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I32 Design Brief, 4 pages

I32 two channel integrated amplifier

The I32 is an upgradable two x 120 watt integrated amplifier utilising proprietary UFPD power technology. It is designed to provide high power output with very low distortion and system control for Primare's new 30 series range of hi-fi separates. 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 I32 is far superior to conventional Class A/B designs being extremely efficient without generating excessive heat. In addition it provides a special eco-friendly standby mode of just 0.2 W.

Audiophile Topology

The I32 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. To reduce distortion the pre-amp section is isolated from the power section as far as possible, being fed by a dedicated power supply. The I32 incorporates 2 pairs (L,R) of low-noise balanced XLR inputs and 3 pairs of RCA inputs. There are 2 pairs of RCA outputs: pre-out and record. There will also be the option of an upgrade board offering MEDIA/streaming connections like USB, iPod, LAN etc.

All signal paths are as short as possible and all signal treatments (source selection, volume and channel balance trims) are performed purely in the analogue domain. Unbalanced inputs are converted to balanced signals by a conversion stage buffered by the excellent sounding Burr Brown OPA2134 op-amps and fed to volume and balance controls employing closely matched LM1972 attenuators in a balanced configuration. Source selection is via high performance signal relays.

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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, characterised by rising THD with frequency. Primare's UFPD (Ultra Fast Power Device) technology provides for the possibilities of a full-range 'audiophile' Class D design. It is a Class D technology which has a consistent 26dB feedback loop gain across the entire audio bandwidth and is stable way beyond the audible frequencies. 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.

Summary

- 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

- 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

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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.

Ultra low-power standby

The I32 incorporates a very low power eco mode for standby. Power consumption is just 0.2W.

Upgradable Design

A media upgrade will be available, which offers streaming of higher resolution files from Internet, NAS or PCs; Internet radio content and also digital audio input from a range of devices including CD players, smart phones, personal players, sat boxes etc. See spec for **preliminary** list of inputs/outputs (**subject to change**).

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Easy User Interface

An easy set-up menu is available via the I32's graphical display, which is dimmable in four steps. The display auto-dims after a few seconds and returns to programmed brightness at the touch of a control. Set-up includes power-up volume, maximum volume adjustment, input re-naming (up to 6 characters), input disabling and trim function (volume and balance) for each input in steps of 1dB.

Input 5 can be used to provide access to the I32's 120W power modules for additional channels of power amplification in a surround sound system.

Product specification I32

Output Power	2x 120W at 8Ω 2x 230W at 4Ω
Analogue Inputs	2 pair XLR (L & R) 3 pair RCA (L & R)
Optional Media i/o module **(inputs/outputs subject to change)**	2x Digital Coaxial input (2 RCA input jacks) 1x Digital Optical input (1 Toslink) 1x Digital Coaxial output (1 RCA jack) 1x USB data input 1x Comp or S-video o/p (TBD) for iPod/iPhone video playback 1x SD memory data input with converter to USB incorporated in the underside connector box (optional). 1x LAN input (1 RJ45 jack) 1x Wi-Fi /1x DAB/FM antenna (External jacks, DAB and FM using the common antenna) Digital and analogue audio for iPod/iPhone interface
Input Impedance	Both RCA and XLR 36kΩ
Analogue Record Output	1 pair RCA (L & R)
Pre Out	1 pair RCA (L & R)
Output Impedance	RCA 94Ω
Frequency Response	10Hz – 20kHz, -0.5dB
THD + N	< 0.05%, 20Hz – 20kHz, 10W at 8Ω
Signal to Noise	-100 dBv
Power Consumption	Standby: 0.2W; Operate: 31W
Dimensions (wxdxh)	430 x 420 x 106 mm
Weight	11 kg
Colour Options	Black and Titanium