September 2014

I32 Design Brief, 8 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.

more…

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

more...

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

The MM30 media upgrade is 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.

more...

MM30 media board

The MM30 multimedia upgrade module adapts the EISA award-winning I32 integrated amplifier and the PRE32 stereo preamplifier for audiophile streaming, internet radio and gapless audio playback, through integration with UPnP devices such as PC/Mac/NAS iPod®, iPad®, iPhone® or USB thumb drive. It's a genuine 24/192 DAC board including coax, TOSLINK, USB-A and USB-B inputs (incorporating an asynchronous master clock for low jitter), and a high resolution (192 kHz) coax output.

In addition there is a high quality easy-to-install aptX Bluetooth upgrade for the I32, which takes the form of a small internal circuit board and external antenna (for improved reception), the threaded antenna input replacing the DAB/FM terminal on the MM30 fascia.

Our definitions for File Based Audio:

Streaming: 'live' download for Internet radio and Music services like Spotify and playing music over a network from NAS or PC

Playback of Audio files: Playing music files directly from laptop or PC over a USB-B connection. This means using programs like iTunes (Amara) and JRIVER as user interface

Recommendations

- Use of a high quality wireless router
- Use of high quality CAT7 Cables
- Use of a switch between the Primare MM30, NP30 or PRE60 and computer or NAS
- Use of good quality files such as WAV, AIFF or FLAC-uncompressed
- Primare App is available for both iOS and Android. (iOS version supports Voice Over for visually impaired users)
- For High Res streaming LAN is needed
- WLAN: 802.11b, g, n; 2.4 GHz band; WPA, WPA2 security – Ethernet: 10/100 MBit/s – DHCP and AutoIP support
- Advantage of an asynchronous USB connection is that the clock, present in the DAC, controls the flow of audio data from the computer to avoid the imprecise clock used in the computer.
- Please use a high quality USB-B cable for connection and make sure to check your audio settings on your computer
- Also try the different USB connections on your laptop as they do sound different.
- Please make sure to download the PC audio driver from the SUPPORT section on our website
- For playing music from PC over USB-B please download the Primare PCaudio driver from the SUPPORT page from www.primare.net
- From MAC it will play automatically over USB-B will give best sound quality from Spotify PREMIUM. (please set audio setting in Spotify to Extreme)
- Firmware updates can be done from the device's MENU or from Primare App

more…

Supported Audio Formats

Codec	Channels	Samplerates in kHz	Sample format	Bitrate	Gapless	Restrictions
WAV	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24 Float: 32	n.a.	yes	samplerate > 48kHz not on WLAN
LPCM	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24	n.a.	yes	samplerate > 48kHz not on WLAN
AIFF	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	Int: 8, 16, 24 Float: 32	n.a.	yes	samplerate > 48kHz not on WLAN
FLAC	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48, 88.2, 96, 176.4, 192	16/24	n.a.	yes	samplerate > 48kHz not on WLAN
ALAC	mono/ stereo	44.1, 48, 88.2, 96	16/24	n.a.	yes	
MP3	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 320kBit/s CBR/VBR	yes	gapless support needs LAME extensions in file header
MP4 (AAC)	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 400kBit/s CBR/VBR	yes	gapless support needs LAME extensions in file header
OGG Vorbis	mono/ stereo	16, 22.05, 32, 44.1, 48	n.a.	max 500kBit/s CBR/VBR	no	
WMA	mono/ stereo	8, 11.025, 16, 22.05, 32, 44.1, 48	n.a.	max 320kBit/s CBR/VBR	no	WMA9 only, no lossless or professional codec

MM30 Audiophile Topology

DAC upgrades from certain brands are known to interfere with the analogue output causing a noticeable deterioration in sound quality. Consistent with Primare design philosophy, the digital and analogue signal paths within the Primare media upgrade have their own dedicated ground planes - a design feature which protects the purity of the analogue signals.

24/192 USB Interface

For reliable 24/192 operation, Primare has chosen XMOS because it offers an integrated communication hub hosting the MCU. XMOS and Primare's developers in Sweden, have collaborated to optimize XMOS firmware for better performance from Primare's XMOS application. **Please note: 176.4kHz is not supported by XMOS on MM30 (176.4 is supported over network).**

more…

DAC

The MM30 uses a SRC4392 sample rate converter in conjunction with a Burr Brown PCM1792 24/192 DAC, running continually at 24/192. Incoming data at rates other than 24/192 are up-sampled to 24/192 to ensure the optimal operation of the DAC.

