

### General Guidelines for Electronic Kits and Assembled Modules

Thank you for choosing one of our products. Please take some time to carefully read the important information below concerning use of this product. The assembly and operating instructions are on the following pages. Help with component identification can be found on our website at [www.quasarelectronics.co.uk/componentid.htm](http://www.quasarelectronics.co.uk/componentid.htm). If you are unsure about any aspect of the assembly or use of this product please contact our Support Team before proceeding.



#### WEEE Directive (Waste Electrical and Electronic Equipment)

##### Notice To All European Union Citizens. Important environmental information about this product.

The crossed out wheeled bin symbol on this product, package or documentation indicates that disposal of this product after its lifecycle could harm the environment. Do not dispose of this product (or batteries if used) as unsorted municipal waste. It should be disposed by a specialized company for recycling.

The unit should be returned to your distributor or to a local recycling service. Please respect the local environmental rules. If in doubt contact your local authorities about

waste disposal rules.

#### Safety: General rules concerning safe use of our Kits or Modules.

To ensure your safety, please observe these safety measures. In no way are these complete. As safety requirements vary, please check with your local authorities, in order to comply with local requirements. If in doubt, seek the help of a qualified person.

**Battery or wall-adaptor operated devices are safe devices. They do not require special attention unless mains voltage is connected to an output e.g. a relay.**



To ensure electrical safety, and also protection from fire or personal injury, make sure your mains operated equipment complies with these safety hints:

- Use a suitable plastic enclosure. If a metal enclosure is used, make sure it is properly earthed.
- Use a power switch if the device consumes more than 10W. Use a double pole switch for mains operated, transformer-less kits.
- Mount a fuse in series with the mains switch. Use a slow blow (T) 50mA fuse for transformers up to 10W and a 100mA fuse for transformers up to 20W.
- Use a mains input connector, or a robust power cord with a clamp.
- Internal wiring carrying mains voltages must have a minimum cross-sectional area of 0.5mm<sup>2</sup>.

If supplied, attach the power rating label near the power cord of the device and fill-out the mains voltage, frequency, power consumption and fuse values.

#### Troubleshooting and Support

90% of non working kits are due to poor soldering.

We operate a Get-You-Going service for non-working kits but there is a charge based on the time and components needed to complete the repair. Quite often it is not economically viable for us to repair and it is cheaper to supply a new ready made product at full cost.

#### Disclaimer

Quasar Electronics reserves the right to change product specifications or to discontinue products without notice. Quasar Electronics cannot be held responsible for any loss or damage, direct or indirect, which might occur from the use of a product. Quasar Electronics Kits or Modules are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications the purchaser assumes all responsibility for ensuring compliance with all local laws. In addition, they are not suitable for use as or as a part of life support systems, or systems that might create a hazardous situation of any kind.

## QUASAR PROJECT 3017v5 - LM386 Low Voltage Audio Amplifier Module

This is a 1 Watt mono audio power amplifier module using the LM386N IC. It will operate best from 6-12Vdc 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. Start with the lowest height components and work up to the highest (the pot).

Make sure you get the LM386 IC and electrolytic capacitors the correct way around. The electrolytics are polarized and have a “-“ sign marked on the body and the “+” lead is longer. They must be inserted correctly into the PCB. The IC and socket have a notch at one end, which is marked on the PCB 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. You might prefer to insert the IC before soldering the potentiometer.

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 manufacturer's specifications however.

A jumper sets the gain. Jumper Off = 20 (26dB), Jumper On = 200 (46dB). The potentiometer provides input attenuation. Keep the IC gain as low as possible to achieve full output, with the input potentiometer and your signal source at maximum. This keeps 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 1K Ohm 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 (feedback 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. The pot 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 product page on our website:

[www.quasarelectronics.co.uk/3017.htm](http://www.quasarelectronics.co.uk/3017.htm)

