



# LPA01

## Laboratory Power amplifier

### USER GUIDE



## LPA01 User Guide

# LPA01

**High frequency, dc accurate, power amplifier for laboratory and industrial applications.**

### Description

LPA01 is a high frequency amplifier with 1A pk current output capability at 24V pk-pk from dc to greater than 1MHz. It uses a composite amplifier arrangement with an integrated power driver to give dc accuracy and excellent high frequency performance, with high reliability.

LPA01 is compensated to drive any capacitive, inductive or resistive load; internal short circuit protection plus power diodes with high energy transient absorption devices protect the LPA01 against overload or inductive flyback transients.

The gain is set using 0.1% resistors for accuracy and thermal stability.

As well as ac and ac+dc coupling there is a special coupling mode, ac+ (dc), where the dc component is not eliminated entirely but is reduced by a factor of about 10. This is particularly useful for testing wound components with a controlled dc bias current where the dc resistance of the component is considerably lower than the ac resistance. The high frequency bandwidth can also be reduced with a low pass filter.

The LPA01 is mains powered and housed in a robust steel cabinet.

**These specifications are quoted in good faith but Newtons4th Ltd reserves the right to amend any specification at any time without notice.**



**Newtons4th Ltd**

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## Warranty

This product is guaranteed to be free from defects in materials and workmanship for a period of 36 months from the date of purchase.

In the unlikely event of any problem within this guarantee period, first contact Newtons4th Ltd. or your local representative, to give a description of the problem. If the problem cannot be resolved directly then you will be given an RMA number and asked to return the unit. The unit will be repaired or replaced at the sole discretion of Newtons4th Ltd.

This guarantee is limited to the cost of the LPA01 itself and does not extend to any consequential damage or losses whatsoever including, but not limited to, any loss of earnings arising from a failure of the product.

In the event of any problem with the equipment outside of the guarantee period, Newtons4th Ltd. offers a full repair service – contact your local representative.

The LPA01 does not require any calibration.

## Declaration of Conformity

We, Newtons4th Ltd, declare that the product LPA01 conforms to the requirements of Council Directives:

Conforms to the EEC Directives:

2014/30/EU relating to electromagnetic compatibility:  
EN 61326-1:2013

2014/35/EU relating to Low Voltage Directive:  
EN 61010-2-030:2010:

January 2017

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(Director of Newtons4th Ltd)

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## **IMPORTANT SAFETY INSTRUCTIONS**

This equipment is designed to comply with BSEN 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use) – observe the following precautions:

- Ensure that the supply voltage agrees with the rating of the instrument printed on the back panel **before** connecting the mains cord to the supply.
- This appliance **must** be earthed. Ensure that the instrument is powered from a properly grounded supply outlet.
- The input and output connectors, and the internal circuitry are isolated from earth - do not exceed  $\pm 40V$  peak common mode.
- Keep the ventilation holes on the underneath, rear, and sides free from obstruction.
- Do not operate or store under conditions where condensation may occur or where conducting debris may enter the case.
- There are no user serviceable parts inside the instrument – do not attempt to open the instrument, refer service to the manufacturer or his appointed agent.
- In the event of a failure of the mains fuse, disconnect the mains cord and replace the fuse with the same type and rating, as shown on the rear of the instrument.
- Switch off the amplifier and ensure that the output current has fallen to zero before disconnecting an inductive load from the output.

**Note: Newtons4th Ltd. shall not be liable for any consequential damages, losses, costs or expenses arising from the use or misuse of this product however caused.**

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## Specification

| Parameter                                                       | LPA 01             | Units              |
|-----------------------------------------------------------------|--------------------|--------------------|
| Input connector                                                 | isolated BNC       |                    |
| Input impedance                                                 | 10k                | $\Omega$           |
| Peak operational input voltage                                  | $\pm 12$           | V                  |
| Maximum safe input voltage                                      | $\pm 15$           | V                  |
| Input common mode range                                         | $\pm 40$           | V                  |
| Input offset voltage                                            | 1.5                | mV (typ)           |
|                                                                 | 5                  | mV (max)           |
| Input coupling                                                  | ac, ac+dc, ac+(dc) |                    |
| AC coupling filter -3dB                                         | 16                 | Hz                 |
| (DC) gain factor                                                | 0.1                |                    |
| Full power bandwidth                                            | 1M @24V pk-pk      | Hz                 |
| Low bandwidth -3dB                                              | 80k                | Hz                 |
| Low bandwidth filter attenuation                                | 40                 | dB/decade          |
| Low bandwidth filter type                                       | linear phase       |                    |
| Gain options                                                    | x1, x4, x10        |                    |
| Low frequency gain accuracy up to +/- 12V. Typically less than: | 0.2                | %                  |
| Low freq gain accuracy between +/- 12V & +/-14V. Typ less than: |                    |                    |
| Gain Switch setting: x1                                         | 1                  | %                  |
| Gain Switch setting: x4                                         | 3                  | %                  |
| Gain Switch setting: x10                                        | 5                  | %                  |
| Full load gain accuracy typically less than:                    | 2                  | %                  |
| Output connector                                                | isolated BNC       |                    |
| Continuous output current                                       | 0.7                | A rms              |
| Peak Output Current                                             | 1                  | A pk               |
| Peak operational output voltage                                 | $\pm 12$           | V                  |
| Maximum Safe output voltage                                     | $\pm 15$           | V                  |
| Slew rate                                                       | 600                | V/us               |
| Temperature range                                               | 0 - 40             | $^{\circ}\text{C}$ |
| Size                                                            | 8.5 x 15 x 25      | cm                 |
| Weight                                                          | 2                  | kg                 |
| Universal Power source                                          | 90-265 @ 47-63     | V rms /Hz          |
| Power consumption                                               | 40                 | VA (max)           |

