

P rinciples and E lements

of

POWER ELECTRONICS

Devices, Drivers, Applications, and Passive Components

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Table of Contents

1

Basic Semiconductor Physics and Technology

Example 1.1: Resistance of homogeneously doped silicon	2
1.1 Processes forming and involved in forming semiconductor devices	4
1.1.1 Alloying	
1.1.2 Diffused	
Example 1.2: Constant Surface Concentration diffusion – predeposition	7
Example 1.3: Constant Total Dopant diffusion – drive in-1	8
Example 1.4: Constant Total Dopant diffusion – drive in-2	8
1.1.3 Epitaxy growth - deposition	
1.1.4 Ion-implantation and damage annealing	
Example 1.5: Ion implantation	13
1.2 Thin Film Deposition	14
1.2.1 Chemical Vapour Deposition (CVD)	
1.2.2 Physical Vapour deposition (PVD)	
1.3 Thermal oxidation and the masking process	19
1.4 Polysilicon deposition	21
1.5 Lithography – optical and electron	23
1.5.1 Optical Lithography	
1.5.2 Electron Lithography	
1.6 Etching	27
1.6.1 Wet Chemical Etching	
1.6.2 Dry Chemical Etching	
1.7 Lift-off Processing	33
1.8 Resistor Fabrication	34
1.9 Isolation Techniques	34
1.10 Wafer Cleaning	35
1.11 Planarization	36
1.12 Gettering	37
1.13 Lifetime control	37
1.14 Silicide formation	38
1.15 Ohmic contact	39
1.16 Glassivation	42
1.17 Back side metallisation and die separation	43
1.18 Wire bonding	43

1.19	Types of wafer silicon	47
1.19.1	Purifying silicon	
1.19.2	Crystallinity	
1.19.3	Single crystal silicon	
1.19.3i	Czochralski process	
1.19.3ii	Float-zone process	
1.19.3iii	Ribbon silicon	
1.19.4	Multi-crystalline Silicon	
1.19.5	Amorphous Silicon	
1.20	Silicon Carbide	51
1.21	Si and SiC physical and electrical properties compared	51

2

The pn Junction

	Example 2.1: Built-in potential of an abrupt junction	58
2.1	The pn junction under forward bias (steady-state)	59
2.2	The pn junction under reverse bias (steady-state)	59
2.2.1	Punch-through voltage	
2.2.2	Avalanche breakdown	
2.2.3	Zener breakdown	
2.3	Thermal effects	60
	Example 2.2: Diode forward bias characteristics	61
2.4	Models for the bipolar junction diode	61
2.4.1	Piecewise-linear junction diode model	
	Example 2.3: Using the pwl junction diode model	62
	Example 2.4: Static linear diode model	62
2.4.2	Semiconductor physics based junction diode model	
2.4.2i	Determination of zero bias junction capacitance, C_{j0}	
2.4.2ii	One-sided pn diode equations	
	Example 2.5: Space charge layer parameter values	67

3

Power Switching Devices and their Static Electrical Characteristics

3.1	Power diodes	71
3.1.1	The pn fast-recovery diode	
3.1.2	The p-i-n diode	
3.1.3	The power Zener diode	
3.1.4	The Schottky barrier diode	
3.1.5	The silicon carbide Schottky barrier diode	

57

71

3.2	Power switching transistors	76
3.2.1	The bipolar npn power switching junction transistor (BJT)	76
3.2.1i	- BJT gain	
3.2.1ii	- BJT operating states	
3.2.1iii	- BJT maximum voltage - first and second breakdown	
3.2.2	The metal oxide semiconductor field effect transistor (MOSFET)	79
3.2.2i	- MOSFET structure and characteristics	
3.2.2ii	- MOSFET drain current	
3.2.2iii	- MOSFET transconductance and output conductance	
3.2.2iv	- MOSFET on-state resistance	
3.2.2v	- MOSFET p-channel device	
	Example 3.1: Properties of an n-channel MOSFET cell	84
3.2.2vi	- MOSFET parasitic BJT	
3.2.2vii	- MOSFET on-state resistance reduction	
1	- Trench gate	
2	- Vertical super-junction	
3.2.3	The insulated gate bipolar transistor (IGBT)	87
3.2.3i	- IGBT at turn-on	
3.2.3ii	- IGBT in the on-state	
3.2.3iii	- IGBT at turn-off	
3.2.3iv	- IGBT latch-up	
1	- IGBT on-state SCR static latch-up	
2	- IGBT turn-off SCR dynamic latch-up	
3.2.4	Reverse blocking NPT IGBT	90
3.2.5	Forward conduction characteristics	91
3.2.6	PT IGBT and NPT IGBT comparison	91
3.2.7	The junction field effect transistor (JFET)	91
3.3	Thyristors	92
3.3.1	The silicon-controlled rectifier (SCR)	
3.3.1i	- SCR turn-on	
3.3.1ii	- SCR cathode shorts	
3.3.1iii	- SCR amplifying gate	
3.3.2	The asymmetrical silicon-controlled rectifier (ASCR)	
3.3.3	The reverse-conducting thyristor (RCT)	
3.3.4	The bi-directional-conducting thyristor (BCT)	
3.3.5	The gate turn-off thyristor (GTO)	
3.3.5i	- GTO turn-off mechanism	
3.3.6	The gate commutated thyristor (GCT)	
3.3.6i	- GCT turn-off	
3.3.6ii	- GCT turn-on	
3.3.7	The light triggered thyristor (LTT)	
3.3.8	The triac	
3.4	Power packages and modules	104