### 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

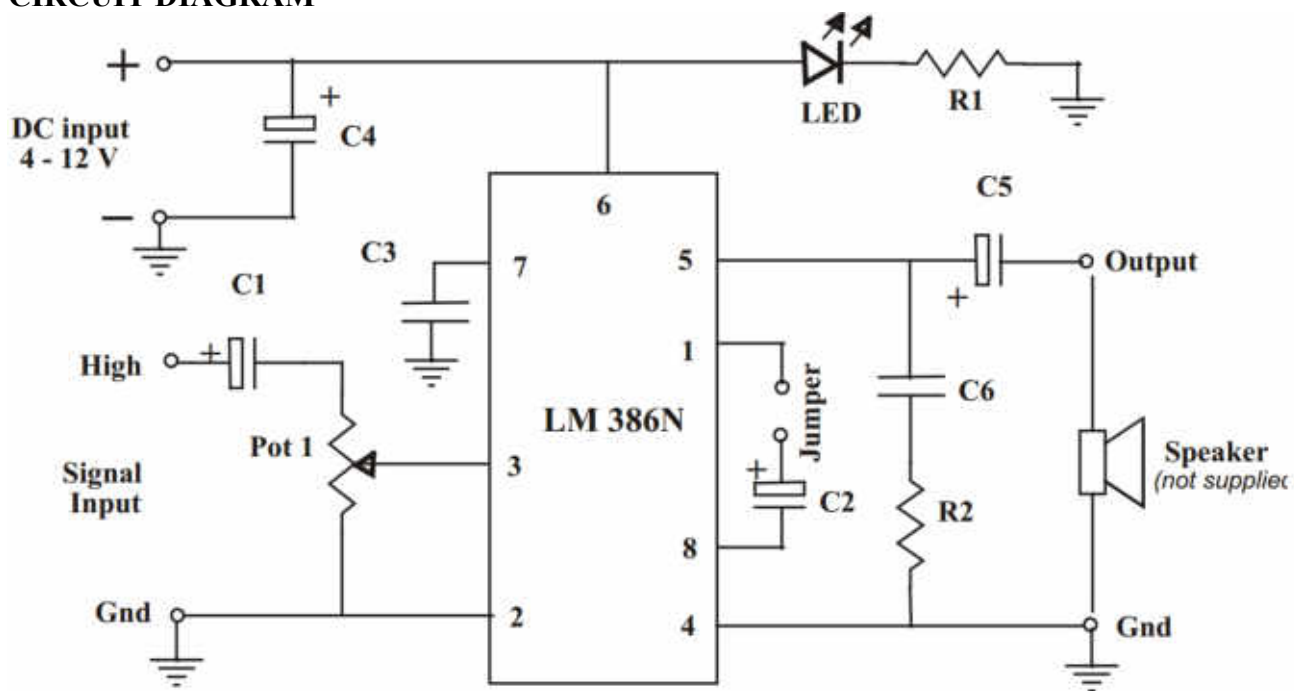
Input Z ~ 10 k ohm

### COMPONENT LISTING

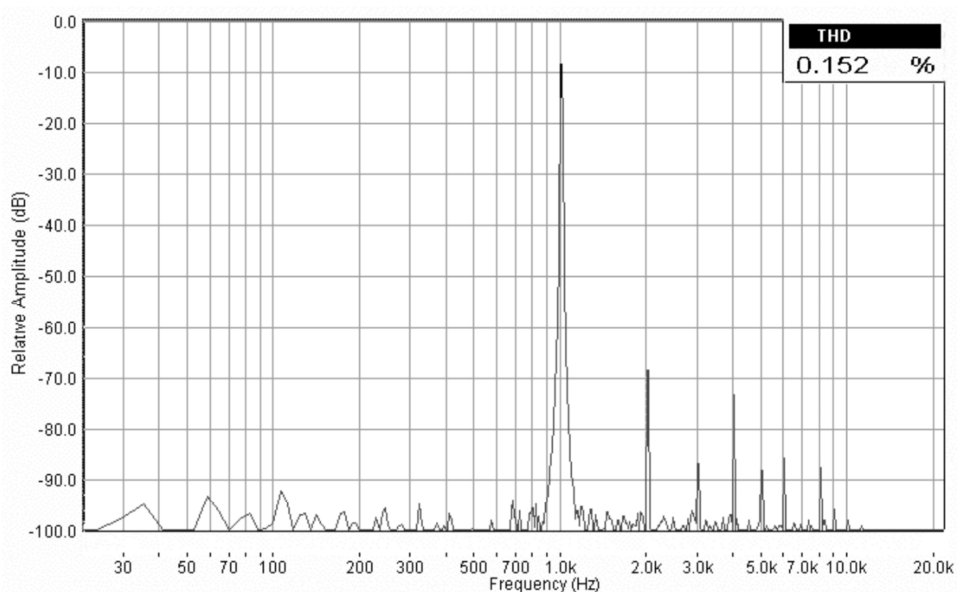
Resistors			
R1	1K	Brown black red	1
R2	10R	brown black black	1
POT	10K	Log potentiometer	1
Capacitors			
C1	2u2	Electrolytic capacitor	1
C2	10u	Electrolytic capacitor	1
C3	100n	Monoblock capacitor (104)	1
C4	100u	Electrolytic capacitor, 16V	1
C5	470u	Electrolytic capacitor, 16V	1
C6	47n	Monoblock capacitor (473)	1
IC1	LM386N	Audio Power Amplifier IC	1
LED	3mm red LED		1
SW1	SPDT PCB-mounted switch		1
2-pin Single Row Header			1
Jumper for header			1
8-pin IC socket			1
2-pole screw terminal blocks			3
Kit 3017v5 PCB			1

# QUASAR PROJECT 3017v5 - LM386 Low Voltage Audio Amplifier Module

## CIRCUIT DIAGRAM



## HARMONIC DISTORTION



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



Image of assembled version with shaft potentiometer and screw terminal block connectors.