3 Input attenuator and equaliser A 2 x 0 dB plugs (JDA900 and TXA000) B Manual gain and slope adjustment (AC6171) X None																		
3-1 Future option X None																		
4-1 Interstage slope and gain adjustment A 2 x 8 dB slope @ 862 MHz (2 x TDE810) and no gain adjustment plugs B 2 x 8 dB slope @ 862 MHz (2 x TDE810) and full gain (2 x JDA900) C 2 x 8 dB slope @ 862 MHz, temp. comp. (2 x TTE810) and no gain adj. plugs D 2 x Flat response (2 x TXA000) and full gain (2 x JDA900) K Out 1 electrical gain & slope (AC6170), out 2 TDE810 and JDA900 X None																		
4-2 Output module for output 2 A 0 dB, 2 outputs in use (AC6120) B Splitter -3.7 dB, 3 outputs in use (AC6124) C Tap -8 dB, 3 outputs in use (AC6128) D Tap -12 dB, 3 outputs in use (AC6112) X None																		
5-1 Return path input module A 0 dB plug (JDA900) B HPF 15 MHz, ingress blocker (AC6223) X None																		
5-2 Return path unit A Active return 21 dB (AC6144) without att. and equal. B Active return 21 dB (AC6144) with 0 dB att. and equal. (2 x JDA900) E Passive return (AC6140) without att. and equal. F Passive return (AC6140) with 0 dB att. and equal. (2 x JDA900) G Active return 30 dB with gain and slope adjustment (AC 6146) X None																		
6-1 Future option X None																		
7-1 Future option X None																		
8-1 Element management transponder A Standard, CATVisor (AC6910) B With tuner level measurement, CATVisor (AC6950) C Standard, HMS (AC6910 HMS) D With tuner level measurement, HMS (AC6950 HMS) G Standard, CATVisor (AC6951) H Standard, HMS (AC6951 HMS), Q2/2007 X None																		
9-1 Power supply A Local powering, euro plug (230 VAC) B Remote powering with cable clamp (65 VAC) C Local powering, UK plug (230 VAC)																		
9-2 Gain and housing A 39 dB platform, painted housing, socket head screws																		