Operational Amplifier Series

Measurement Method for Input and Output Impedance of Op- Amp

Contents:

1. Measurement method for input impedance

Impedance is represented by the ratio of the current variation ΔI to the voltage variation ΔV.

$$Z = \frac{\Delta V}{\Delta I} \ [\Omega]$$

The variation in the input bias current is measured against the variation in the input common-mode voltage range.

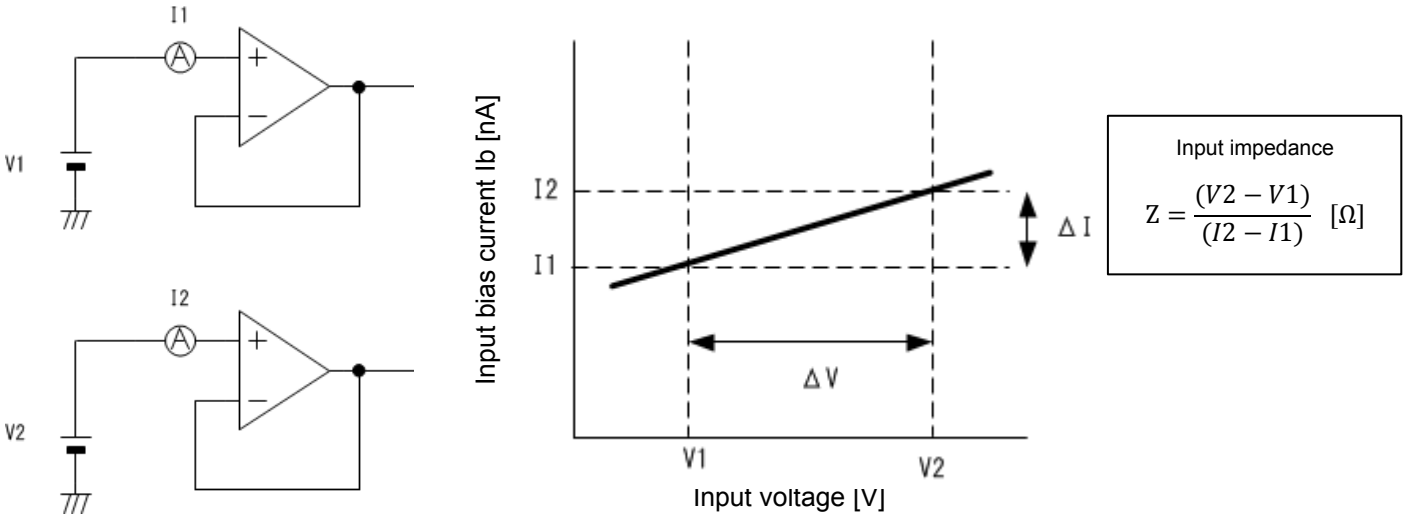

Figure 1. Input voltage and input bias current

The input bias current is not measured with a voltage follower, but by using the Null Amp method (refer to the measurement circuit diagram in the data sheet).

2. Measurement method for output impedance

Impedance is represented by the ratio of the current variation ΔI to the voltage variation ΔV.

$$Z = \frac{\Delta V}{\Delta I} \ [\Omega]$$

In a voltage follower configuration, the variation in the output voltage is measured by changing the output source and sink currents. In some output circuit configurations, the impedance may be different between the source and sink sides. Therefore, the variation in the output voltage should be checked during both the output current sourcing and sinking.

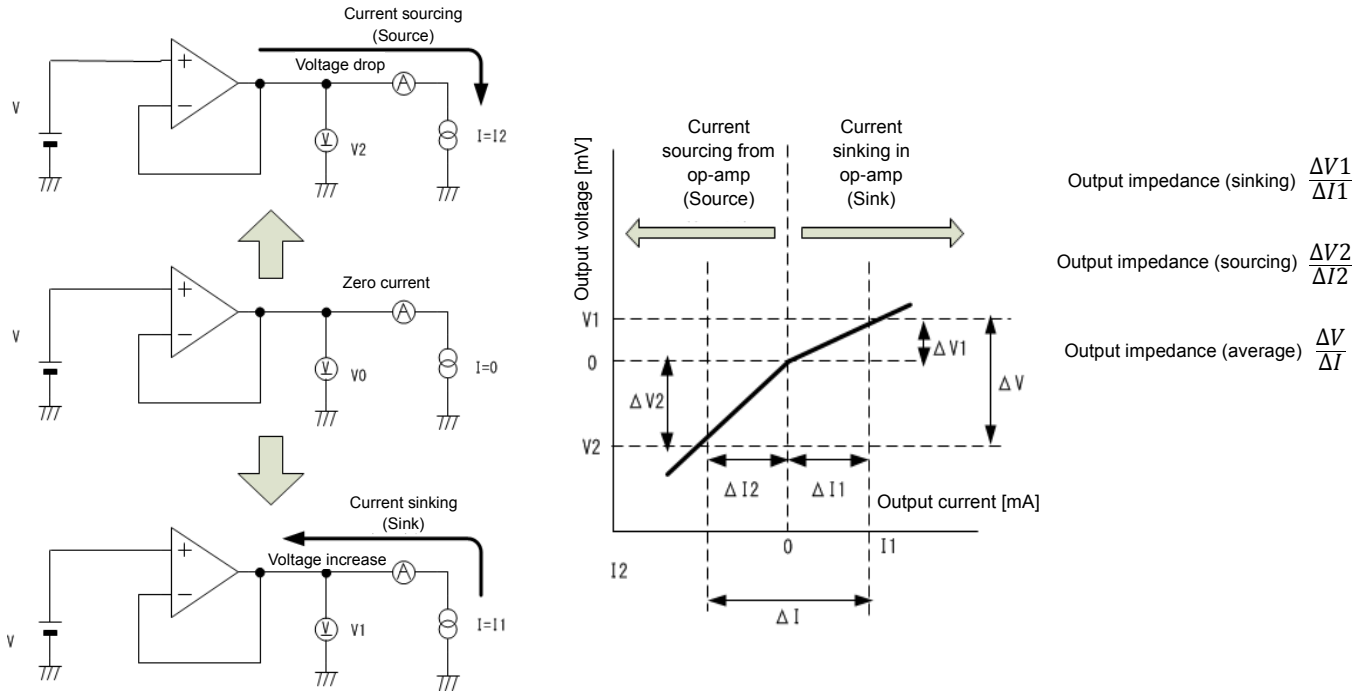

Figure 2. Output current and output voltage

3. Supplementary

The contents above describe the input and output impedance to direct current or low frequencies. When a negative feedback is applied on an op-amp, the output impedance of the op-amp is compressed by its open loop gain. Therefore, the output impedance is reduced to a very small value at a low frequency. In the high frequency region, the output impedance increases as the open loop gain of the op-amp is attenuated with frequency at a slope of -6 dB/OCT.

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.

7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

11) ROHM has used reasonable care to ensur the accuracy of the information contained in this document. However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

12) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. For more details, including RoHS compatibility, please contact a ROHM sales office. ROHM shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.

13) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act.

14) This document, in part or in whole, may not be reprinted or reproduced without prior consent of ROHM.

ROHM SEMICONDUCTOR

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

http://www.rohm.com/contact/