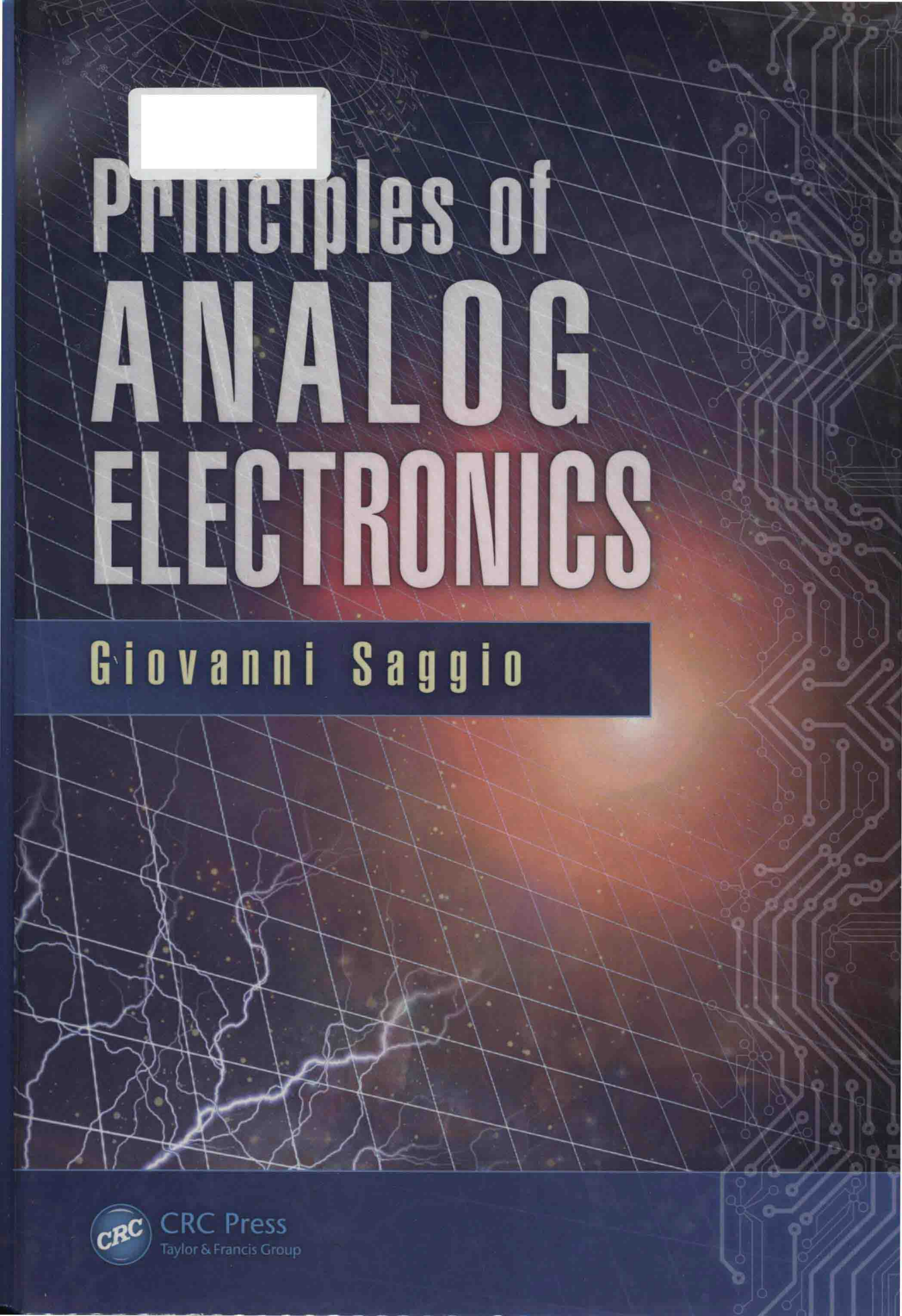


The background of the book cover features a dark, textured surface with a grid of thin white lines. On the right side, there is a complex, glowing circuit board pattern in white and yellow. A bright, jagged lightning bolt strikes diagonally across the lower-left portion of the cover. The overall color palette is dark blue and black, with highlights of white and yellow from the circuit and lightning.

Principles of **ANALOG** **ELECTRONICS**

Giovanni Saggio



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We live in a world that does not tolerate the slightest grammatical mistake but indulges in the complete ignorance in scientific matters. Could this strange disparity perhaps be caused by the tumultuous scientific developments in the past few decades? Fortunately, there is a silver lining; for one who knows science, he or she potentially has the key to success in his or her hands.

