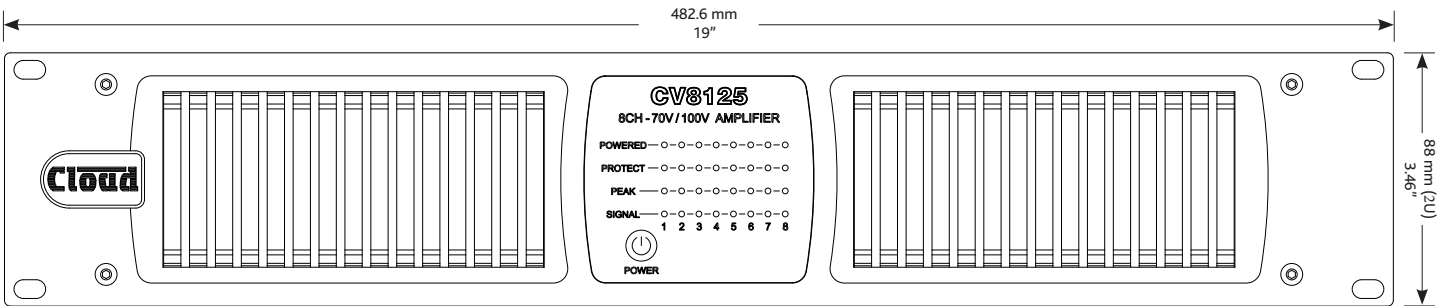
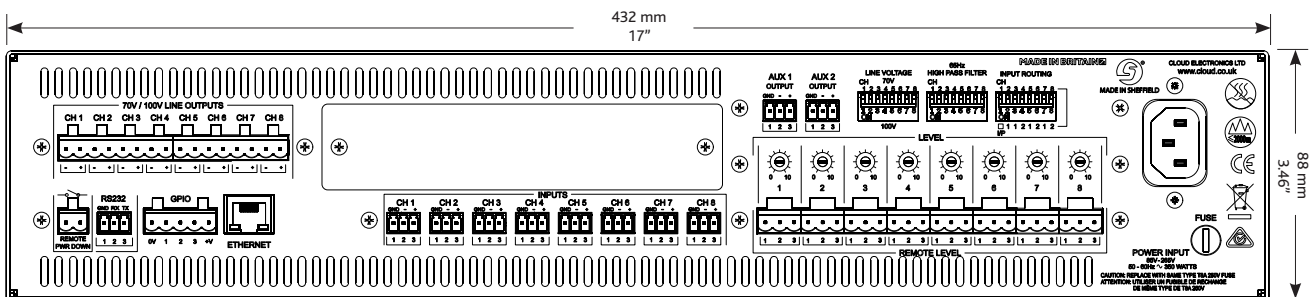


CLOUD CV SERIES DIGITAL AMPLIFIERS

MODELS: CV2500/CV4250/CV8125



Cloud CV8125 - front panel view



Cloud CV8125 - rear panel view

General Description

Cloud CV digital amplifiers are versatile multi-channel power amplifiers of advanced design, able to drive 100 V/70 V line loudspeaker systems directly. They are ideal for sound reinforcement applications in the retail, leisure, hospitality, commercial or industrial sectors. Large installations using multiple amplifiers will benefit from the amplifiers' network connectivity: each amplifier may be configured individually, controlled and monitored remotely over a standard Ethernet network.

All models include on-board, user-configurable DSP permitting great flexibility of internal architecture, and a wide variety of remote control options including Ethernet, RS-232 and DC: the latter providing compatibility with standard Cloud remote control plates. An important aspect of the design is that "out of the box", the amplifiers emulate earlier Cloud amplifier designs. It is not necessary to either connect a computer nor remove the lid to access internal jumpers to set primary configuration parameters such as input routing, which may be done using rear panel DIP switches. Where more advanced configuration options are needed, they can be easily accessed through the internal web server and an Ethernet connection to an external device.

Models:

The range comprises four models:

MODEL	CHANNELS	POWER
CV2500	2	2 x 500 W
CV4250	4	4 x 250 W
CV8125	8	8 x 125 W

The amplifiers use an energy-efficient Class D output stage which dispenses with line output transformers, and consequently offer great savings in weight and size over traditional designs of equivalent power ratings. Safety features of the design include output DC detection, overcurrent protection, and thermal monitoring. A switch-on delay provides loudspeaker protection at power-up. All models are built in a 2U steel enclosure, and use variable-speed forced-air cooling.

