8 Channel Switching Amplifier Filter

APx581

Switching amplifier filter for multichannel audio analysis

Manufacturers of power amplifiers are moving to switching designs (also called Class D or switch-mode) to make their amplifiers lower cost and more efficient compared to conventional linear power amplifier designs.

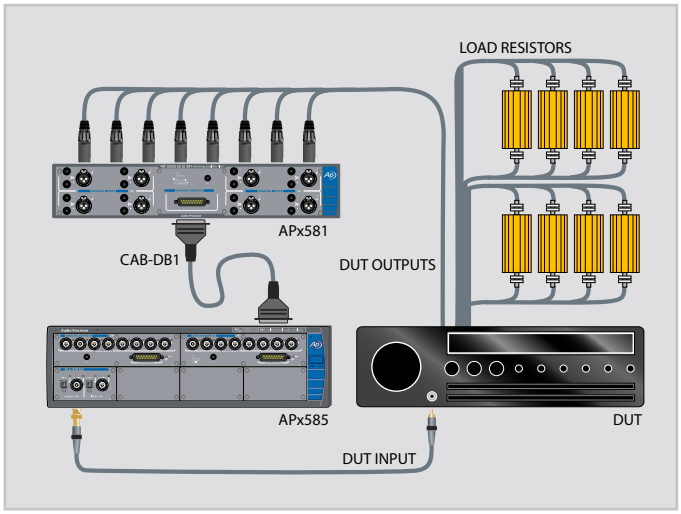
This technology has particular appeal in automotive and personal stereo applications where efficiency, low battery consumption, small size, and low cost are desired. However, amplifiers using this technology present new measurement challenges. The switching process adds fast rising edges at the switching frequency to the audio output signal.

These fast edges are of no consequence to the typical load (a loudspeaker), but present a difficult signal for measurement instruments. The fast switching edges present high energy content and will introduce slew rate limiting when presented to the input stage of most measurement instruments. When stressed by these fast edges, the analyzer input amplifier will usually slew rate limit and will not be able to function effectively in its normal mode. Auto ranging will be affected and the signal under test will be misrepresented to the following measurement circuits. The result is that noise and distortion measurements of switching amplifiers with almost any analyzer without preconditioning will yield inaccurate and unpredictable results.

The solution to this problem is to precondition the signal before presentation to the analyzer. The way to do this is in the form of a low pass filter that will soften the fast edges while passing the primary audio signal intact. The best approach to this filter is a passive design, as it will handle

the fast edges properly, is relatively low cost, and will not require power. A well-designed passive filter will also not compromise the audio signal passing through it by adding noise or distortion as an active design might.

The 8-channel APx581 is based on Audio Precision's highly successful AUX-0025 2-channel switching amplifier filter. When paired with the pin-compatible APx585 multichannel audio analyzer, the APx581 completes the solution for testing multichannel switch-mode amplifiers.



Key Features of the APx581

The APx581 is an eight-channel passive low-pass filter specifically designed to minimize switching amplifier carrier components while passing a broad audio spectrum. This filter provides the signal preconditioning necessary to accurately measure switching amplifier outputs using a wide-range audio analyzer.

- **Passive design for optimal performance.**
- **Balanced XLR inputs / DB-25 outputs ready for easy connection to APx585 multichannel audio analyzer.**
- **Custom inductors designed for power handling and minimizing low-frequency distortion.**
- **Rack mount option available with RAK-581 kit.**

SPECIFICATIONS

Number of Channels
8

Frequency Response
± 0.05 dB, 10 Hz to 20 kHz.

