

Op Amp Macromodel Parameter Selection Guidelines

Intuitive Research and Technology Corporation
For more information see <http://www.edn.com/article/CA6402894.html>

- AV – open-loop differential DC voltage gain (dimensionless number)
Sometimes given in data sheets as large signal voltage gain. If given in dB, convert to a dimensionless number using the equation $AV = 10^{\frac{dB}{20}}$. Default value: AV = 100K (corresponds to 100 dB).
- CMR – common mode rejection ratio (dimensionless number)
The ratio of the differential voltage gain to the common mode voltage gain. If given in dB, convert to a dimensionless number using the equation $CMR = 10^{\frac{dB}{20}}$. Default value: CMR = 100K (corresponds to 100 dB).
- VRP – positive rail voltage difference (volts)
The difference between the positive power supply voltage input and the maximum output voltage swing. This parameter is always a positive number. Default value: VRP = 1 (rail-to-rail op amps can have much lower values).
- VRN – negative rail voltage difference (volts)
The difference between the minimum output voltage swing and the negative power supply voltage input. This parameter is always a positive number. Default value: VRN = 1 (rail-to-rail op amps can have much lower values).
- SR – slew rate (volts per second)
Maximum output voltage rate of change with large differential input voltage. If a value is not given in the data sheet, it may be determined from the output voltage slope in a voltage follower pulse response plot. Default value: SR = 1Meg.
- FU – unity gain frequency (Hertz)
The frequency where the dominant pole reduces the small signal open-loop voltage gain to one (0 dB). Sometimes given in data sheets as gain bandwidth. FU may also be determined from a plot of gain vs. frequency. Default value: FU = 1Meg.
- PM – phase margin (degrees)
The difference between the output phase shift at unity gain and 180 degrees (where oscillation occurs). A measure of op amp stability. The value *must* be $0 < PM < 90$. If a value is not given in the data sheet, it may be determined from a plot of phase and gain vs. frequency. PM may also be determined empirically by comparing the overshoot from a plot of the op amp pulse response to the corresponding response of the macromodel. Decreasing PM increases the overshoot. If none of these is available, use a default value of PM = 60.
- IQ – quiescent power supply current (amps)
Default value: IQ = 0.5m.
- ILP – positive (source) output current limit (amps)
Maximum current out of the op amp. Default value: ILP = 50m.
- ILN – negative (sink) output current limit (amps)
Maximum current into the op amp. Default value: ILN = 50m.
- RO – output resistance (ohms)
Default value: RO = 10.
- VOS – input offset voltage (volts)
Default value: VOS = 0.
- CIN – input capacitance (farads)
Default value: CIN = 2p.
- RIN – input resistance (ohms) (high input impedance macromodel only)
Default value: RIN = 1E10.
- IB – input bias current (amps) (NPN and PNP input macromodels only)
The average of the two input currents as specified in most data sheets. Default value: IB = 10n.