

Hybrid power amplifiers

RS stock numbers 301-707, 303-236

Two hybrid audio-power amplifiers with output powers of 30W or 120W. These versatile devices form the basic building blocks for constructing high quality amplifiers using a minimum of additional components.

HY60 (RS stock number 303-236)

The RS HY60 is a fully encapsulated high quality power amplifier with integral heatsink capable of delivering 30W continuous power into an 8Ω load. Operating from $\pm 25V$ (typical) supply rails, the amplifier requires no external passive components, only five connections being necessary; input, output, positive rail, negative rail and ground. 'T' slots in the heatsink facilitate mounting using the M3 nuts and screws supplied.

Electrical characteristics

Parameter	Typ.
Output power	30W max
Frequency response (-3dB)	15Hz-50kHz
Total harmonic distortion (Typical) at 1kHz	0.015%
Intermodulation distortion	<0.006%
Signal to noise ratio (DIN AUDIO)	100dB
Slew rate	15V/ μ s
Rise time	5 μ s
Input sensitivity	500mV rms
Input impedance	100k Ω
Load impedance	4 Ω to ∞
Damping factor (8 Ω at 100Hz)	>400
Supply voltage	$\pm 25V$ ($\pm 30V$ max) (+15V min with reduced O/P)
Supply current	1A (8 Ω load)

Features

- 30W and 120W versions available
- Fully encapsulated
- Integral heatsinks
- Only five external connections necessary.

Figure 1

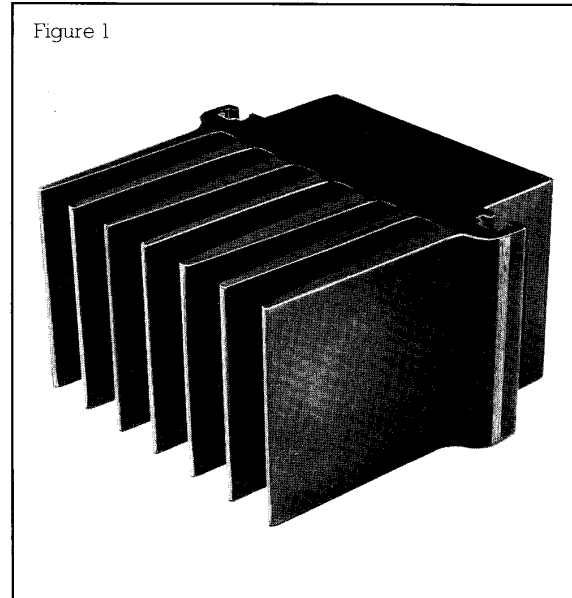
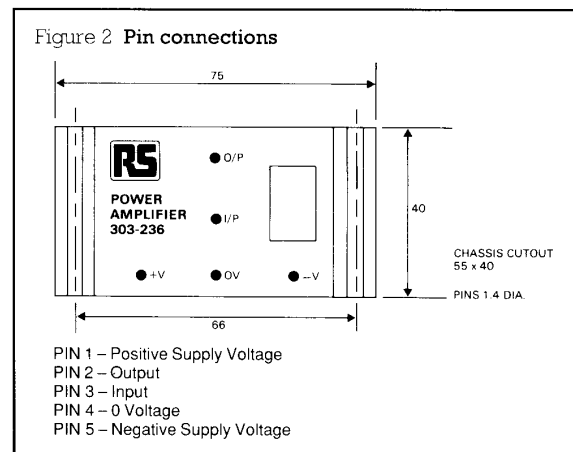
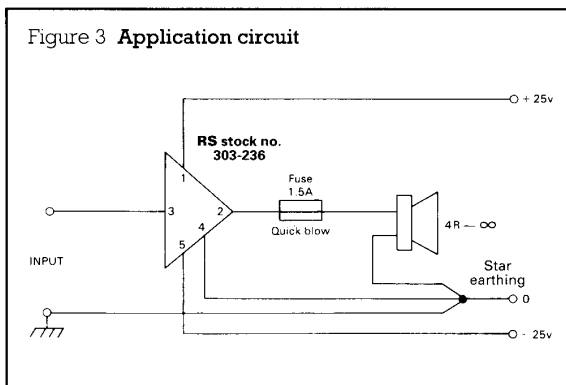


