

Kit 17. LM386 Low Voltage Audio Amplifier



This is a 1 watt mono amplifier module Kit using the LM386N IC from National Semiconductor. It will operate best from 6-12V DC and will work well from a battery since the quiescent current drain is only 4 mA, if the LED is not used. It requires no heatsink for normal use. The input and output are both ground referenced. Maximum output will be obtained with a 12V power supply and 8 ohm speaker.

Assembly Instructions :

Assembly is very straight forward. Make sure you get the integrated circuit and the electrolytic capacitors the correct way around. The electrolytic capacitors are polarized, they have a + or - marked on them and they must be inserted correctly into the PCB. The IC and socket have a notch at one end, which is marked on the PC board overlay. Solder the socket in place first before installing the IC itself. The LED cathode has a flat and is marked on the board. The anode is the longer lead. Leave the potentiometer until last.

Check the polarity before connecting the battery or power supply. If it does not work, recheck all component positions and polarity. Check all solder joints, and all external wiring. Don't forget the power switch. The IC itself is quite robust, and there is very little else to go wrong. Remember when testing, it will not produce full output for more than a short duration because of limited heat dissipation. We found it easily exceeded the manufacturers specifications however.

The gain is adjustable from 20 to 200, i.e. 26 to 46 dB. We have also provided input attenuation. You should keep the IC gain as low as necessary to achieve full output, with the input potentiometer and your signal source at maximum. This will keep the signal to noise ratio as high as possible. All gain provided by the amplifier will reduce the S/N ratio by a similar amount, since the equivalent input noise figure is constant. The jumper may be replaced with a resistor if an intermediate gain level is required. Try a value of 1k ohms to start. If you don't require the LED you could use R1.

Circuit Description :

There are only a few external components, the IC contains most of the necessary circuitry. C1 is the input coupling capacitor, which blocks any DC that might be present on the input. C2 maintains DC bias levels in the gain adjustment circuit (feed back bypass). C4 provides power supply decoupling, and C5 is the output coupling capacitor. C6 & R2 act as a zobel network providing a high frequency load to maintain stability where loud speaker inductive reactance may become excessive. Pot 1 provides adjustable input level attenuation. The LED is a power on indicator, and may be omitted if not required.

The National data sheet contains all the necessary information about the LM386N. You may download it from the software download page on our website :

<http://www.kitsrus.com>

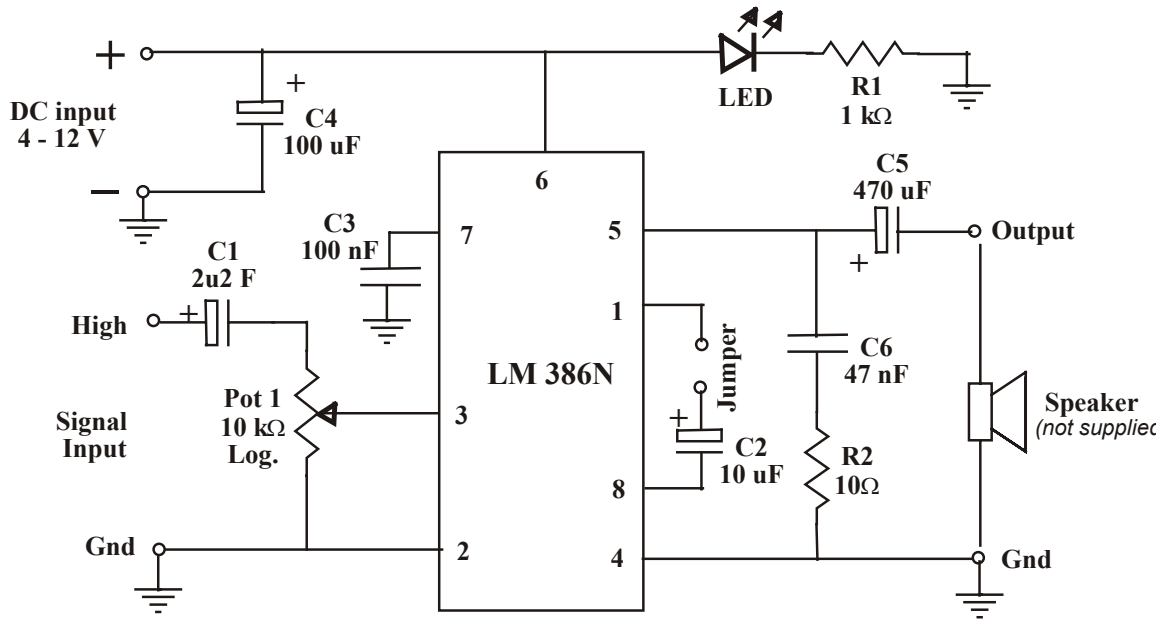
Specifications :

| | |
|--------------|---|
| D.C. input : | 4 – 12 V at 1 - 3 VA |
| Idle current | ~ 4 mA w/o LED. (10-15mA with LED) |
| Power output | > 1 Watt RMS max. 8 ohms, 12V DC > 0.4 Watt RMS continuous |
| Freq. Resp. | > 40 Hz – 20 kHz, 8 ohm ~ 40 – 100 kHz, – 3dB, G=20 |
| THD | < 1 % @ 400 mW, 12V DC < 0.2 % @ 125 mW |
| S/N ratio | > 70 dB, G = 20 > 50 dB, G = 200 |
| Gain | ~ 46 dB maximum |
| Input Z | ~ 10 k ohm |

Components :

| | |
|------------------------------------|---|
| C1 : 2.2 uF electrolytic capacitor | 1 |
| C2 : 10 uF ecap | 1 |
| C3 : 100 nF monoblock (104) | 1 |
| C4 : 100 uF 16V ecap | 1 |
| C5 : 470 uF 16V ecap | 1 |
| C6 : 47 nF ceramic (473) | 1 |
| R1 : 1k ohm (brown, black, red) | 1 |
| R2 : 10 ohm (brown, black, black) | 1 |
| Pot : 10k ohm log potentiometer | 1 |
| IC : LM386N Integrated Circuit | 1 |
| LED : 3mm Red LED | 1 |
| Pins | 6 |
| 8 pin IC socket | 1 |
| PCB mount SPDT switch | 1 |
| 2 pin header and jumper | 1 |
| Kit 17v41 Printed Circuit Board | 1 |

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Harmonic
Distortion
@ 1 kHz.
0.5 W into 8 ohms.
12V DC input.