All models have a total power output capability of 1 kW, this maximum power rating being shared equally between odd-numbered channels in any combination, and even-numbered channels in any combination. Thus the odd-numbered channels can deliver a total of 500 W and similarly, the even-numbered channels can deliver 500 W. This feature allows – for example – one multi-channel amplifier to drive loudspeaker systems in areas of a building differing in size, while optimising the overall power capability.

Particular design attention has been paid to the amplifiers' energy efficiency*. An automatic power-down (APD) feature puts the amplifier into an ultra-low-current standby mode if no input signal has been detected for 30 minutes; in this mode the power consumption is approx. 2.5 W. The amplifiers also include a remote standby/wake up function, enabling them to be placed into standby mode - and subsequently powered-up again - by a simple external contact closure. Wake-up time is typically 200 ms.

In addition to the "soft" power switch and associated LED, the front panels are fitted with four LEDs for each channel: these confirm signal presence, peak level, activation of the protection circuitry and amplifier power status.

*ENERGY STAR certification.

The inputs are electronically balanced, on plug-in multiway connectors: an optional 8-channel Dante™ input card is available to allow the amplifiers to reside on a Dante™ network. Rear panel controls are provided for individual channel levels; multi-pole DIP switches allow the configuration of input routing options and the selection of per-channel 65 Hz high-pass filters (to help prevent loudspeaker transformer core saturation in 100 V/70 V line systems). Further DIP switches allow selection of 100 V line or 70 V line working. The rear panel also provides two balanced, line level, auxiliary outputs which may be used to feed low-frequency subs, additional amplifiers, for recording, or other purposes. By default, these carry the “pre-amp out” signals in Channels 1 and 2 respectively, but either may be extensively reconfigured via software (see following pages).

Many more set-up options can be achieved by configuring the amplifier’s DSP section, which uses an on-board web server. This may be accessed via the Ethernet interface from any computer or other device with an HTML5/CSS3-compatible browser application. DSP functions include input routing, level, limiting, 7-band Room EQ, hi-pass filtering, up to 1.5 s of delay and 5-band speaker optimisation EQ. Total flexibility of input routing permits an amplifier to be easily configured for multi-channel or parallel channel operation, bi-amping with full control of crossover parameters, or derivation of a separate channel for sub-bass use (model dependent). Additionally, it is also possible to redefine the sources for the auxiliary outputs, which also include Room and Speaker EQ sections, crossover filtering and level controls. Users can determine which amplifier functions are accessible on the hardware controls and which are only available via the web browser interface.

In addition to Ethernet remote control via the web server pages, the amplifiers are compatible with standard Cloud RL Series remote level control plates: each channel has a dedicated remote control connector for this purpose. A greater degree of control is possible via the RS-232C serial port; this allows the amplifier’s levels, channel mutes and power-down to be readily controlled by most third-party control systems (e.g., Crestron, AMX, etc.). Serial codes may also be transmitted via Ethernet. A 3-way GPIO port is also provided, which may be used as an external master mute (equivalent to the Music Mute control input on most other Cloud products), or for fault condition signalisation.

An optional web monitor card, the WM-n is available for all models (where ‘n’ = the number of channels supported); this replaces the standard speaker output card and performs scheduled, offline impedance tests using test tones.

Internal temperatures, amplifier power status and results of impedance tests (when the optional WM-n card is fitted) will be reported via the web interface and SNMP.

Key Features

Amplifier:

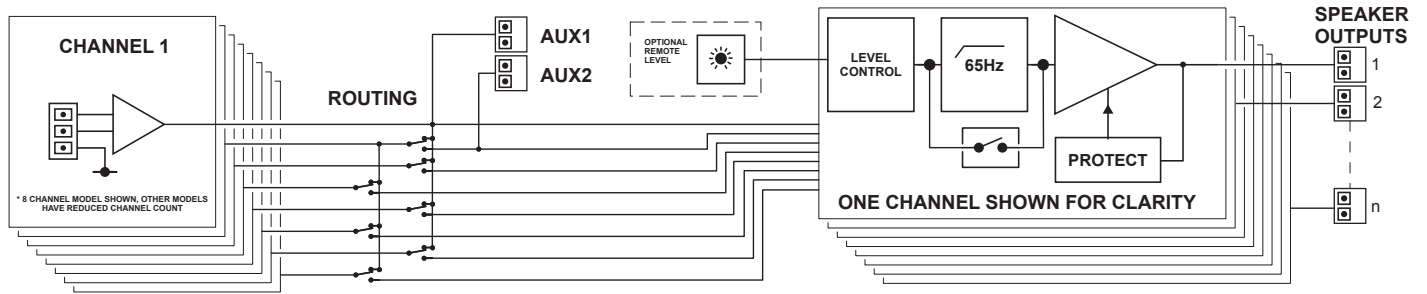
- Advanced design of 2, 4, and 8-channel Class D power amplifiers
- Standard “out-of-the-box” Cloud amplifier functionality: requires no computer configuration or internal access for basic operation
- Transformerless output stage drives 70 V/100 V line systems directly
- Nominal power ratings: 2 x 500 W (CV2500), 4 x 250 W (CV4250), and 8 x 125 W (CV8125)
- Thermal protection, overcurrent limiting and DC offset protection
- Switch-on delay for speaker protection during power-up
- On 4, and 8 channel models, power sharing allows odd and even channel groups to deliver a maximum of 500 W each
- Per-channel, front panel LEDs for signal presence, peak level, protection activity and power status
- Balanced line level inputs
- Optional Digital Interface Bus
- Per-channel output level controls
- Rear panel input routing switches configure amplifier for manual selection of multichannel, stereo or mono operation
- Rear panel switches select 70 V line or 100 V line output levels
- Per-channel high-pass filter (65 Hz default frequency: adjustable in software) to protect against transformer saturation in 100 V/70 V line systems
- Balanced, line level auxiliary outputs with full channel functionality, configurable and controllable via software

- Independent Automatic Power Down on odd and even channel groups; minimises power consumption in absence of an input signal
- <3 W power consumption with all channels quiescent
- RS-232C serial port for remote control of all amplifier functions, including DSP configuration
- Compatible with standard Cloud RL Series remote level control plates (per-channel)
- Remote Power Down control input
- 3-way GPIO port for master mute function or fault reporting
- Variable speed forced-air cooling
- 2U 19” rackmounting units

DSP functions:

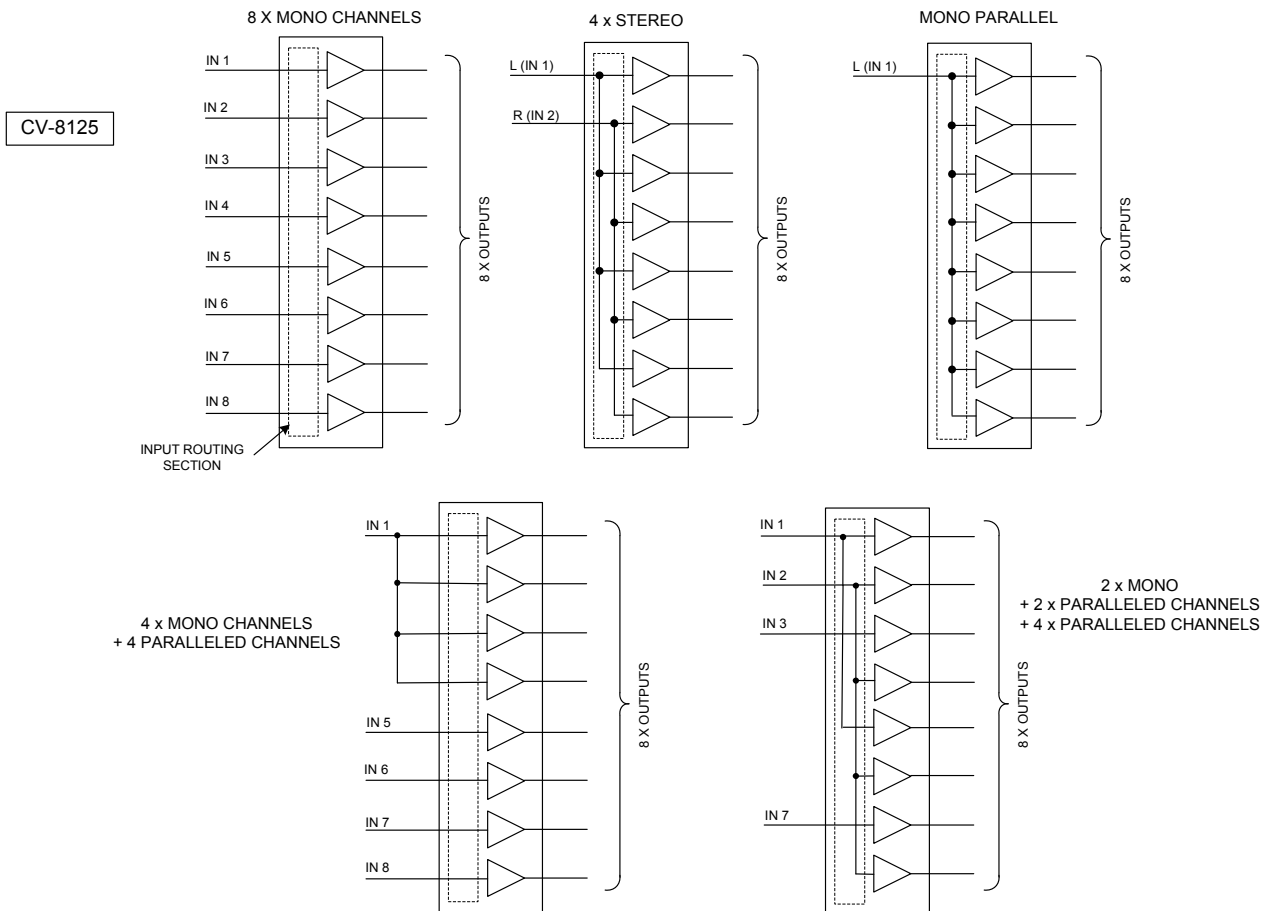
- On-board, per-channel DSP section providing extensive routing, filtering, EQ and limiting for all channels including the auxiliary outputs
- 1.5 s delay pool, freely assignable across all channels and aux outputs
- Simple DSP configuration via on-board web server; any device with a compatible web browser and an Ethernet connection can be used to perform setup
- Built-in DSP crossover configurations allow amplifiers to be easily used with 2-way speakers
- Crossover configurations allow derived LF sub output
- DSP-implemented 5-band parametric speaker EQ section
- Optional EQ presets for OEM speakers (*under development*)
- Optional web monitor card performs load impedance tests and reports out-of-tolerance results via a web interface or SNMP

