National Semiconductor

Quad Op Amp Evaluation Boards

Part Number CLC730024, CLC730031

August 1997

The CLC730024 is an evaluation board intended for the evaluation of quad Op-Amps in the DIP package. The CLC730031 is a similar board, but laid out for an SOIC package.

To obtain optimum performance from a high speed device, a good Printed Circuit Board (PCB) layout is essential. The importance of the layout becomes greater as the frequency of operation increases. Some of National Semiconductor's quad Op-Amps have bandwidths in excess of 100MHZ, therefore it is vital that sound PCB layout techniques be used when designing with these devices. The CLC730024 and CLC730031 are examples of good PCB layouts which designers are encouraged to copy.

To minimize capacitive feedthrough and noise, if there are op-amps not being used, they should be configured as unity gain buffers (with a resistor in the feedback path for current feedback devices) and the non-inverting inputs connected to GND. On devices that are being used, the ground plane should be removed from beneath the feedback and gain setting resistors, to minimize parasitic capacitance on sensitive nodes. Input and output traces should be laid out as transmission lines with the appropriate termination resistors very near the device. On a 0.0065" (FR4 or equivalent) a 0.1" wide trace over ground plane on the opposite side of the board will exhibit a characteristic impedance of 50Ω.

Parasitic or load capacitance directly on the output of an amplifier will introduce additional phase shift in the device. If excessive, this phase shift can lead to peaking in the frequency response or, in extreme cases, oscillation. A small series resistor in series with a capacitive load effectively decouples it from the buffer output and removes the undesirable effects of excess phase shift. Further detail on the selection of these resistors can be found in the individual amplifier data sheets.

Parts List

R_{IN1}, R_{IN2}, R_{IN3}, R_{IN4},	select for desired input resistance
R_{OUT1},R_{OUT2},R_{OUT3}, R_{OUT4}	select for desired output resistance
R_{F1},R_{F2},R_{F3},R_{F4}	select according to data sheet and application
R_{G1},R_{G2},R_{G3},R_{G4}	select according to data sheet and application
C_1,C_2	0.1µF capacitor
C_3,C_4	6.8µF capacitor
L_1,L_2	Optional ferrite bead inductors

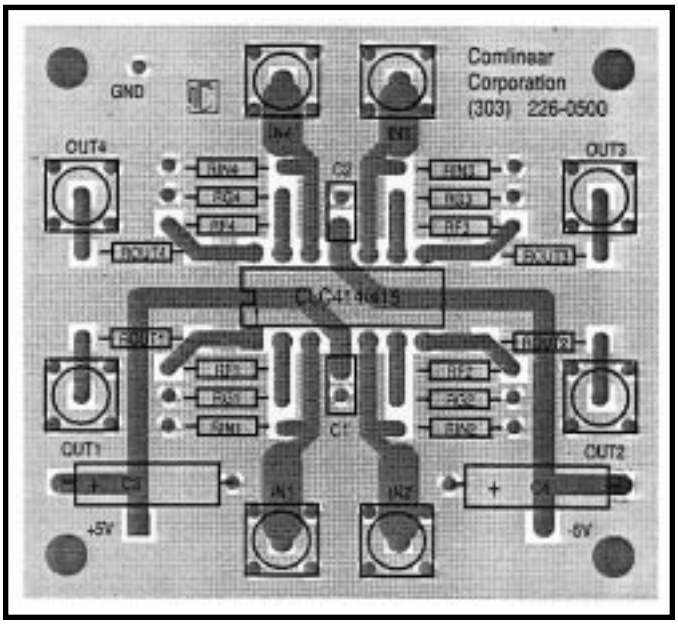


Figure 1: 730024 Board Layout and Component Placement

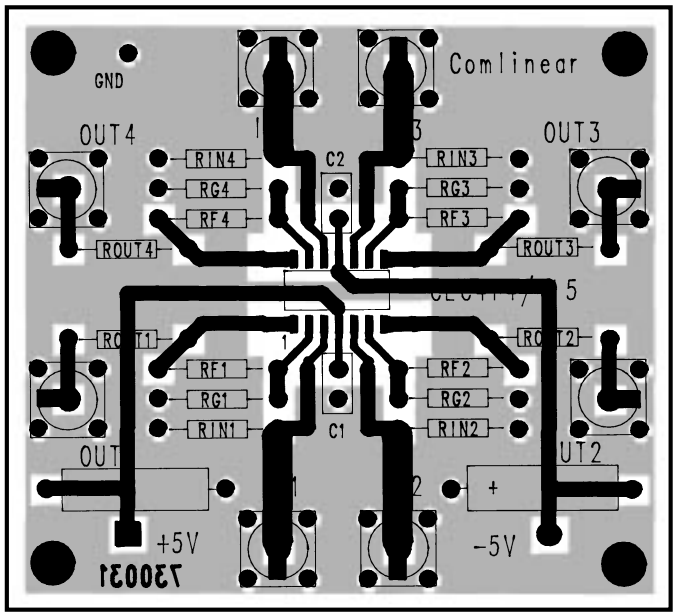


Figure 2: 730031 Board Layout and Component Placement

© 1997 National Semiconductor Corporation

Printed in the U.S.A.

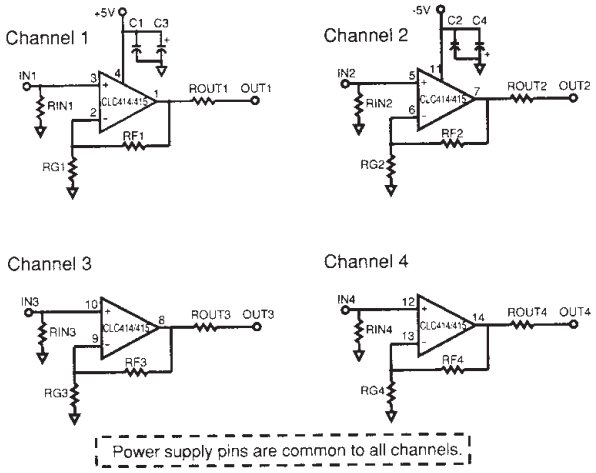


Figure 3: Evaluation Board Schematic

Customer Design Applications Support

National Semiconductor is committed to design excellence. For sales, literature and technical support, call the National Semiconductor Customer Response Group at **1-800-272-9959** or fax **1-800-737-7018**.

Life Support Policy

National's products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of National Semiconductor Corporation. As used herein:

1. Life support devices or systems are devices or systems which, a) are intended for surgical implant into the body, or b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
E-mail: europe.support.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Francais Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block
Ocean Centre, 5 Canton Road
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.