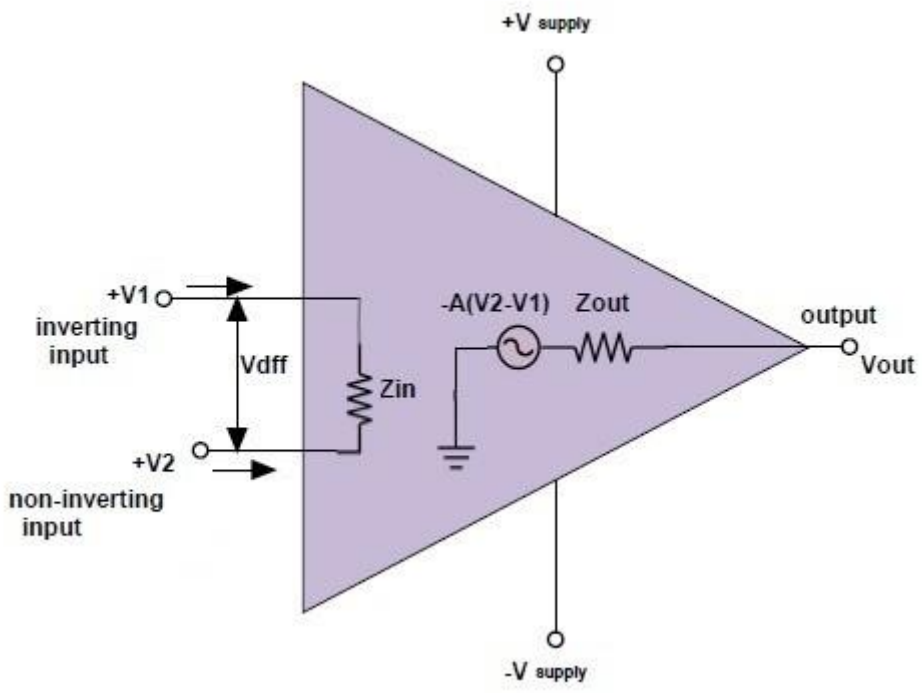
23ECT203 – LINEAR INTEGRATED CIRCUITS

Ideal OP-AMP characteristics


+V supply
+V1
inverting
input
Vdff
Zin
-A(V2-V1)
Zout
output
Vout
+V2
non-inverting
input
-V supply

- Infinite input impedance
- Zero output impedance
- Zero common-mode gain, or, infinite common-mode rejection
- Infinite open-loop gain A
- Infinite bandwidth.

Infinite Open-Loop Gain (AOL): An ideal op-amp has an infinitely large open-loop gain. This means that it can amplify input signals to an arbitrarily large output voltage without any limitations. In practical op-amps, the open-loop gain is very high, but it is not infinite.

Infinite Input Impedance: The ideal op-amp has infinite input impedance, which means that it draws no current into its inputs. As a result, the voltage at the inverting and non-inverting inputs is the same (virtual short circuit), making the analysis of op-amp circuits easier.

Zero Output Impedance: The ideal op-amp has zero output impedance, which means that it can drive any load without any voltage drop. In reality, op-amps have low but finite output impedance.

Infinite Bandwidth: An ideal op-amp has an infinitely wide bandwidth, allowing it to amplify signals of any frequency without distortion. In practice, op-amps have a limited bandwidth that decreases at higher frequencies.

Zero Input Offset Voltage: The ideal op-amp has zero input offset voltage, meaning that there is no voltage difference between its inverting and non-inverting inputs when the output is zero. In real op-amps, there is a small offset voltage that can introduce errors.

Infinite Slew Rate: The ideal op-amp has an infinitely fast slew rate, meaning it can instantly respond to changes in the input voltage. In practice, op-amps have a finite slew rate that limits their response to fast input voltage changes.

Infinite Common-Mode Rejection Ratio (CMRR): An ideal op-amp rejects any common-mode voltage applied to its inputs, amplifying only the differential voltage. This property ensures that noise and interference on both inputs do not affect the output. In real op-amps, CMRR is very high but not infinite.

No Noise: The ideal op-amp is noiseless, meaning it does not introduce any noise at its inputs or outputs. In real op-amps, noise is present, and its magnitude depends on the op-amp's design and manufacturing.

Infinite Power Supply Rejection Ratio (PSRR): An ideal op-amp is immune to changes in the power supply voltage, meaning that variations in the supply voltage do not affect its performance. In reality, PSRR is high but not infinite.


Thank
you