Block Diagram



Input Routing

The input routing switches permit various permutations of mono, stereo and multi-channel operation without any external parallel wiring. Some possibilities are shown below (CV8125 shown as example):



Although the routing options available using the rear panel switches are likely to suit most applications, even greater flexibility of routing is available using the web browser pages, which allow any amplifier channel to be sourced from any physical input (or none) without restriction.

Software configuration

All models can be easily configured for specific amplification tasks using the on-board web server via a computer (or any device with a compatible web browser) connected to the rear panel Ethernet port.

Some examples of web browser control pages are shown below:

Audio: Channel 1

Mono

Input Routing

Rear Panel No

Input Type

Input Source

Mono Sum No

Room EQ

Speaker EQ

Output

Output Level

Rear-panel No

Level

Mute Off

Line voltage

Rear-panel No

Voltage

Limiters

Audio channel configuration allows expanded input routing options, stereo-to-mono summing, room and loudspeaker EQ adjustment, limiting and output level control.

The EQ sections have "basic" (2-band) and "advanced" (7-band fully parametric) modes.

Room EQ

Enabled Yes

Advanced mode Off

Bass

Treble

Room EQ

Enabled Yes

Advanced mode On

Band

Freq

Gain

Q

Speaker EQ

High Pass Filter

Rear-panel No

Enabled Yes

Cutoff

Polarity +

EQ Enabled Yes

Advanced mode Off

Manufacturer

Model

The two auxiliary outputs can be fully configured: source, level, EQ, filtering, etc. are all available.

Audio: Auxiliary 1

Auxiliary Output

Input Routing

Slave Yes

Master ◀ Channel 1 ▶

Room EQ

Filter

Filter Type ◀ Low Pass ▶

Slope ◀ Linkwitz-Riley 24dB ▶

Frequency ◀ 20000 ▶
Frequency

Speaker EQ

Output

Limiter

Enabled On

Threshold ◀ -9 ▶
dB

Clip Offset ◀ 9 ▶
dB

A total of 1428 ms of delay can be freely shared between the main amplifier channels and the auxiliary outputs. Delay can be assigned in terms of meters and feet as well as time.