Anyone who really knows electronics can design new ideas.

Preface

Anyone who knows electronics can create new ideas, and this book explores that possibility by focusing on analog electronics. This is because in the real world, signals are mostly analog, spanning continuously varying values, so that circuits interfaced with the physical world have an analog nature, to process analog signals.

The fascinating area of analog “grows” to overlap fundamental areas (fields, circuits, signals and systems, and semiconductors), here morphed into a self-consistent comprehensive book. This approach leads to a text that captures the big picture, while still providing the necessary details, to reduce knowledge fragmentation and to improve learning outcomes.

The presentation is accurate and clear, including appropriate examples and detailed explanations of the behavior of real electronic circuits.

The text is “humanized” not only because the important theorems and laws are treated, but also because we look at the people who fundamentally contributed to those. Curiosities (How did Google get its name? Why is it difficult to locate crickets in a field? Why does the violin bridge have that strange shape?, etc.), observations, and real life application-oriented examples (electrocardiogram instrumentation, active noise-canceling headphones, USB-powered charger, etc.) are provided to contribute to a practical approach.

The first part of the book includes a clear and thorough presentation of the mathematical (Chapter 1), physical (Chapter 2), and chemical concepts (Chapter 3) that are essential to understanding the principles of operation of electronic devices. This may be particularly useful for students with a limited background in basic matters who want to take a serious approach to electronics.

The circuit approach is detailed with models (Chapters 4, 5, 10) and main theorems (Chapter 6).

Passive and active electronic devices are described and analyzed, with specific reference to the fundamental filters (Chapter 7), and to the most common Si-based components such as diodes, BJTs, and MOSFETs (Chapters 4, 8). Semiconductor devices are then used to design electronic circuits, such as rectifiers, power suppliers, clamper and clipper circuits (Chapter 9). The main topologies of amplifiers based on BJTs (Chapter 11), and on MOSFETs (Chapter 12), along with their variants and improvements (Chapters 13, 14), are also discussed. Relevant or curious circuit applications are analyzed as well (Chapter 15).

At the end of each chapter, helpful summaries are provided, with key points, jargon, terms, and exercises with solutions also included.

Practical tables, often missing in many books on electronics, are included here to illustrate the coding schemes necessary to recognize commercial passive and active components.

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Contents

Preface	xvii
Author	xix
Chapter 1 Mathematical Tools.....	1
1.1 Multiples and Submultiples.....	1
1.2 Periodic Waveforms	3
1.2.1 Sine Waves.....	9
1.2.2 Square Waves.....	9
1.2.3 Characterizations	10
1.2.3.1 Average Value	10
1.2.3.2 Root Mean Square Value	10
1.2.3.3 Descriptive Values.....	11
1.3 Fundamental Trigonometric Formulae	11
1.3.1 Pythagorean Identity.....	11
1.3.2 Addition and Subtraction	12
1.3.3 Werner Formulas	13
1.3.4 Duplication Formulas.....	13
1.3.5 Prosthaphaeresis Formulas.....	14
1.4 Complex Numbers.....	14
1.5 Phase Vector (or Phasor).....	15
1.6 Laplace Transform	17
1.7 Taylor Series	18
1.8 Fourier Series and Integral	19
1.9 Modulation.....	21
1.10 Key Points, Jargon, and Terms	22
1.11 Exercises	23
Chapter 2 Physical and Electrical Background	29
2.1 Force, Work, Energy, Power.....	29
2.2 Heat and Temperature.....	32
2.2.1 Degree Celsius or Centigrade (°C)	32
2.2.2 Degree Fahrenheit (°F).....	33
2.2.3 Kelvin (K)	33
2.3 Electric Charge.....	35
2.4 Coulomb Force	35
2.5 Electric Field	36
2.6 Electric Induction	38
2.7 Electric Current.....	39
2.8 Electric Voltage	41
2.9 Electron Mobility	43
2.10 Electric Energy and Power	43
2.11 Conventional Notations	45

