

A Test Methodology to Measure the Open-Loop Voltage Gain of an Operational Amplifier

Authors : Maninder Kaur Gill, Alpana Agarwal

Abstract : It is practically not feasible to measure the open-loop voltage gain of the operational amplifier in the open loop configuration. It is because the open-loop voltage gain of the operational amplifier is very large. In order to avoid the saturation of the output voltage, a very small input should be given to operational amplifier which is not possible to be measured practically by a digital multimeter. A test circuit for measurement of open loop voltage gain of an operational amplifier has been proposed and verified using simulation tools as well as by experimental methods on breadboard. The main advantage of this test circuit is that it is simple, fast, accurate, cost effective, and easy to handle even on a breadboard. The test circuit requires only the device under test (DUT) along with resistors. This circuit has been tested for measurement of open loop voltage gain for different operational amplifiers. The underlying goal is to design testable circuits for various analog devices that are simple to realize in VLSI systems, giving accurate results and without changing the characteristics of the original system. The DUTs used are LM741CN and UA741CP. For LM741CN, the simulated gain and experimentally measured gain (average) are calculated as 89.71 dB and 87.71 dB, respectively. For UA741CP, the simulated gain and experimentally measured gain (average) are calculated as 101.15 dB and 105.15 dB, respectively. These values are found to be close to the datasheet values.

Keywords : Device Under Test (DUT), open loop voltage gain, operational amplifier, test circuit

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