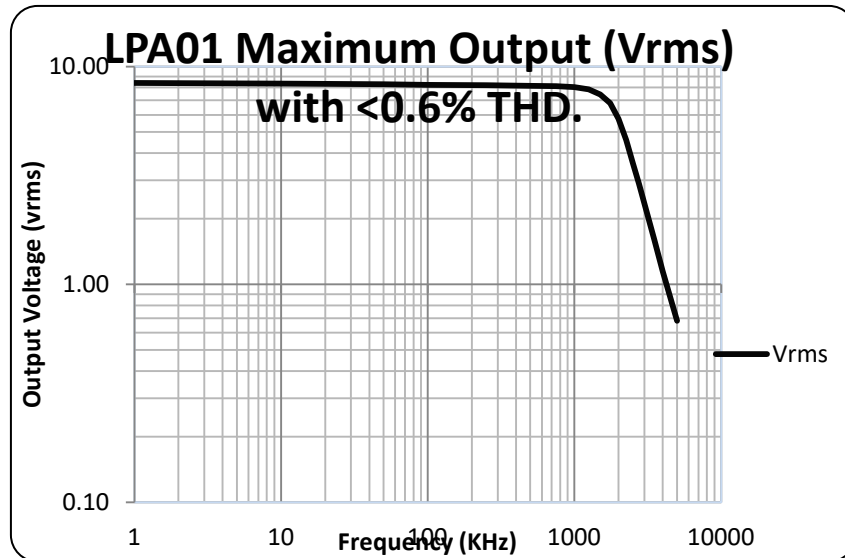
Notes: All specifications at 230V, 50Hz, 23 $^{\circ}$ C unless otherwise stated.  
All specifications are typical values unless otherwise stated.

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## Total Harmonic Distortion:

For frequencies up to 1MHz, Total Harmonic Distortion is typically less than 0.6%.

This graph demonstrates the effect of Total Harmonic Distortion on the Maximum Output Voltage of the LPA01 amplifier at higher frequency levels up to 5MHz.



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**Note:** The amplifier contains an output rms current protection circuit, and when driving some capacitive loads this circuit may be activated. Due to capacitor construction, at high current the amount of energy transfer distorts the current waveform resulting in excessive peak current (Fig 1 below), whilst the rms value remains within specification. To ensure correct functionality and prevent false triggering of the protection circuit, ideally the current waveform should be a sinewave as pictured in (Fig.2 below).

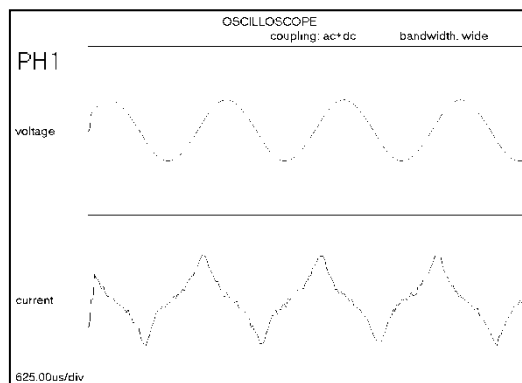


Fig 1 (Distorted current waveform)

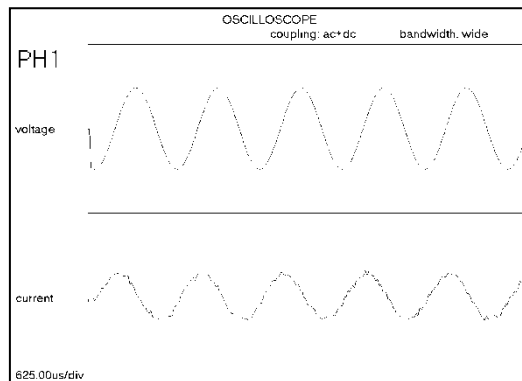


Fig 2 (Correct current waveform)

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In the event of any problem with the instrument, during or outside of the guarantee period, contact your local representative

Newtons4th Ltd offer a full repair and re-calibration service

It is recommended that the instrument be re-calibrated annually

Contact details:

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We have a policy of continuous product improvement and are always keen to hear comments, whether favourable or unfavourable, from users of our products. Please telephone, fax, write or e-mail with your comments



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