Contents

2.12	Magnetic Field	45
2.12.1	Biot–Savart Law	46
2.12.2	Magnetic Properties of Matter	47
2.13	Magnetic Induction	48
2.14	Undulatory Phenomena	51
2.14.1	Electromagnetic Waves	51
2.14.1.1	Light	51
2.14.1.2	Electromagnetic Waves in a Medium	52
2.14.2	Mechanical Waves	53
2.15	Key Points, Jargon, and Terms	56
2.16	Exercises	57
Chapter 3	Nature of Matter	61
3.1	Atomic Model	61
3.1.1	Shells, Subshells, Orbitals	63
3.1.2	Spectroscopic Notation	66
3.1.3	Octet Rule	67
3.2	Lattice	68
3.3	Wave–Particle Duality	70
3.4	Electromagnetic Radiation	72
3.4.1	Photoelectric Effect	72
3.4.2	Production of Radiation	73
3.4.3	Radiation and Ionization	73
3.5	Energy Band Theory	76
3.6	Conductors	80
3.7	Insulators	81
3.8	Semiconductors	82
3.8.1	Intrinsic and Extrinsic Semiconductors	82
3.8.2	Commonly Used Semiconductors	82
3.8.2.1	Germanium	84
3.8.2.2	Silicon	84
3.8.2.3	Gallium Arsenide	87
3.8.2.4	Organic Semiconductors	88
3.8.2.5	Others	88
3.9	Electrical Resistance and Joule Heating	89
3.10	Temperature Coefficient	89
3.11	Key Points, Jargon, and Terms	90
Chapter 4	Two-Terminal Components	93
4.1	Definitions	93
4.2	Conventional Notations	95
4.3	Topology of Interconnections	95
4.3.1	Series Topology (Voltage Divider)	95
4.3.2	Parallel Topology (Current Divider)	95
4.3.3	Bridge Topology	96
4.3.4	Star and Triangle Topologies	96
4.4	Resistors	97

Contents

4.4.1	Resistance, Resistivity, Conductance, and Conductivity	97
4.4.2	Classification	99
4.4.3	Coding Scheme	100
4.4.4	Power Resistors	103
4.4.5	Trimmer and Potentiometer	104
4.4.6	SMD Resistors	104
4.4.7	Ohm's Law	105
4.4.8	Joule's Law	108
4.4.9	Real Power	108
4.4.10	Physical Meaning of the RMS Value	110
4.4.11	Resistors in Series	111
4.4.12	Resistors in Parallel	112
4.4.13	Resistor Bridge	113
4.4.14	Resistors in Star and Triangle Connections	113
4.4.15	Voltage Divider	115
4.4.16	Current Divider	116
4.5	Electrical Sources	116
4.5.1	Ideal Voltage Source	117
4.5.2	Ideal Current Source	118
4.5.3	Non-Ideal Voltage and Current Sources	118
4.6	Capacitors	119
4.6.1	Capacitance	119
4.6.2	Types of Capacitors	123
4.6.3	Capacitor Markings	124
4.6.3.1	Ceramic Capacitors	124
4.6.3.2	Polyester Capacitors	125
4.6.3.3	Electrolytic Capacitors	126
4.6.3.4	Color-Coding Scheme	126
4.6.3.5	SM Capacitors	126
4.6.4	Charge and Discharge of a Capacitor	127
4.6.5	Capacitors in Series	128
4.6.6	Capacitors in Parallel	129
4.6.7	Energy Stored in Capacitors	130
4.6.8	Reactive Power	131
4.7	Inductors	133
4.7.1	Inductance	133
4.7.2	Flux	134
4.7.3	Electromagnetic Induction	134
4.7.4	Self-Inductance	136
4.7.5	Types of Inductors	137
4.7.5.1	Solenoid	137
4.7.5.2	Coaxial	138
4.7.6	Inductors in Series	138
4.7.7	Inductors in Parallel	139
4.7.8	Energy Stored in Inductors	140
4.7.9	Reactive Power	140
4.8	Capacitor-Inductor Duality	141
4.9	Complex Power	142

