



M8xi Integrated Amplifier

Design Whitepaper

The M8xi is a powerful, fully-featured, high-end integrated amplifier developed by Musical Fidelity, and released for general sale during April 2020. The general concept was introduced during 2017-2018 by the old Musical Fidelity company, yet the product was finally designed during 2019 by a team of Heinz Lichtenegger (Audio Tuning CEO), Simon Quarry (Musical Fidelity lead-designer) and key staff at Audio Tuning's manufacturing partners, Canor Spol sro and HiPro.

Musical Fidelity has a rich history of innovative, market-leading hi-fi products. The purpose of the M8xi was to introduce a powerful, high-end amplifier with a complete feature set that balances audiophile integrity with convenience. In the past, products like the KW-500S attempted to address this situation, but the M8xi enters at a higher price point, and puts the decision of source material back in the hands of the customer. The M8xi is designed to work with CD systems, streamers, AV systems and analogue sources.

The M8xi is also introduced as an alternative to the existing M8 Pre and M8500S / M8700M products. Where the M8 pre/power products appeal to pure audiophile principles of "one-box-per-task", the M8xi is a more convenient one-box solution that combines the pre and power amplification stages into one box with the further addition of a DAC.

The Power Amplifier

The most striking aspect of the M8xi design is the high power output, generously rated at 550W into 8Ω (870W into 4Ω and Peak 1.6kW into 2Ω). This stage operates in optimally adjusted Class B, for lowest distortion. The purpose of this power is to drive almost any speaker available on the commercial market today with comfort and control, regardless of bigger and/or insensitive designs.

The power amplifier employs a bridged design, which means the system can create a higher output with lower voltages on the power supply rails. The alternative to a bridged design involves far higher voltages across the supply rails, which means system reliability can become a concern. Output devices would also be pushed nearer to their safe limits by a non-bridged design. Therefore, the bridged layout allows for enough voltage, as well as current, to run the output devices to their maximum potential with greater security in use.

The output devices themselves are high-stability Darlington pairs. The Sanken STD-03N and STD-03P bipolar devices are market tested to a high standard, and the employed configuration with low beta droop means they will not need to draw a significant increase in current at any time, which would in turn increase distortion figures.

The effectiveness of the power amplifier, and the overall performance of the M8xi is dependent on the generously rated toroidal transformers. Inside, the M8xi employs separate transformers for each power amp, which in turn drive two separate power supplies to ensure the configuration is a dual-mono layout in the truest sense. The transformers used are based on the design of the M8 500S, with plenty of headroom and an inherent low-noise design.

The Pre-Amplifier

The pre-amplifier of the M8xi is designed just as a dedicated pre-amplifier would be, largely operating in Class A and running off its own independent power supply – effectively treating the overall M8xi design as a dedicated pre and two dedicated monobloc power amplifiers in one box.

Featuring XLR and RCA inputs, it employs low-noise op-amps in all sections for maximum signal integrity. The laser-trimmed volume control (Texas Instruments PGA2320) has a precision-matched position attenuator with maximum 0.2dB mismatch at lower volume levels, which guarantees precise imaging and soundstage integrity whether being played quiet or loud. As is common amongst other Musical Fidelity amplifiers, the M8xi also boasts a switchable Home Theatre (HT) input. This input couples directly to the power amplifier stage, allowing for a suitably specified AV processor to control the home cinema volume levels while benefiting from the sonic character of the Musical Fidelity.

The marriage of pre and power amplifiers of such power in one box does introduce some inherent difficulties when dealing with low level sources. For this reason, the design decision was taken to not include a phono stage. A phono stage is a vital part of any turntable system, and a compromised phono stage would negatively impact the overall ability of the amplifier. To help analogue listeners, Musical Fidelity already produce a coveted range of compatible external phono stages, such as the M6 Vinyl, which would be an ideal sonic match.

The M8xi also features XLR and RCA balanced outputs, for wider system applications. There are variable outputs for connecting to additional external amplifiers, as well as an RCA fixed stereo output for analogue recording or "tape out" applications, such as connecting an external headphone amplifier.

The DAC

The M8xi also features a five (5) input DAC. DACs are increasingly common in integrated amplifier designs to add convenience when connecting a variety of digital sources, so the decision was taken to build-in a DAC that would perform to a high standard, independently of the amplifier.

Based around the Texas Instruments PCM5242 TI low-distortion and low-noise DAC chip, which is also employed in many other premium products in the hi-fi industry as well as in previous Musical Fidelity products, the M8xi has 2 x coaxial (S/PDIF), 2 x optical (S/PDIF) and 1 x asynchronous USB Type-B inputs. The coaxial and the USB inputs are capable of supporting hi-res audio streams up-to 24-bit / 192kHz, and the optical input is capable of supporting up-to 24-bit / 96kHz. For maximal performance, all data streams are up-sampled and re-clocked by an internal converter to reduce jitter and remove unwanted artefacts in the sound.

The M8xi DAC features a top quality over sampling 24 bit sample rate converter (SRC) circuit which asynchronously up-samples all incoming data rates to 192 kHz. This moves the digital artefacts to well outside the audio band, allowing easy removal without detriment to the top end of the audio band. It also reclocks the base input clock frequency to eliminate jitter along with related noise and artefacts. All this is done with no effect on the digital purity of the signal. The SRC is followed by a twin 24 bit DAC IC PCM5242 arranged in a fully differential (balanced) analogue output topology for lowest output noise and distortion levels, allowing astounding imaging, detail and transparency. The complete circuit thus delivers all music types exactly as the artist originally intended. It also takes into account different sampling frequencies with the upper bandwidth extending to greater than 80 kHz for 192kHz natively sampled input signals. The M8xi DAC's fully asynchronous USB input copes with files up to 24-bit 192 kHz sample rate input. This takes full advantage of the higher quality recordings now available. It works with all personal computers running Microsoft Windows®, Linux and Apple® OS.

The DAC section features its own power supply, for added integrity, and for convenience in use the DAC inputs show in the same list as the analogue inputs, controlled from the front panel or with the supplier IR remote control.

Additional Comments

The M8xi boasts a pure electrical signal path for perfect signal transfer with zero loss in transmission. Current limiting and DC-offset limit protection are both transparent, and these built-in protective mechanisms cause the power amplifier to shutdown if any failure within the system is detected.

Trigger inputs and outputs to couple with any 5 – 12V input or output were added to the back-panel for easy system integration. These are set so that the M8xi stays on as long as the trigger signal stays high.

The overall visual appearance and chassis construction was taken from existing M8 models to match the overall “M Series” aesthetic. The M8xi therefore boasts solid anodised aluminium front panel and knobs, extruded heatsinks and chassis air vents for added heat dissipation.

Sound Traits

The M8xi is sonically designed to be an audibly recognisable Musical Fidelity product. Key characteristics of the sound are:

- Powerful
- Expansive
- Spacious
- Open
- Effortless, with any speaker load