



LPA01

Laboratory Power amplifier

User Guide



This manual is copyright © 2006-2021 Newtons4th Ltd. and all rights are reserved. No part may be copied or reproduced in any form without prior written consent.

Document Title: LPA01 User Manual v7.0
Document Release Date: 04th June 2021

Document Ref: D000289 issue 07

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.

LPA01 User Guide

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



Manufacturer: Newtons4th Ltd.
Address 1 Bede Island Road
Leicester
LE2 7EA

We declare that the product:

Description: Laboratory Amplifier

Product name: LPA

Model: LPA01

Conforms to the EEC Directives:

2014/30/EU relating to electromagnetic compatibility:
BS EN 61326-1:2013
BS EN 55022 class A

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

June 2021

Jigar Patel
(Senior Engineer Newtons4th Ltd.)

LPA01 User Guide

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 $\pm 40\text{V}$ 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.
- This unit is fitted with safety BNC input and output connections, appropriate safety BNC cables **must** be used, standard metal BNC cables **will** damage these connectors.

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.

**DANGER OF ELECTRIC SHOCK**

Only qualified personnel should install this equipment, after reading and understanding this user manual. If in doubt, consult your supplier.

**RISQUE D'ELECTROCUTION**

L'installation de cet équipement ne doit être confiée qu'à un personnel qualifié ayant lu et compris le présent manuel d'utilisation. Dans le doute, s'adresser au fournisseur.

**GEFAHR VON ELEKTRISCHEM SCHOCK**

Nur entsprechend ausgebildetes Personal ist berechtigt, diese Ausrüstung nach dem Lesen und Verständnis dieses Anwendungshandbuches zu installieren. Falls Sie Zweifel haben sollten, wenden Sie sich bitte an Ihren Lieferanten.

**RISCHIO DI SCARICHE ELETTRICHE**

Solo personale qualificato può installare questo strumento, dopo la lettura e la comprensione di questo manuale. Se esistono dubbiconsultate il vostro rivenditore.

**PELIGRO DE DESCARGA ELÉCTRICA**

Solo personal cualificado debe instalar este instrumento, después de la lectura y comprensión de este manual de usuario. En caso de duda, consultar con su suministrador.

LPA01 User Guide

Specification

Parameter	LPA 01	Units
Input connector	isolated BNC	
Input impedance	10k	Ω
Peak operational input voltage	± 12	V
Maximum safe input voltage	± 15	V
Input common mode range	± 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	± 12	V
Maximum Safe output voltage	± 15	V
Slew rate	600	V/ μ s
Temperature range	0 - 40	$^{\circ}$ 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.