Contents

4.10	Summary of Constitutive Relations	145
4.11	Key Points, Jargon, and Terms	145
4.12	Exercises	147
Chapter 5	Two-Port Networks.....	161
5.1	Definitions.....	161
5.2	Transformers	163
5.3	Dependent Sources	165
5.4	Models of Two-Port Networks.....	166
5.4.1	Classification.....	167
5.4.2	Equivalent Circuits	168
5.4.3	Examples of Conversion between Network Parameters.....	168
5.4.3.1	From (H) to (Z).....	168
5.4.3.2	From (Z) to (H).....	170
5.4.4	Conversion Table.....	171
5.4.5	Examples	172
5.5	Interconnections of Two-Port Networks.....	175
5.5.1	Series Connection	175
5.5.2	Parallel Connection	175
5.5.3	Series–Parallel and Parallel–Series Connections..	176
5.5.4	Cascade Connection	177
5.6	Key Points, Jargon, and Terms	178
5.7	Exercises	178
Chapter 6	Circuit Theorems	191
6.1	Definitions.....	191
6.1.1	Electric Circuit and Its Elements	191
6.1.2	Equivalent Networks.....	193
6.1.3	Node, Branch, Mesh.....	193
6.1.4	Ground and Floating Ground	194
6.1.5	Decibel	195
6.2	Kirchhoff's Laws.....	197
6.2.1	Kirchhoff's Current Law (KCL)	198
6.2.2	Kirchhoff's Voltage Law (KVL)	198
6.3	Thévenin's Theorem	199
6.4	Norton's Theorem.....	201
6.5	Superposition Theorem	202
6.6	Miller's Theorem.....	203
6.7	Miller's Dual Theorem.....	205
6.8	Substitution Theorem.....	206
6.9	Impedance Matching and Bridging.....	206
6.9.1	Introduction	206
6.9.2	Maximum Power Transfer Theorem	207
6.9.2.1	Resistive Impedances for Both Source and Load.....	207

Contents

	6.9.2.2	Complex Impedance for Source and Resistive Impedance for Load.....	208
	6.9.2.3	Complex Impedances for Both Source and Load.....	209
	6.9.3	Maximum Voltage or Current Transfer.....	211
	6.9.4	Efficiency	212
	6.9.5	Matching Networks	213
6.10		Who Decides What	213
6.11		Key Points, Jargon, and Terms	214
6.12		Exercises	215
Chapter 7		Frequency Domain	223
7.1		Introduction	223
7.2		Resistance, Reactance, Impedance.....	224
	7.2.1	Capacitive Reactance	225
	7.2.2	Inductive Reactance	226
7.3		Electronic Filters	226
	7.3.1	Low-Pass RC Filter	228
		7.3.1.1 Amplitude Response	229
		7.3.1.2 Phase Response	231
		7.3.1.3 Group Delay Response	232
		7.3.1.4 Considerations.....	233
	7.3.2	High-Pass RC Filter	233
		7.3.2.1 Amplitude Response	235
		7.3.2.2 Phase Response	236
	7.3.3	LC Filter	238
	7.3.4	RLC Filter	240
	7.3.5	Ideal Filters	244
7.4		Sources of Phase Shift	246
7.5		RC Integrator.....	247
7.6		Key Points, Jargon, and Terms	249
7.7		Exercises	249
Chapter 8		Semiconductor Components.....	253
8.1		Doping of Semiconductors	253
	8.1.1	N-Type Silicon	255
	8.1.2	P-Type Silicon.....	258
8.2		Charge Carriers.....	259
	8.2.1	Electrons and Holes.....	259
	8.2.2	Majority and Minority Carriers.....	260
	8.2.3	Law of Mass Action.....	263
8.3		Current in Semiconductors.....	264
	8.3.1	Drift Current.....	264
	8.3.2	Diffusion Current.....	266
	8.3.3	Total Current.....	268
	8.3.4	Leakage Current.....	268

Contents

8.4	P-N Junction	268
8.4.1	Built-In Electric Field	269
8.4.2	Built-In Potential	271
8.5	Diode	272
8.5.1	The Bias	275
8.5.1.1	Forward Bias	275
8.5.1.2	Reverse Bias	276
8.5.2	I-V Characteristic and Threshold Voltage	277
8.5.3	The Resistance	279
8.5.3.1	Static Resistance	280
8.5.3.2	Dynamic Resistance	280
8.5.4	The Capacitance	281
8.5.4.1	Junction or Depletion Capacitance	281
8.5.4.2	Diffusion or Transit Time Capacitance	281
8.5.5	Zener	282
8.5.6	LED	283
8.6	BJT	286
8.6.1	Introduction	286
8.6.2	Working Principles	288
8.6.3	Forward-Active Mode	289
8.6.4	Cutoff Mode	293
8.6.5	Saturation Mode	293
8.6.6	Modes and Models	293
8.6.7	I-V Graph for C.B. Configuration	295
8.6.7.1	Input Characteristics (C.B.)	295
8.6.7.2	Output Characteristics (C.B.)	296
8.6.8	I-V Graph for C.E. Configuration	297
8.6.8.1	Input Characteristics (C.E.)	297
8.6.8.2	Output Characteristics (C.E.)	298
8.6.8.3	Early Effect	299
8.6.9	I-V Graph for C.C. Configuration	300
8.6.9.1	Input Characteristics (C.C.)	300
8.6.9.2	Output Characteristics (C.C.)	301
8.7	MOSFET	301
8.7.1	Field Effect Transistors	301
8.7.2	Working Principles	302
8.7.3	Ohmic Condition	304
8.7.4	Pinch-Off Condition	306
8.7.5	Saturation Condition	307
8.7.6	I-V Graph	307
8.7.7	Subthreshold Current	309
8.7.8	Types of MOSFETs	309
8.8	BJT versus MOSFET	310
8.9	Numbering and Coding Schemes	311
8.9.1	JEDEC	311
8.9.2	Pro Electron	312

