

Contents

1	Introduction	1
1.1	Silicon and Plastic	1
1.2	Challenges in Electronics on Flexible Substrates	3
1.3	Book Aims and Overview	5
	References	6
2	Applications of Large-area Electronics on Foil	9
2.1	From Miniaturization to Flexible Substrates	9
2.2	Applications	10
2.2.1	Large-area Applications	10
2.2.2	Low-Cost Applications	11
	References	13
3	State of the Art in Circuit Design	15
3.1	Introduction	15
3.2	Design-Environment Setup	19
3.3	Circuit Design	20
	References	22
4	Device Modeling and Characterization	25
4.1	Transistor Model	25
4.2	Measurements and Characterization	31
4.2.1	Parameters Extraction	33
4.2.2	Dynamic Behavior	40
	References	42
5	Sensor Frontend Architecture	43
5.1	Analog Signal Conditioning	43
5.2	Data Conversion	45
5.3	Robust Digital Blocks	48
	References	52

6	Circuit Design for Analog Signal Conditioning	53
6.1	A Filter Based on a Tunable Transconductor	53
6.1.1	The Proposed $G_m C$ Filter	53
6.1.2	Transconductor Analysis	55
6.1.3	Transconductor Design	57
6.1.4	Transconductor Realization	60
6.1.5	Transconductor Measurements and Simulations	61
6.1.6	Tunable Filter	63
6.2	Amplifiers	65
6.2.1	A Continuous-time Amplifier	65
6.2.2	A Discrete-Time Amplifier	70
6.3	Conclusions	79
	References	80
7	Circuit Design for Data Conversion	81
7.1	A Synchronous Latched Comparator	81
7.1.1	Comparator Topology and Analysis	81
7.1.2	Proposed Latched Comparator	84
7.1.3	Latch Design and Simulation	86
7.1.4	Latch Realization	89
7.1.5	Latch Measurements	89
7.2	A Digital to Analog Converter Based on a Metal-Oxide Technology	92
7.2.1	GIZO Technology	92
7.2.2	Proposed Current-Steering DAC	94
7.3	VCO-Based Analog to Digital Converter	100
7.3.1	Proposed VCO-Based ADC	100
7.4	Conclusions	108
	References	109
8	Circuit Design for Digital Processing	111
8.1	The Proposed Positive-Feedback Level Shifter Logic	111
8.1.1	PLS Logic Analysis	112
8.1.2	PLS Inverter Design	115
8.1.3	Test Foil Design	115
8.1.4	Test Foil Measurements	117
8.2	Conclusions	127
	References	128
9	Conclusions	129

Circuit Design on Plastic Foils

Raiteri, D.; Cantatore, E.; van Roermund, A.H.M.

2015, X, 130 p. 103 illus., 53 illus. in color., Hardcover

ISBN: 978-3-319-11426-2