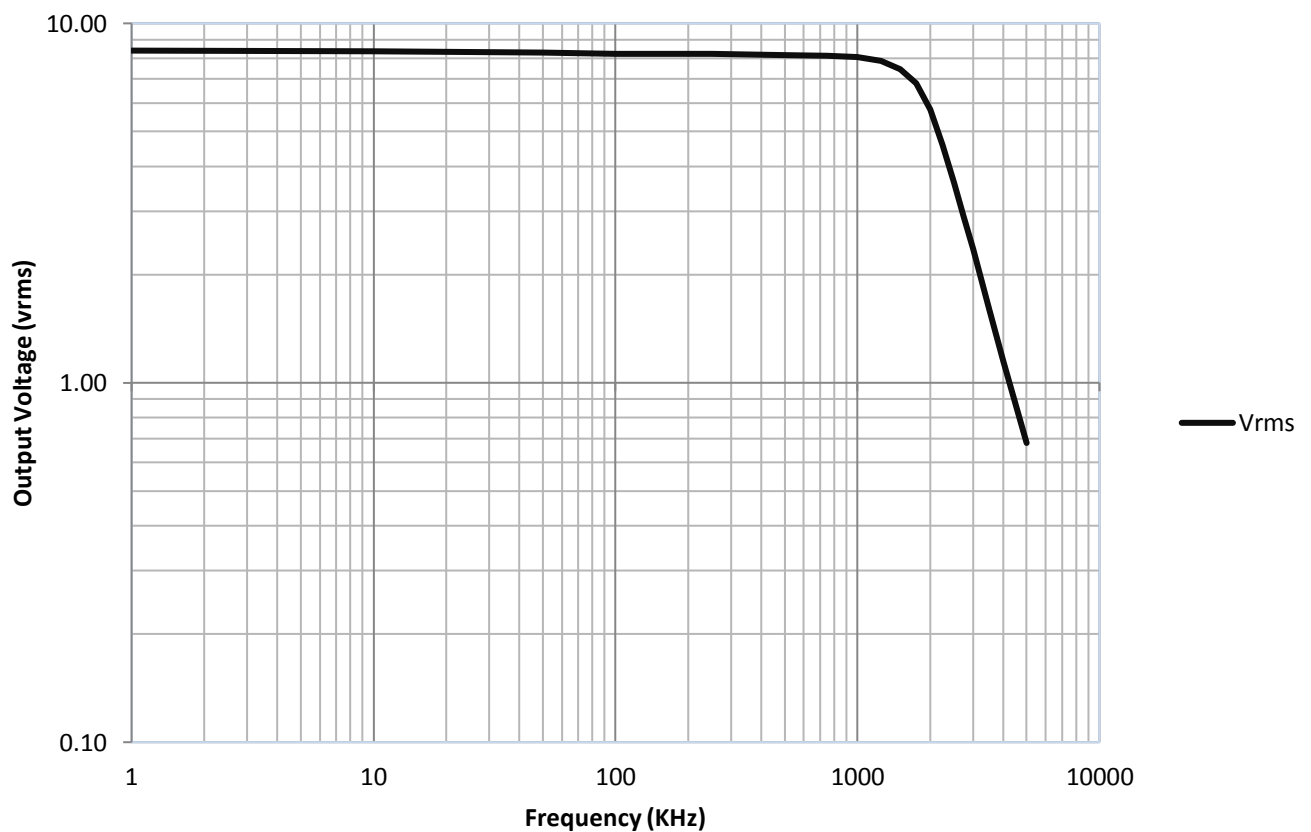
LPA01 User Guide

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.

LPA01 Maximum Output (Vrms) with <0.6% THD.



LPA01 User Guide

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).

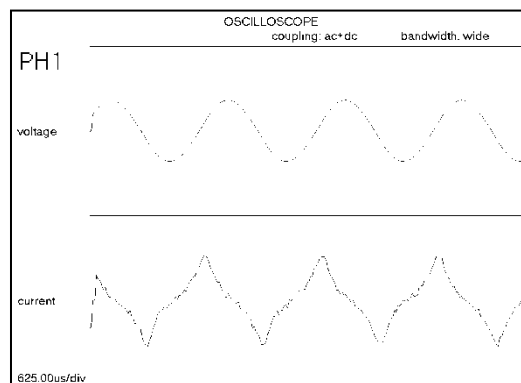


Fig 1 (Distorted current waveform)

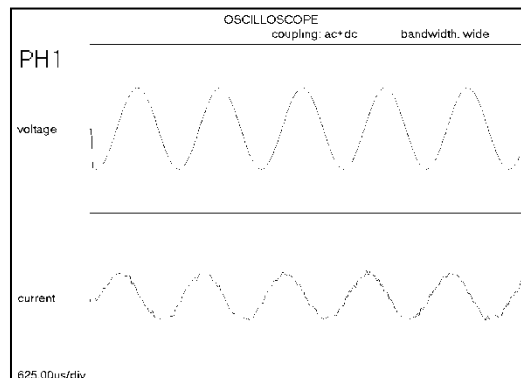


Fig 2 (Correct current waveform)

LPA01 User Guide

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:

Newtons4th Ltd

1 Bede Island Road
Leicester
LE2 7EA
United Kingdom

Tel: (0116) 230 1066 International: +44 116 230 1066

Fax: (0116) 230 1061 International: +44 116 230 1061

E-mail address: sales@newtons4th.com
office@newtons4th.com

Web site: www.newtons4th.com

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