8.9.3	JIS	312
8.9.4	Others.....	313
8.10	Key Points, Jargon, and Terms	314
8.11	Exercises	315
Chapter 9	Diode Circuits.....	319
9.1	Rectifiers.....	319
9.1.1	Half-Wave Rectifier	319
9.1.2	Filtered Half-Wave Rectifier	320
9.1.2.1	Choice of Smoothing Capacitor	321
9.1.2.2	Choice of Diode	322
9.1.2.3	Observation on Harmonic Content	324
9.1.3	Bridge Full-Wave Rectifier	325
9.1.4	Filtered Full-Wave Rectifier.....	326
9.2	DC Power Supply	328
9.3	Voltage Doubler Circuits	330
9.4	Clamper Circuits	331
9.5	Clipper Circuits	332
9.6	Key Points, Jargon, and Terms	334
9.7	Exercises	334
Chapter 10	Amplifiers.....	339
10.1	Definitions and Classifications	339
10.2	Key Parameters	342
10.2.1	Gain.....	342
10.2.2	Impedances	342
10.2.3	Efficiency	343
10.2.4	Class.....	344
10.2.5	Stability	347
10.2.6	Bandwidth.....	347
10.2.7	Slew Rate	351
10.2.8	Distortion	351
10.2.9	Noise	354
10.2.9.1	Types	355
10.2.9.2	Measures	357
10.3	Types of Amplifier	358
10.3.1	Voltage Amplifier	358
10.3.2	Current Amplifier.....	360
10.3.3	Transresistance Amplifier	362
10.3.4	Transconductance Amplifier	364
10.3.5	Power Amplifier	367
10.4	Loading Effect and Driving Parameters	367
10.5	Key Points, Jargon, and Terms	368
10.6	Exercises	369

Chapter 11	Amplifiers: Basic BJT Configurations	371
11.1	Conventional Notations	371
11.2	Step-by-Step First Design.....	371
11.2.1	DC Bias Resistor	371
11.2.2	AC Source	373
11.2.3	DC Blocking Capacitors	373
11.2.4	AC Collector Resistor	374
11.3	BJT as a Signal Amplifier	375
11.3.1	BJT as a Two-Port Network	375
11.3.2	BJT Small Signal Model	375
11.3.2.1	Mathematical Meaning of the Hybrid Parameters	377
11.3.2.2	Physical Meaning of the Hybrid Parameters	378
11.3.3	DC and AC Current Gains	381
11.3.4	Typical H-Parameter Values	382
11.3.5	Hybrid Parameter Conversion	384
11.4	C.E. Configuration	385
11.4.1	DC Analysis	387
11.4.1.1	Fixed Bias.....	387
11.4.1.2	DC Load Line	388
11.4.1.3	DC Stability.....	389
11.4.1.4	Emitter Feedback Bias	390
11.4.1.5	Voltage Divider Bias	392
11.4.2	AC Analysis	395
11.4.2.1	AC Load Line	396
11.4.2.2	C.E.: Input Resistance	398
11.4.2.3	C.E.: Current Gain.....	400
11.4.2.4	C.E.: Voltage Gain	403
11.4.2.5	C.E.: Output Resistance.....	405
11.5	Swamped C.E.....	406
11.5.1	DC Analysis.....	407
11.5.2	AC Analysis	407
11.5.2.1	Swamped C.E.: Current Gain	407
11.5.2.2	Swamped C.E.: Input Resistance	408
11.5.2.3	Swamped C.E.: Voltage Gain	410
11.5.2.4	Swamped C.E.: Output Resistance.....	413
11.6	C.C. Configuration (Emitter Follower)	413
11.6.1	DC Analysis	414
11.6.2	AC Analysis	415
11.6.2.1	C.C. (C.C. Hybrid Parameters): Input Resistance	416
11.6.2.2	C.C. (C.C. Hybrid Parameters): Current Gain	417
11.6.2.3	C.C. (C.C. Hybrid Parameters): Voltage Gain	418
11.6.2.4	C.C. (C.C. Hybrid Parameters): Output Resistance	419