Figure 2 Pin connections



Application

Figure 3 Application circuit



Notes:

1. For normal conditions no supplementary heat sink is needed; the amplifier must however, be mounted to allow a vertical flow of air through the fins (T slots vertical).
2. The amplifier must be powered from a true split line (symmetrical) supply and under no circumstances should an attempt be made to use a single line.
3. No input capacitor is required as the module incorporates an internal capacitor of 100V working.
4. Internal circuits are designed to protect the amplifier against abnormal loads. Short circuits can be tolerated for ten seconds. However, for loud-speaker protection it is recommended that a 1.5 amp quickblow fuse is mounted between the output and the speaker.
5. 'Star earthing' techniques should be observed to avoid hum-loops, ie. all 0 volt connections, including speaker return leads, should be made at the power supply.
6. Long connecting leads between the power supply smoothing capacitors and the module will cause instability and module failure. The leads should be no longer than 300mm.

See current RS Catalogue for RS stock numbers and ordering information.

Figure 4 Suggested HY60 power supply circuit

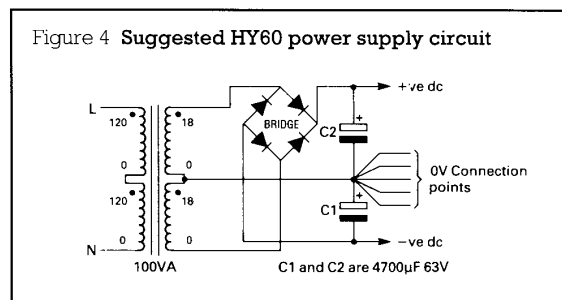
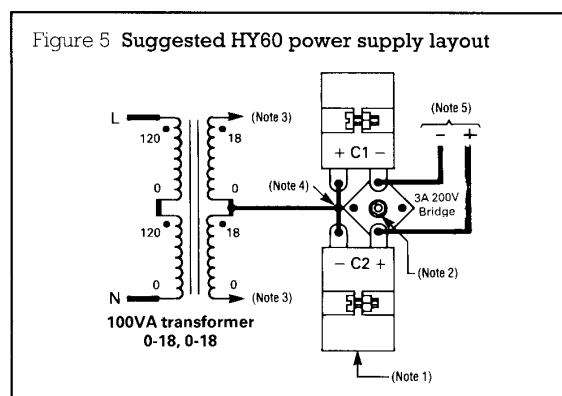


Figure 5 Suggested HY60 power supply layout



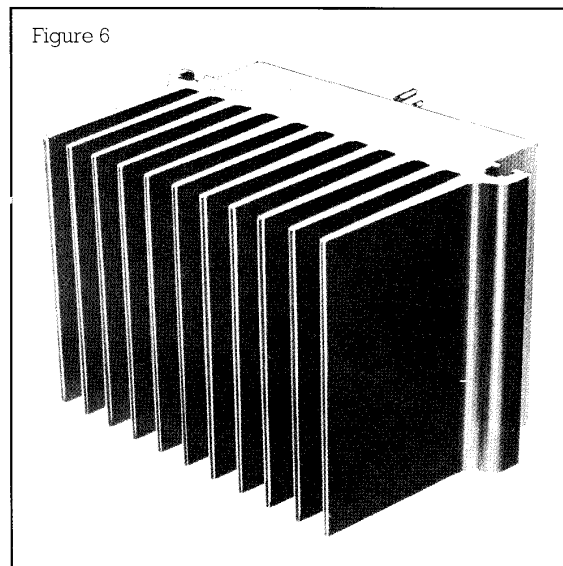
Notes:

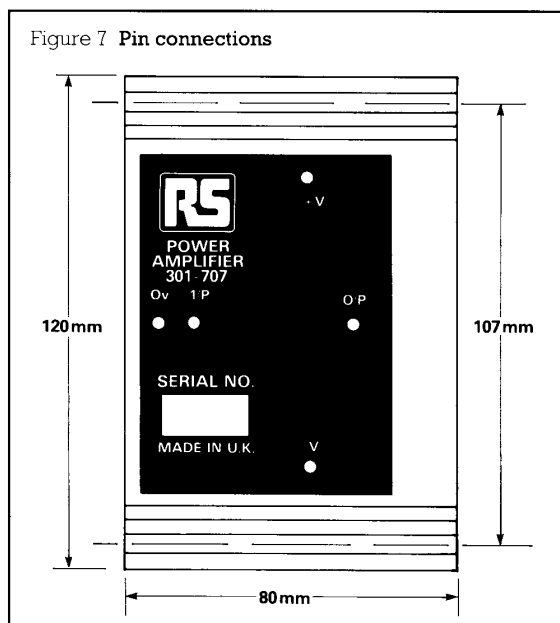
1. Arrange the capacitors such that opposite polarity terminals are facing each other.
Link one pair of terminals and refer to Note 5.
2. Bolt the bridge rectifier directly to the aluminium baseplate, with the + terminal directly connected to the +ve terminal on C2, and the - connected to the -ve on C1.
3. Wire the secondary leads to the ac terminals on the bridge rectifier.
4. The halfway point of the wire between the capacitors forms the common earthing point. The transformer centre tap, HY60 0V terminal, speaker ground, mains earth and input ground connections should all be made at this point.
5. Use different colour wires, keep them short (<150mm if possible), and twist them together.
If supplying two modules, take the leads for each back to the rectifiers.
Do not wire from one module to the next.

MOS 248 (RS stock number 301-707)

The RS MOS 248 is a fully integrated high quality power amplifier with an integral heatsink. The module incorporates a VMOS output stage and is capable of delivering 120W continuous power into an 8Ω load. Operating from ±55V (typical) supply rails the amplifier requires only five external connections; input, output, positive rail, negative rail and ground, plus one external resistor. 'T' slots in the heatsink facilitate mounting using the M4 nuts and screws provided.

Figure 6





Electrical characteristics

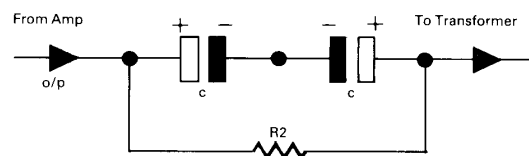
Parameter	Typ.
Output power	120W max
Frequency response (-3dB)	15Hz-100kHz
Total harmonic distortion (Typical) at 1kHz	0.005%
Intermodulation distortion	<0.006%
Signal to noise ratio (DIN AUDIO)	100dB
Slew rate	20V/ μ s
Rise time	3 μ s
Input sensitivity	500mV rms
Input impedance	100k Ω
Load impedance	4 Ω to ∞
Damping factor (8 Ω at 100Hz)	>400
Supply voltage	$\pm 55V$ ($\pm 60V$ max)
Supply current	1.8A (8 Ω load)

Notes:

- For normal usage and conditions the amplifier needs no supplementary heatsink; it must however, be mounted to allow a vertical flow of air through the fins (T slots vertical).
- The amplifier must be powered from a true split line (symmetrical) supply and under no circumstances should an attempt be made to use a single line.
- No input capacitor is required owing to an internal capacitor of 100V working.
- As the amplifier has no built in protection circuitry, apart from the inherent protection characteristics of MOSFETs themselves, it is advised that a 2.5A quick blow fuse be mounted in the positive **and** the negative supply lines. Fuses in these positions will also give adequate protection for a loudspeaker of nominal impedance, providing the recommended fuse rating is not exceeded.
- 'Star earthing' techniques should be observed to avoid hum-loops, ie. all 0 volt connections, including speaker return leads, should be made at the power supply.
- Long connecting leads between the power supply smoothing capacitors and the module will cause instability and module failure. The leads should be no longer than 300mm.