Delay Configuration

Delay Allocation 750 of 1482 ms

Units ◀ ms ▶

Channel 1	100 ms
Channel 2	150 ms
Channel 3	250 ms
Channel 4	250 ms
Channel 5	0 ms
Channel 6	0 ms
Channel 7	0 ms
Channel 8	0 ms
Auxiliary 1	0 ms
Auxiliary 2	0 ms

Reset Save

The amplifiers have built-in fault monitoring and logging facilities.

Additionally, with the optional WM monitor card, each channel can have its test signal frequency defined, together with load impedance and test tolerance. Impedance tests may be scheduled to run at user-selectable intervals and at specific times of day. Amplifier power-on/power-off times and over-temperature are also recorded; an event log is maintained for record-keeping purposes.

Monitoring

Status

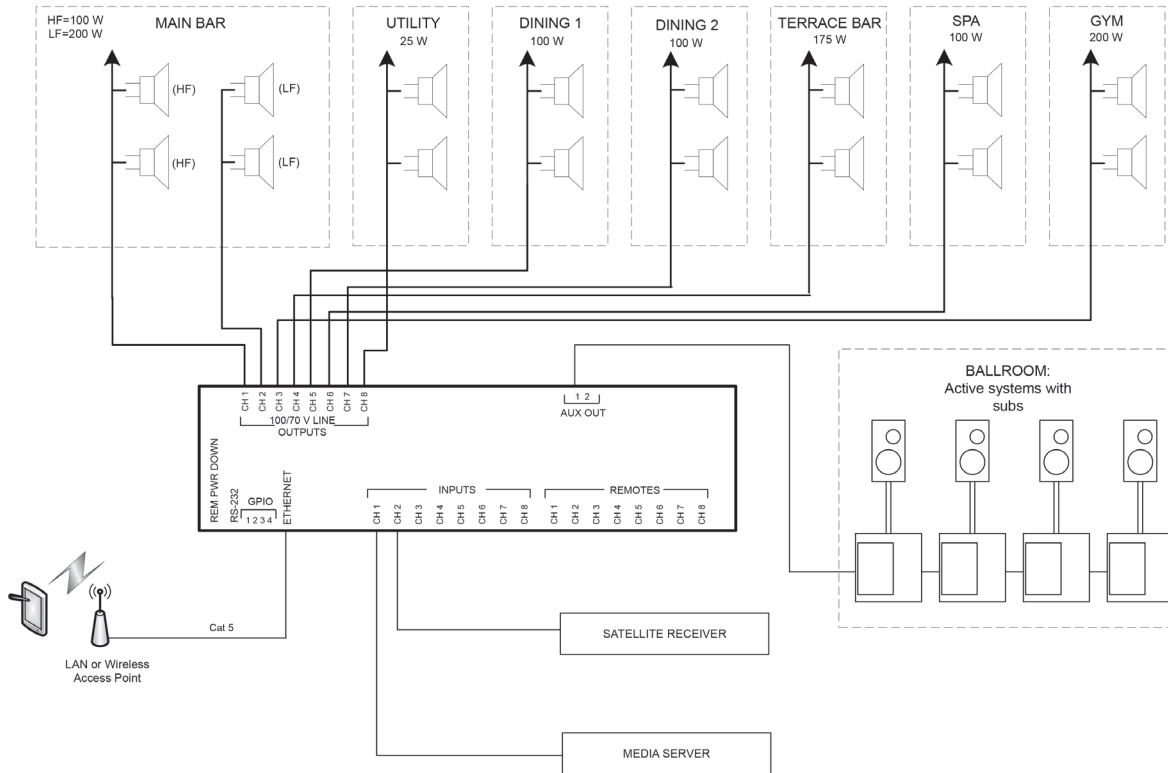
	1	2	3	4	5	6	7	8
Powered	○	○	○	○	○	○	○	○
Protect	○	○	○	○	○	○	○	○
Peak	○	○	○	○	○	○	○	○
Signal	○	○	○	○	○	○	○	○
Temperature	●	●	●	●	●	●	●	●

Rear Panel Controls

Temperature

PSU 1	25 °C
PSU 2	25 °C
Channel	1 2 3 4 5 6 7 8
Temperature	--- °C

Application Example



The example above shows how the eight channels of a CV8125 amplifier may be used to provide audio to different areas of a hotel. All loudspeakers are 100/70 V line models and the system may be extended to additional speakers in each area as required, provided the total 500 W power capacity of the odd/even channel groups is not exceeded.

The Main Bar area is shown with a two-way speaker system: Channels 1 and 2 are configured as a 2-way crossover, with filter characteristics set according to the speaker manufacturers' specifications.

