Structured Electronic Design

Design of application-specific
negative feedback amplifiers
with operational amplifiers

Anton J.M. Montagne

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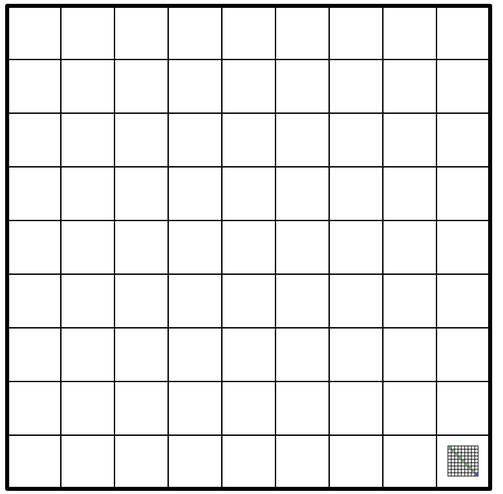
Design step

Design tool



design aspect

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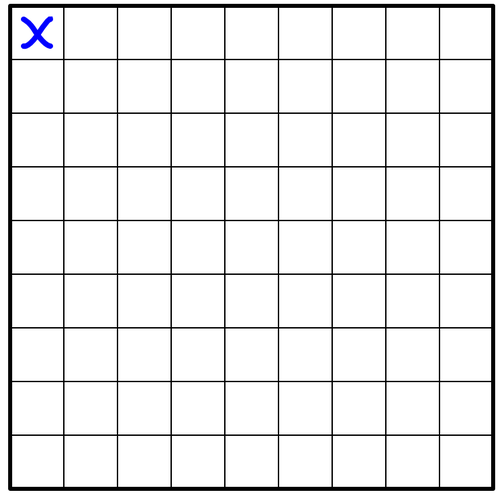
Design step

Design tool

Setting up and understanding the specifications

SLiCAP



Function, performance, costs and environment

design aspect

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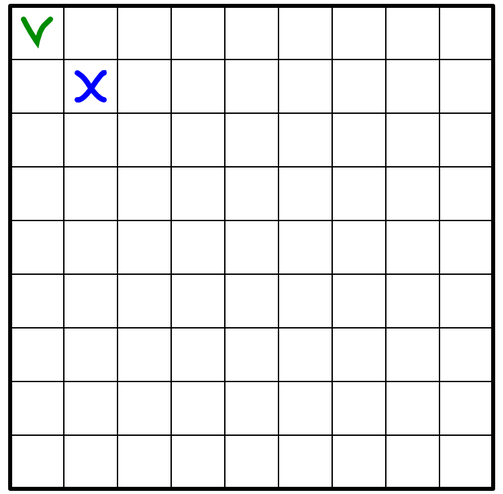
Design step

Design tool

Setting up and understanding the specifications

Design considerations w.r.t. the amplifier type: A, B, C, D



SLiCAP

SLiCAP

Function, performance, costs and environment

Feedback configuration

design parameters

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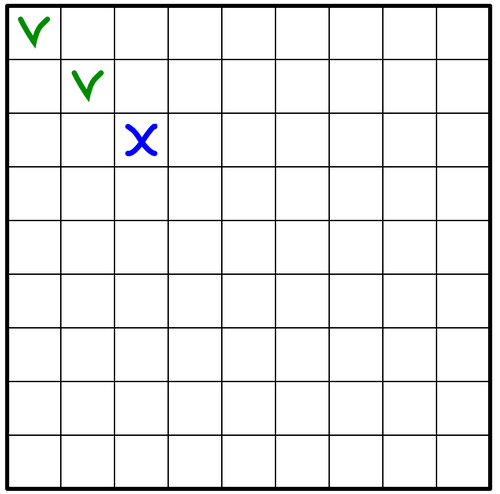
Design step

Design tool

Setting up and understanding the specifications — SLiCAP

Design considerations w.r.t. the amplifier type: A, B, C, D — SLiCAP

Design considerations w.r.t. the V/I drive capability and biasing stability — SLiCAP



Function, performance, costs and environment

Feedback configuration

Biasing concept, supply voltages

design aspect

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Design step

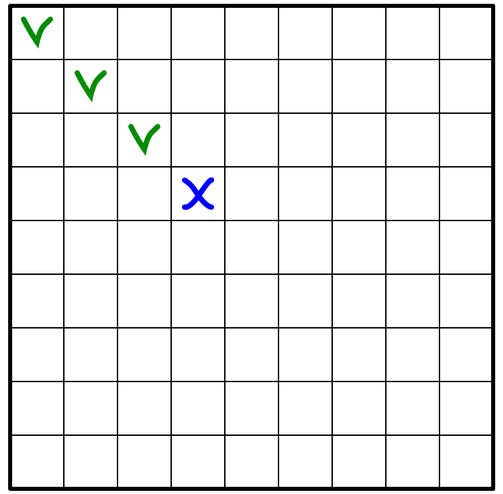
Design tool

Setting up and understanding the specifications — SLiCAP

Design considerations w.r.t. the amplifier type: A, B, C, D — SLiCAP

Design considerations w.r.t. the V/I drive capability and biasing stability — SLiCAP