Output transformer applications

Due to a voltage offset at switch-on and to a slight voltage offset on the output under normal running conditions a resistor/capacitor network should be fitted in series with the transformer primary (as shown below).



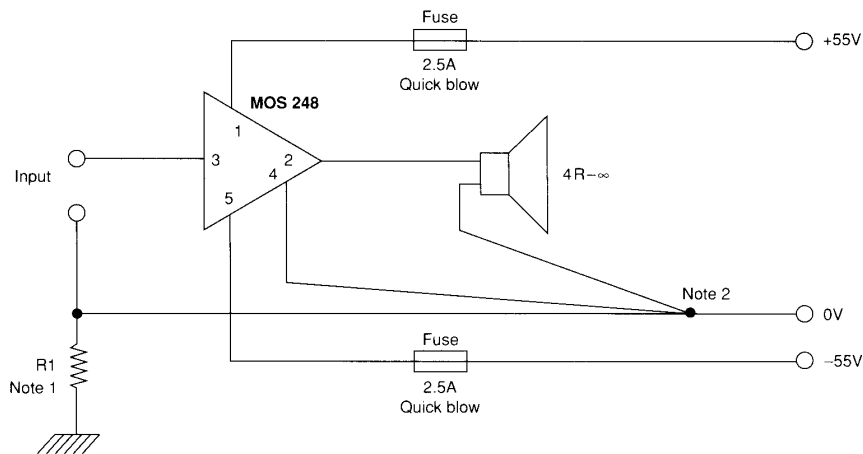
$$R2 = 4.7\Omega / 4 \text{ Watts}$$

*C = 1000 μ F/dc working voltage to be equal to maximum supply voltage

*This capacitor value has been calculated for an 8 Ω operation to achieve a lower frequency response of 50Hz. For the same frequency response into a 4 Ω load 'C' becomes 2200 μ F. It is important to note that module damage will occur if the transformer saturates under any circumstances. Likewise, do not exceed the capacitor values stated.

Applications information

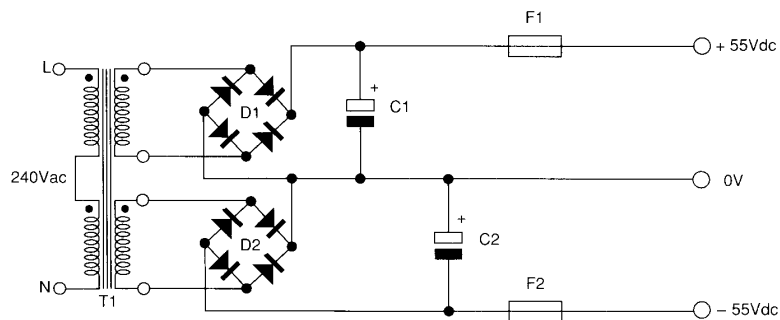
Figure 8 Application circuit



Notes:

1. In order to prevent earth loop problems when a pre-amplifier is connected the fitting of a resistor (R1) is recommended in the position shown. The value is not critical but should be between 82 and 270Ω 0.25W.
2. Use 'star earthing' techniques to avoid hum-loops.

Figure 9 Typical MOS 248 power supply



Parts list for power supply

T1	500VA 0-40, 0-40
D1/D2	25A 200V Bridge mounted on 1.4°C/W heatsink
C1/C2	6800μF 63V
F1/F2	2.5A quick blow

See current RS Catalogue for RS stock numbers and ordering information.

The mains input primary must be protected by a ceramic HBC fuse and due to the high initial peak current a 10A rating is suggested.