The other areas are arranged to take advantage of the amplifier's odd/even channel maximum power capacity.

A Wireless Access Point is connected to the Ethernet port, allowing control of the entire system to be achieved from a hand-held device anywhere in the vicinity. Source selection and level control for each zone can be adjusted using the internal web pages on any standard browser. Only two external audio sources are shown for clarity, but up to eight may be connected: the browser pages permit any source to be assigned to any of the eight channels.

One of the auxiliary outputs is shown connected to a set of active 2-way speaker systems in the Ballroom; because this output is balanced, a long cable run may be used without fear of signal loss or interference.

Technical Specifications

		All Models			
Performance	Output Power	Total output power 1 kW, all channels ¹			
	Output Voltage	70 V or 100 V (rms)			
	Frequency Response	20 Hz to 20 kHz, +/-0.5 dB			
	High Pass Filter	-3 dB @ 65 Hz via rear panel switches -3 dB @ 20 Hz to 20 kHz via DSP configuration			
	Distortion	0.03%THD @1 kHz, 1 dB below rated output			
	Noise	-94 dB, 22 Hz to 22 kHz			
	Crosstalk	< -90 dB @1 kHz, -82 dB @10 kHz adjacent channels <-107 dB @1 kHz, -93 dB @10 kHz non-adjacent channels All tested with 125 W load			
Inputs	Connectors	3-pole 3.5 mm-pitch plug-in screw-terminal connectors			
	Sensitivity	0 dBu (0.775 V _{rms})			
	Input Impedance	10 kohms (balanced); 5 kohms (unbalanced)			
General	Output connectors	2-pole 5 mm-pitch plug-in screw-terminal connectors			
	Remote level control connectors	3-pole 5 mm-pitch plug-in screw-terminal connectors Compatible with Cloud RL Series remote control plates			
	Power input	85 to 264 V AC, 40 to 60 Hz			
	Mains protection	Class 3T 250 V fuse, 20 x 5 mm, rating T8A			
	Amplifier Protection	Overcurrent DC Thermal monitoring Switch-on delay			
	Status Indicators	Power applied, Protection active, Signal peak, and Signal present			
	Cooling	Variable speed fan			
	Dimensions (W x H x D)	Net	482.6 mm x 88 mm x 381.8 mm (19 in x 3.46 in x 15.03 in)		
		Shipping	606 mm x 164 mm x 558 mm (23.9 in x 6.5 in x 22 in)		
	Weight		CV2500	CV4250	CV8125
Net		6.86 kg (15.37 lb)	7.26 kg (16.26 lb)	8.05 kg (18.03 lb)	
Shipping		8.86 kg (19.85 lb)	9.26 kg (20.74 lb)	10.05 kg (22.51 lb)	

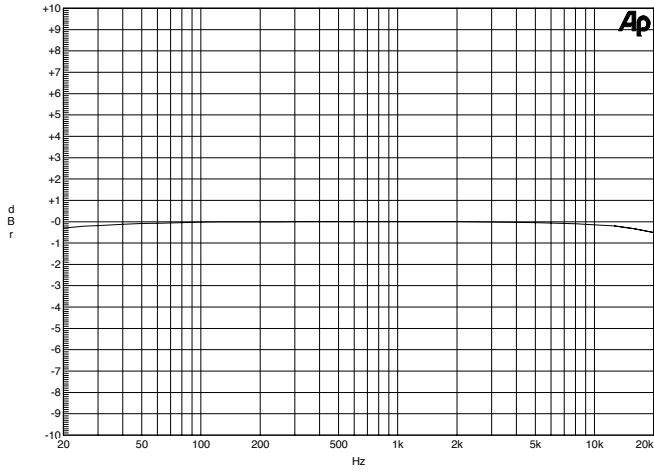
NOTES: 1. Odd- and even-numbered channel groups can deliver up to 500 W simultaneously, but in models with more than two channels, the available power is reduced proportionately when any channel is delivering more than its nominal rating.

Energy Star certificate web link: <http://www.ul.com/customer-resources/ul-energy-efficient-product-database/>
UL Energy Efficient Product Database.

