AMP7

Design Notes	Revision 1.0 March 2009

Document ID: **266**   **Written by Jan**

AMP7 FEATURES

- Stereo or bridged mono inputs/outputs
- Footprint, 100x160 mm
- High power design
- Line level analogue audio inputs. Sensitivity adjustable with external resistors
- High efficiency 85-90% mean small heat sink and small transformer requirements
- Over / under voltage turn off
- Over current protection, temperature overload protection
- The module is suitable for amplifiers and active speakers
- 2x150W @ 8Ω, 1.0% THD+N
- 2x300W @ 4Ω, 0.1% THD+N
- 1x600W @ 8Ω bridged, 0.1% THD+N
- 1x1200W @ 4Ω bridged, 0.1% THD+N

TA3020 FEATURES

- Class-T architecture
- Up to +/-60V supply
- High Power output capacity
- High Efficiency
- Dynamic Range = 102 dB
- Mute Input
- Over-current protection
- Over and under-voltage protection

Design notes for AMP7

The AMP7 development has been a long process, over several years. The aim was for a high power amp, capable of driving woofers, PA and other heavy loads under demanding conditions. The aim was also to use hole-mount components, for builders who do not like small surface mount parts, like those found on AMP2 and Truepath boards. It was also to be an integrated solution, all on a single board if possible. However, the first version to ship will be without the power supply section.

One key to D-class amp performance is minimizing the length and inductance of power traces and switching traces. At the same time, a high power design needs a number of components like decoupling capacitors, protection diodes etc, very near the switching components. So combining short traces with hole mount components and high power is a challenge and calls for a design that may be unconventional. However hole mount components allow solutions that are different from surface mounts, and if designed right, hole-mounted components are not a drawback. The AMP7 design has much shorter switching paths than for example AMP2.

For AMP7 we use the Tripath TA3020 chip, which is hole-mounted, and withstands quite high voltages. This is a well proven chip and used for our Truepath and AMP165 kits. The AMP7 was to be optimized for high power levels, using hole-mount components only if possible. The TA3020 chip has been around for quite a while. The TA3020 is has advantages for DIY:ers in that it is hole mounted and that it is quite a massive chip, with a large metal surface back, with considerable heat dissipation capacity, and capable of considerable gate switching currents needed to switch large FETs.

Placing the FETs on the PCB bottom side, allows very short connections to the gate drives of the Tripath chip, near power supply decoupling and output filter. At the same time the bottom mounting surface can act as a heat sink. This simplifies construction of the amp as a whole. As mentioned, the length of the switching traces and power traces on the power nodes where to be minimized. The output filter is made primarily of a large toroid inductor which is placement very close to the FETs. Right along the inductors, are the two output node polyprop filter capacitors. In all, a very compact design. Heavy duty ultra fast diodes clamp the outputs. This amp is capable of being a heavy duty woofer amp for relatively low impedance speakers of 8 ohms or even 4 ohms bridged. For a very high power system, you can use an AMP15 for the mid-high range, combined with a AMP7 as low / woofer amp. AMP7 can also be used with outputs in parallell, for loads down to 1 ohm.

For a complete amp, you need to add a high current power supply, capable of driving your loads. Maximum +/-60V is recommended. You also need two independent housekeeping supplies, one for the onboard 5V, and one for the gate drives. For the 5V, there is a 5V regulator on teh AMP7 board, that needs to be powered, typically by 8 to 12V 50mA. The gate supply needs around 250mA, 10V, referenced 10V above the negative supply. For these two housekeeping powers, you can use PS2-P+P both set at 10V.

The PSU1-series supplies are also suitable:

PSU1-SS: Soft start and mains filter
PSU1-PS: rectifiers and bulk capacitors
PSU1-VR: Two voltage regulators for 5V and VN10
Note that the voltage regulator PSU1-VR, needs a separate transformer or similar moderate voltage supply.