

EE4109: Agenda (lecture 12)

1. Discussion of the homework
 - LTspice files Active Antenna.
 - SLiCAP files Active Antenna.
2. Active Antenna Breakdown.
3. Number of Controller Stages.
4. Stages Contribution to LP Product.
5. Pole-splitting and Cascode Stages.
6. Preferred Controller Stages.

		order of designing									independent performance aspects								
		1	2	3	4	5	6	7	8	9	type	gain	noise	power efficiency	clipping	small-signal bandwidth	frequency response	weak nonlinearity	DC (temperature) stability
feedback configuration		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
feedback network		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
controller input stage		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
controller output stage type		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
controller output stage biasing		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
loop gain poles product		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
frequency compensation		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
differential error to gain ratio		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺
over-all biasing		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺

Orthogonal design

Teamwork: Design considerations

Can the required performance be achieved with a **single-stage** amplifier?

Noise?

Drive capability?

Bandwidth?

Distortion?

Mid-band accuracy?

Cost factors?

What could a **two-stage architecture** look like?

Design considerations?

Tradeoffs between **performance aspects** and **cost factors?**

Team 1, Single-stage feedback amplifier

Mid-band accuracy with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Hand-calculation of the loop gain (parameter determination with LTSpice)

Verification by simulation (LTSpice or SLiCAP)

Discussion of results

3. Methods to improve

Give several methods to improve the mid-band accuracy

Discuss interaction with other performance aspects and cost factors

Team 2, Single-stage feedback amplifier

Bandwidth with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Hand-calculation of the bandwidth (parameter determination with LTSpice)

Verification by simulation (LTSpice or SLiCAP)

Discussion of results

3. Methods to improve

Can you think of reasons to modify the bandwidth?

Give several methods to modify the bandwidth

Discuss interaction with other performance aspects and cost factors

Team 3, Single-stage feedback amplifier

Distortion with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Check the distortion with LTSpice

Discussion of results

3. Methods to improve

Give several methods to improve the linearity

Discuss interaction with other performance aspects and cost factors

Team 4, Single-stage feedback amplifier

Noise with the current stages

1. What specification do we have?
2. Can the specifications be met with a single-stage solution?

Simulate noise performance of the output stage with LTSpice or SLiCAP

Discussion of results

3. Methods to improve

Can you think of reasons to modify the noise performance?

Give several methods to modify the noise performance

Discuss interaction with other performance aspects and cost factors

Team 5, Two-stage feedback amplifier

Topology generation two-stage amplifier

Propose different topologies

Generate different two-stage topologies for the signal path

Give design considerations:

- Type of input stage

- Type of output stage

- Relevant performance aspect of the stage

- Design parameters and cost factors

Rank the proposed solutions

- Criteria?

- Motivate the proposed order