Performance Graphs

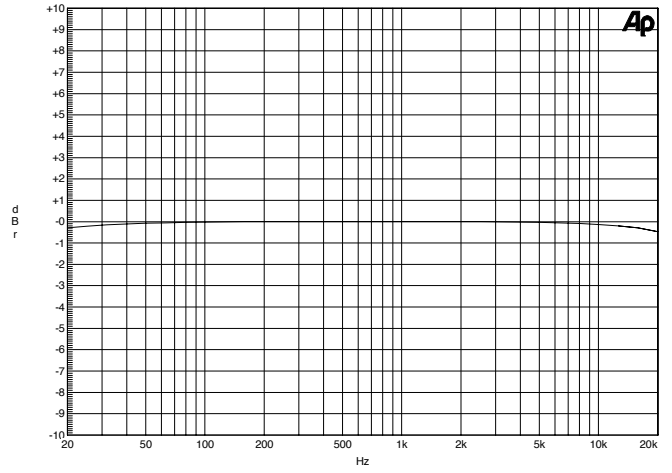
Frequency Response

Frequency Response, Ch1 into 80 Ohms



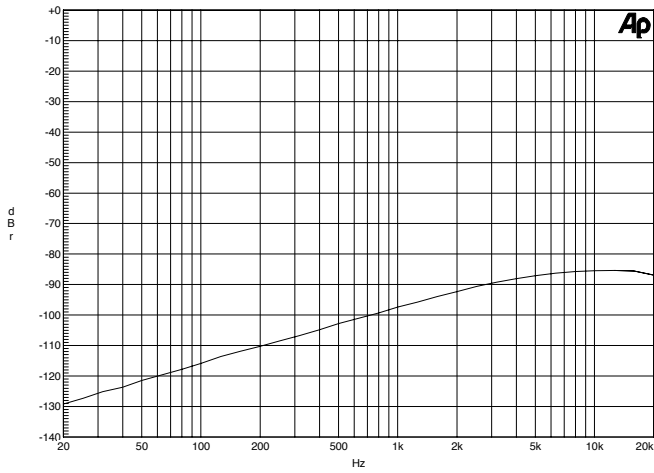
Open Circuit Frequency Response

Frequency Response, Ch1 No Load



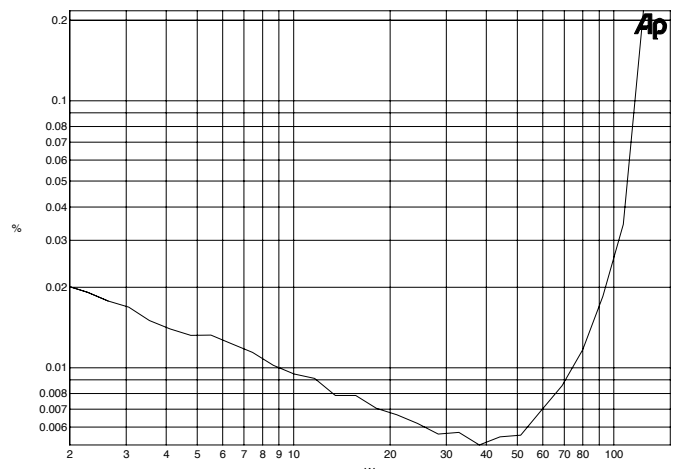
Crosstalk Ch1 to Ch2

Crosstalk Performance, Ch1 to Ch2, Ch1 @100V O/P into 80 Ohms



THD+N

THD+N % VS Ouput Power into 80 Ohms



Architect's and Engineer's Specification

The power amplifiers shall be available in two channel, four channel, six channel and eight channel versions. The output stage shall be a transformerless constant voltage type suitable for driving 100 V line or 70 V line loudspeaker systems. Each amplifier shall have two groups of channels with a total of 500 watts available from each group: the even numbered channels shall form one group, the odd channels a second group. Power sharing shall be achieved by amplifier channel loading.

The amplifiers will include an automatic power-down (APD) feature which will shut down either group of channels that has not received an input signal for thirty minutes.

The amplifiers' front panels shall incorporate a "soft" AC power switch, an LED indicating POWER ON, and LEDs indicating Signal Present, Peak Level, Protect status and Power status for each channel. The Signal Present LEDs shall illuminate when the output level is 30 dB below the rated output. The Peak LEDs shall illuminate at the onset of signal clipping. The Protect LEDs shall indicate activation of the channel protection circuitry. The Power status LEDs shall indicate that the channel has not been powered down by the APD system.