Insertion Loss
0.05 dB, typically

High Frequency Rejection
>50 dB, 250 kHz to 20 MHz , typically

Maximum Input
± 200 Vpeak

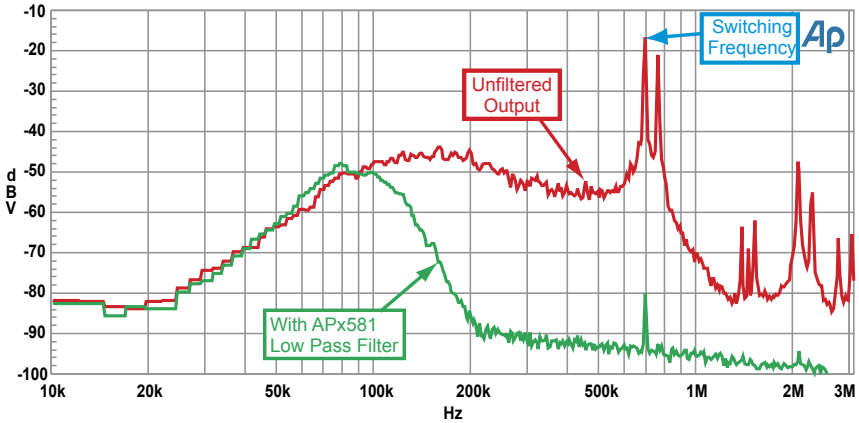
Interchannel Crosstalk
> 82 dB at 20 kHz

Distortion
< –110 dB harmonic
(measured at 70 Vpp, 1 kHz)

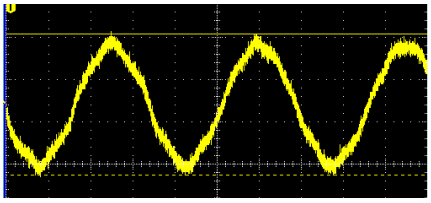
< –100 dB IMD (at 70 Vpp with 18 kHz and 20 kHz dual tone test signal. IMD components are at 2 kHz, 16 kHz, and 22 kHz)

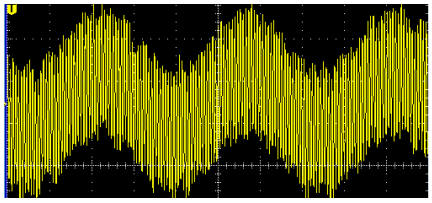
Dimensions
16.75 x 3.14 x 10.34 inches
(42.55 x 7.98 x 26.26 centimeters)

Weight
11.5 lb. (5.22 kg) unpacked

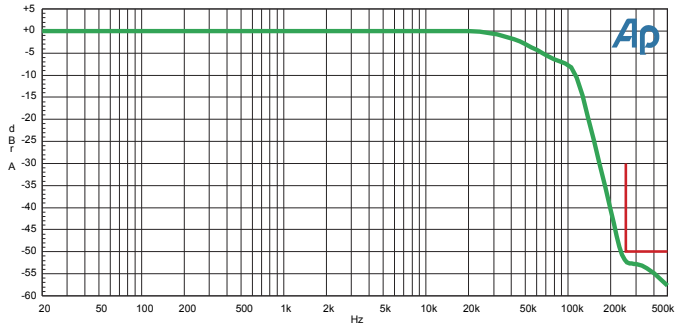


Spectrum analysis of the output of an amplifier with and without the APx581 filter. The red trace shows the unfiltered output; the green trace shows the effect of adding the filter.

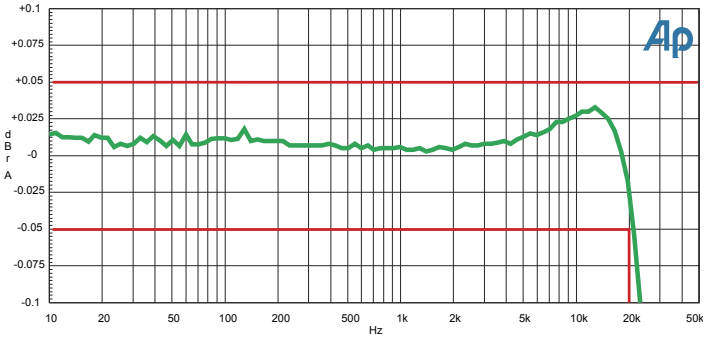




Unfiltered output from switching power amplifier compared to output filtered by APx581.



APx581 overall response showing attenuation beyond the passband.



APx581 passband response showing flatness out to 20 kHz.

Audio precision

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