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## Design Brief - A34.2 Power Amplifier

4 pages



The A34.2 is a 2 x 150 watt stereo power amplifier utilising proprietary UFPD technology. It is designed to provide high power output with very low distortion for Primare's PRE32 audiophile preamplifier and all other preamps, as well as multi-channel audio processors. UFPD's instantaneous rise time results in a naturally fast, clean and agile sound over a much wider frequency range and with exceptional headroom. Ecologically the A34.2 is far superior to conventional Class A/B designs being extremely efficient without generating excessive heat.

### Audiophile Topology

The A34.2 houses two discrete UFPD amplifiers housed in a heavy gauge alloy steel chassis, which provides strength, rigidity, and screening, while being effective at damping vibrations from external sources. Each channel incorporates unbalanced (RCA) and balanced (XLR) inputs, as well as high quality gold plated speaker terminals, trigger and RS232 control inputs.

The A34.2 can easily be switched to bridged mode and will then provide one fully balanced mono channel capable of delivering up to 550W into 8ohms.

Balanced signal transmission means that two identical signal lines are used to carry the same signal with opposite phase. Any noise is common to both lines and is present in equal amounts with identical phase. At the receiving end a (differential) receiver retains the opposite phase signals (music) and rejects the common phase ones (noise), leaving only the pure original signal. Balanced circuits therefore keep the signal as free as possible from interference.

All audio signal switching between bridged or stereo mode, unbalanced (RCA) or balanced (XLR) inputs is carried out using high performance signal relays.

The A34.2 incorporates a preamp stage comprising Burr-Brown OPA2134 and Analogue Devices AD8512 OP-amps that automatically maintains a constant gain of 30dB (unbalanced) and 24dB (balanced), while stabilising input impedance at 15kohm in stereo or bridged configuration.

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## Ultra Fast Power Device (UFPD) Class-D Amplifier

The use of switch mode power electronics is gaining in popularity as the result of its lower energy consumption and as a way to squeeze more amplifier channels into smaller spaces. Unfortunately Class D amplifiers and their switch mode power supplies have traditionally deserved a reputation for poor audio quality because it is very difficult to produce a full range 'hi-fi' signal through them. A major source of distortion is the demodulation filter on the output which becomes unstable with variations in loudspeaker impedance, unless it's controlled by sufficient feedback. The failure to provide enough feedback to cope with dynamic changes in loudspeaker impedance across the audio band results in the 'classic' Class D sound of rising THD with frequency. While very dynamic and vivid initially, it can sound tiring and uncontrolled in the long term, especially when driving complex loads like multi-driver speakers.

Primare's UFPD (Ultra Fast Power Device) provides for the possibilities of an 'audiophile' Class D design. It is a Class D technology which has a consistent 26dB feedback loop gain across the entire audio range and is stable way beyond the audio band. This is quite easy to achieve in conventional linear 'continuous signal' amplifiers, but much more difficult in 'non-continuous' high speed switching amplifiers.

Rather than have the amplifier and then the filter as discrete stages, the UFPD design integrates the two, making control with feedback much more immediate and accurate. The UFPD amplifier actively adapts the loop gain to keep the total loop stable during start up, clipping and current limit. It senses the changes to the filter output and compensates by applying the precise amount of feedback. This adaptive pole control allows for several more dBs of constant loop gain across the audio band and maintains performance irrespective of load (impedance) variations.

Primare's UFPD treats all signals equally regardless of frequency or slew rate and has the ability to suppress the filter resonance entirely. Consequently THD is kept very low at all frequencies. With a very wide 'load independent' frequency response UFPD is able to drive any speaker while maintaining control and accuracy.

Primare has optimised the performance of its innovative UFPD design with the precise selection of circuit component values and quality, verifying the design with extensive measurement and listening.

### UFPD notes:

- UFPD switching frequency is above 300kHz.
- The output filter cut-off is higher than the audio band but is well below 300kHz.

### UFPD displays:

- Wide bandwidth
- Flat frequency response
- Load independant frequency response
- Low output impedance in the entire audio band
- Low THD in the entire audio band
- Low noise

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**Most Class D technologies display:**

- Limited bandwidth
- Peaking frequency response
- Load dependant frequency response
- High output impedance at high frequencies
- High THD at high frequencies
- High noise

**PFC Power Supply**

Although switch mode power supplies have gained a reputation for noise and unreliability, the theoretical advantages of the design are well known. The rails can be regulated with precision and current demand from the mains is lower as the result of high efficiency and the absence of current spikes: energy is taken from the mains over a larger period of the sine wave.

In conjunction with UFPD, Primare uses an isolated PFC (Power Factor Control) technology in the power supply, which controls the current from the mains voltage so that it is a pure sine wave with the same frequency and phase as the mains voltage. This means that even if 1000W is taken from the mains, other equipment in the room will not be affected. Its presence becomes virtually invisible to the mains voltage! The isolating stage of the converter works in a ZVS mode and as a result, the switch flanks contain a lower quantity of harmonics, providing lower EMI and a clean environment for the amplifiers to work in.



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**Product specification A34.2 stereo mode**

Output power	2 x 150W / 8 ohm THD+N <0.1%
Inputs	2x RCA / 2x XLR switchable, RS232, trigger (12V)
Input impedance	15kohm RCA/XLR
Output Impedance	0.3ohm at 1kHz
Gain	30dB unbalanced, 26dB balanced
Frequency response	20 Hz – 20kHz, -0.5dB
Signal to Noise	20-20kHz unweighted 105dBV
THD + N	< 0,005% (1kHz, 100W, 8 ohm)
THD + N	<0.02% 20Hz-20Khz (10W 8 ohm)

**Product specification A34.2 bridged mode**

Output power	1 x 550W / 8 ohm THD+N <0.1%
Inputs	1x RCA / 1x XLR switchable, RS232, trigger (12V)
Input impedance	15kohm RCA/XLR
Output Impedance	0.6ohm at 1kHz
Gain	30dB unbalanced, 26dB balanced
Frequency response	20 Hz – 20kHz, -0.4dB
Signal to Noise	20-20kHz unweighted 105dBV
THD + N	< 0,004% (1kHz, 100W, 8 ohm)
THD + N	< 0.015% 20Hz-20Khz (10W 8 ohm)

**Common**

Power consumption	Standby: 0.3W, Idle: 24W
Dimensions (wxdxh)	430 x 385 x 105 mm
Weight	10.5 kg
Colour options	Black or titanium

**Ends June 2014**