The amplifiers shall be provided with a number of inputs equal to the number of channels. The input connectors shall be of removable, screw-terminal type. The inputs shall be electronically balanced and capable of operating with both balanced and unbalanced sources. The input impedance shall be 10 kohms (balanced). It shall be possible to configure the amplifiers to operate in the following configurations as a minimum: all channels independent, one input feeding all channels or two inputs feeding the amplifier channels in pairs for stereo operation. It shall be possible to enable a high-pass 3rd order filter with a turnover frequency of 65 Hz independently in each amplifier channel. The amplifiers shall be provided with externally accessible switches for setting each channel to operate with 70 V line or 100 V line systems independently. It shall be possible to select all the configurations and settings described in this paragraph without accessing the interior of the amplifier enclosure, and without connecting an external device.

It shall be possible to fit an optional card to the amplifier to enable it to accept up to eight input signals from a Dante™ audio network. When fitted, the amplifier will appear in Audinate Dante Controller software as a standard Dante output device.

Output level adjustment will be provided for each amplifier channel via a rear panel control: at the minimum setting, the channel shall be muted. Each channel shall deliver its rated power from an input signal of 0 dBu with the channel level control set at maximum. Output mute protection on power-up and thermal protection shall be provided. The amplifiers will also be protected against short-circuits at the output, and excessive combination of output voltage and current. The amplifiers' outputs shall be on removable, screw-terminal connectors.

The amplifiers shall include a digital signal processing (DSP) section: this shall be controllable through a series of web pages stored internally which shall be accessible on a web browser application on an external computer or similar device connected to a standard Ethernet port.

The DSP section shall provide the following facilities as a minimum: i) configuration of amplifier channels for mono, stereo, mono or stereo bi-amping with or without a separate LF sub output; the availability of these configurations shall be restricted according to the number

of amplifier channels; ii) an input matrix section permitting any input to feed any amplifier channel without restriction, iii) equalisation for each channel: this shall have a minimum of seven bands and be of the fully parametric type; the highest and lowest frequency bands shall be selectable to bell or shelf modes; iv) a further equalisation section for each channel capable of optimising the channel for use with a selection of popular loudspeakers specific to commercial sound applications by both the selection of a loudspeaker-specific preset, and by the use of an equaliser of the parametric type with a minimum of five frequency bands; v) a limiter section in each channel, with threshold adjustment; vi) control of output level, low-pass filtering and polarity of each auxiliary output.

There shall be at least two balanced line level auxiliary outputs on removable, screw-terminal connectors. It shall be possible for the source of each auxiliary output to be selectable from any of the amplifier's main channels, and each output shall include the same equalisation and limiter capabilities as the amplifier's main channels. Each auxiliary output shall also include a filter section to permit the configuration of loudspeaker crossover filters, with choice of filter type and slope.

It shall be possible to apply a time delay to any or all channels and/or auxiliary outputs. The total delay available shall not be less than 1.482 seconds, and it shall be possible to freely share this maximum delay between all channels and/or auxiliary outputs. It shall be possible to assign the delay in units of either time or distance (both metric and imperial).

The amplifier shall maintain an internal log of amplifier power-up and power-down times, occurrences of over-temperature, plus impedance test results if the load monitoring option is fitted.

Load impedance monitoring shall be available as an option on all versions. It shall be possible to specify test frequency for each channel and also the dates and times of load testing.

An optional remote control shall be available for any or all amplifier channels, to allow adjustment of channel level. The remote control connector shall be of removable, screw-terminal type. The amplifiers shall be equipped with a bi-directional serial control port to RS-232C standards: all amplifier and DSP functions shall be controllable via this port.

The amplifier shall be built in a steel chassis suitable for mounting in a standard 19" equipment rack, and occupy two rack spaces. Variable speed forced-air cooling shall be employed; the fan shall not operate unless the internal temperature dictates it.

The amplifiers shall operate on all AC supply voltages between 85 V and 264 V. They shall be compliant with the relevant provisions of EnergyStar® Eligibility Criteria Ver. 3.0 for Audio-Video Products. In the absence of an input signal, they shall automatically enter "standby" mode wherein the DC power consumption shall be less than 3 W. It shall also be possible to control the power status of the amplifiers via a dedicated control input with an external contact closure.

The power amplifiers shall be the Cloud CV2500 (two channels), CV4250 (four channels), and CV8125 (eight channels). The load impedance monitoring option shall be the Cloud WM-2 (two channels), WM-4 (four channels), WM-6 (six channels) and WM-8 (eight channels). The remote level control plate shall be the Cloud RL-1 Series.

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