Design considerations w.r.t. the noise performance — SLiCAP



Function, performance, costs and environment

Feedback configuration

Biasing concept, supply voltages

Controller input noise sources

design aspect

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Design step

Design tool

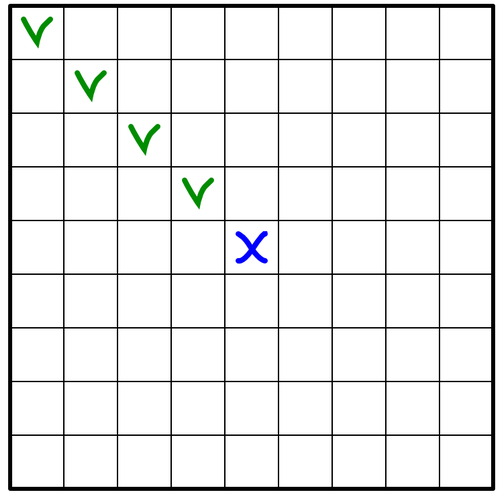
Setting up and understanding the specifications — SLiCAP

Design considerations w.r.t. the amplifier type: A, B, C, D — SLiCAP

Design considerations w.r.t. the V/I drive capability and biasing stability — SLiCAP

Design considerations w.r.t. the noise performance — SLiCAP

Design considerations w.r.t. the mid-band accuracy and bandwidth — SLiCAP



Function, performance, costs and environment

Feedback configuration

Biasing concept, supply voltages

Controller input noise sources

Loop gain and LP product

design aspect

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Design step

Design tool

Design step									Design tool
Setting up and understanding the specifications	✓								SLiCAP
Design considerations w.r.t. the amplifier type: A, B, C, D		✓							SLiCAP
Design considerations w.r.t. the V/I drive capability and biasing stability			✓						SLiCAP
Design considerations w.r.t. the noise performance				✓					SLiCAP
Design considerations w.r.t. the mid-band accuracy and bandwidth					✓				SLiCAP
Component selection (e.g. operational amplifier)						✗			Database
Function, performance, costs and environment	Feedback configuration	Biasing concept, supply voltages	Controller input noise sources	Loop gain and LP product	Putting it all together				design aspect

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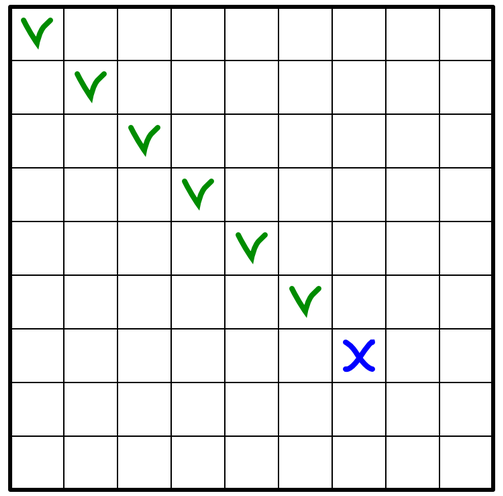
Design step

Design tool

Design step	Design tool
Setting up and understanding the specifications	SLiCAP
Design considerations w.r.t. the amplifier type: A, B, C, D	SLiCAP
Design considerations w.r.t. the V/I drive capability and biasing stability	SLiCAP
Design considerations w.r.t. the noise performance	SLiCAP
Design considerations w.r.t. the mid-band accuracy and bandwidth	SLiCAP
Component selection (e.g. operational amplifier)	Database
Frequency compensation	SLiCAP



Function, performance, costs and environment
Feedback configuration
Biasing concept, supply voltages
Controller input noise sources
Loop gain and LP product
Putting it all together
Frequency response, PZ pattern

design aspect

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Design step

Design tool

Design step	*Function, performance, costs and environment*	Feedback configuration	Biasing concept, supply voltages	Controller input noise sources	Loop gain and LP product	Putting it all together	Frequency response, PZ pattern	Distortion	Design tool
Setting up and understanding the specifications	✓								SLiCAP
Design considerations w.r.t. the amplifier type: A, B, C, D		✓							SLiCAP
Design considerations w.r.t. the V/I drive capability and biasing stability			✓						SLiCAP
Design considerations w.r.t. the noise performance				✓					SLiCAP
Design considerations w.r.t. the mid-band accuracy and bandwidth					✓				SLiCAP
Component selection (e.g. operational amplifier)						✓			Database
Frequency compensation							✓		SLiCAP
Verification of the weak nonlinearity								X	LTspice

design aspect

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Design step

Design tool

	Function, performance, costs and environment	Feedback configuration	Biasing concept, supply voltages	Controller input noise sources	Loop gain and LP product	Putting it all together	Frequency response, PZ pattern	Bias structure	*Design of bias sources*	
Setting up and understanding the specifications	✓									SLiCAP
Design considerations w.r.t. the amplifier type: A, B, C, D		✓								SLiCAP
Design considerations w.r.t. the V/I drive capability and biasing stability			✓							SLiCAP
Design considerations w.r.t. the noise performance				✓						SLiCAP
Design considerations w.r.t. the mid-band accuracy and bandwidth					✓					SLiCAP
Component selection (e.g. operational amplifier)						✓				Database
Frequency compensation							✓			SLiCAP
Verification of the weak nonlinearity								✓		LTspice
(Specification of bias sources)										SLiCAP / LTspice

design aspect

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