Volume Control

The volume will be adjustable from MIN to the configured MAX setting on the I32/PRE32.

Primare Control App available for iPhone/iPad and Android.

The Primare App allows you to choose and play media (including Internet radio) at resolutions up to 24bit/192kHz from network shared music sources and storage through NP30, PRE60 and from I32 and PRE32 with installed MM30 board.

- Switch to the MEDIA input
- Use either the Primare App (for iPhone®/iPad®, or the Android version) or any generic UPnP App.
- Some features, like playing media from USB thumb drive, USB-connected iPhone, iPod®, iPad®, and playing vTuner, require the use of the Primare App.

Primare App will:

- Establish network connections and play from any network shared music source
- Play from USB-A, (stick, iPhone etc)
- Play files up to 24bit/192 kHz resolution
- Play internet radio (vTuner – http://www.vtuner.com)
- Display and save playlists
- Display format, bit rate and sample rate of the song playing
- Provide fast forward and back navigation of the song playing
- Provide volume control including default at start-up (fixed or variable on NP30)
- Allow source selection of devices connected to inputs of the I32, PRE32, PRE60 and NP30
- Allow the renaming of inputs on I32, PRE32 and PRE60
- Give the I32, PRE32, PRE60 or NP30 a name on the network
- Manage software updates on I32, PRE32, PRE60 and NP30
- For playing music from PC over USB-B please download the Primare PCaudio driver from the SUPPORT page from www.primare.net
- From MAC it will play automatically over USB-B will give best sound quality from Spotify PREMIUM. (please set audio setting in Spotify to Extreme)
- Firmware updates can be done from the device's MENU or from Primare App

How to use Spotify with Primare:

Please download the guide here:

http://www.primare.net/assets/_managed/products/files/SpotifywithPrimare_1.pdf

Using a standard UPnP App

Any standard UPnP application on Android or iphone/ipad can be used to access the streaming functionality. However, while UPnP will allow you to browse a media server with playlists, tracks, album-art and transport controls, some features are not available (USB-drive, Ipod, Ipad, Iphone-USB devices). Also no radio is supported with a standard UPnP App.

more…

Firmware upgrade

If a network connection is available, the PRE32 can connect to a Primare server to download new firmware. The Primare App offers an auto-upgrade feature, which automatically notifies the user when an upgrade is available. Simply activate the upgrade from the App. New Firmware can also be upgraded using a USB flash memory.

Inputs selectable from I32 and PRE32

Each input will have its default name, but can be renamed by the user (up to six characters) in the same way as any other input in the I32/PRE32 display architecture.

The inputs are selected using the C24 remote control or the front panel input selector switch.

- Coax input
- Toslink 1-3
- USB-B input (from computer USB interface)
- USB-A input, allowing the device to play audio from USB/Iphone
- MEDIA input – this input must be selected to play streaming media.

MM30 Features and Specifications

Audio formats:	WAV, LPCM, AIFF, FLAC, ALAC, MP3, MP4 (AAC), WMA, OGG,
Sample rates:	32-192kHz
WLAN:	b, g, n mode; WEP (64 and 128Bit), WPA &WPA2 (TKIP & AES)
Connections output	Digital (192 kHz)
Connections input	3x optical (96kHz)
	1x SPDIF (192kHz)
	USB-A
	USB-B (192kHz)
	WLAN (48kHz)
	LAN (192kHz)

Bluetooth Upgrade

The high quality aptX Bluetooth upgrade takes the form of a small internal circuit board and external antenna (for improved reception), which installs easily, the threaded antenna input replacing the DAB/FM terminal on the MM30 fascia.

For compatibility with Primare's high-performance audio design, the receiver-only module supports high quality Bluetooth via aptX (android), AAC, MP3 but rather than use an integrated DAC (as employed by other BT upgrades) the output is fed to the product's own Sample Rate Converter and up-sampled to 192kHz for optimum performance through the existing high resolution DACs. In this way Primare's Bluetooth Upgrade is among the most audiophile available, adding excellent Bluetooth sound quality to the convenience of wireless Bluetooth connections.

Following an easy software update via the PrimareApp, the BT input is added to the product control menu in a discrete BT section, which allows for the renaming of the input for the product display and the also the BT connection. Other controls are 'Visible', 'Unpair' and 'Autoconnect'.

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)
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

September 2014