4

Electrical Ratings and Characteristics of Power Semiconductor Switching Devices

4.1	General maximum ratings of power switching semiconductor devices	107
4.1.1	Voltage ratings	
4.1.2	Forward current ratings	
4.1.3	Temperature ratings	
4.1.4	Power ratings	

107

4.2	The fast-recovery diode	109
4.2.1	Turn-on characteristics	
4.2.2	Turn-off characteristics	
4.2.3	Schottky diode dynamic characteristics	
4.3	The bipolar, high-voltage, power switching npn junction transistor	112
4.3.1	Transistor ratings	
4.3.1i	- BJT collector voltage ratings	
4.3.1ii	- BJT safe operating area (SOA)	
4.3.2	Transistor switching characteristics	
4.3.2i	- BJT turn-on time	
4.3.2ii	- BJT turn-off time	
4.3.3	BJT phenomena	
4.4	The power MOSFET	117
4.4.1	MOSFET absolute maximum ratings	
4.4.2	Dynamic characteristics	
4.4.2i	- MOSFET device capacitances	
4.4.2ii	- MOSFET switching characteristics	
1	- MOSFET turn-on	
2	- MOSFET turn-off	
Example 4.1:	MOSFET drain characteristics	122
4.5	The insulated gate bipolar transistor	123
4.5.1	IGBT switching	
4.5.2	IGBT short circuit operation	
4.6	The thyristor	125
4.6.1	SCR ratings	
4.6.1i	- SCR anode ratings	
4.6.1ii	- SCR gate ratings	
4.6.2	Static characteristics	
4.6.2i	- SCR gate trigger requirements	
4.6.2ii	- SCR holding and latching currents	
4.6.3	Dynamic characteristics	
4.6.3i	- SCR anode at turn-on	
4.6.3ii	- SCR anode at turn-off	
4.7	The gate turn-off thyristor	128
4.7.1	Turn-on characteristics	
4.7.2	Turn-off characteristics	
4.8	Appendix: Effects on MOSFET switching of negative gate drive	130

5

Cooling of Power Switching Semiconductor Devices

5.1	Thermal resistances	136
5.2	Contact thermal resistance	136
5.2.1	Thermal Interface Materials	
5.2.2	Phase Change Gasket Materials (solid to liquid)	
5.3	Heat-sinking thermal resistance	140

133

5.4	Modes of power dissipation	144
5.4.1	Steady-state response	
5.4.2	Pulse response	
Example 5.1:	Semiconductor single power pulse capability	147
Example 5.2:	A single rectangular power pulse	149
5.4.3	Repetitive transient response	
Example 5.3:	Semiconductor transient repetitive power capability	150
Example 5.4:	Composite rectangular power pulses	151
Example 5.5:	Non-rectangular power pulses	153
5.5	Average power dissipation	156
5.5.1	Graphical integration	
5.5.2	Practical superposition	
5.6	Power losses from manufacturers' data sheets	156
5.6.1	Switching transition power loss, P_s	
5.6.2	Off-state leakage power loss, P_l	
5.6.3	Conduction power loss, P_c	
5.6.4	Drive input device power loss, P_G	
5.7	Heat-sinking design cases	158
5.7.1	Heat-sinking for diodes and thyristors	
5.7.1i	- Low-frequency switching	
5.7.1ii	- High-frequency switching	
Example 5.6:	Heat-sink design for a diode	160
5.7.2	Heat-sinking for IGBTs	
Example 5.7:	Heat-sink design for an IGBT - repetitive operation at a high duty cycle	161
5.7.3	Heat-sinking for power MOSFETs	
Example 5.8:	Heat-sink for a MOSFET - repetitive operation at high peak current, low duty cycle	162
Example 5.9:	Heat-sink design for a mosfet - repetitive operation at high duty cycle	163
Example 5.10:	Two thermal elements on a common heatsink	163
Example 5.11:	Six thermal elements in a common package	164
5.8	High-performance cooling for power electronics	165
5.9	Conduction and heat spreading	165
5.10	Heat-sinks	166
5.10.1	Required heat-sink thermal resistance	
5.10.2	Heat-sink selection	
5.10.3	Heat sink types	
5.10.4	Heatsink fin geometry	
5.10.5	Thermal performance graph	
5.11	Heatsink cooling enhancements	174
5.12	Heatsink fan and blower cooling	174
5.12.1	Fan selection	
5.12.2	The fan (affinity) Laws	
Example 5.12:	Fan laws	185
5.12.3	Estimating fan life	
Example 5.13:	Fan lifetime	190
Example 5.14:	Fan testing	191
5.13	Enhanced air cooling	192
5.14	Liquid coolants for power electronics cooling	193
5.14.1	Requirements for a liquid coolant	
5.14.2	Dielectric liquid coolants	
5.14.3	Non-dielectric liquid coolants	
5.15	Direct and indirect liquid cooling	197

5.16	Indirect liquid cooling	197
5.16.1	Heat pipes – indirect cooling	
Example 5.15:	Heat-pipe	204
5.16.2	Cold plates – indirect cooling	
Example 5.16:	Cold plate design	213
5.17	Direct liquid cooling	214
5.17.1	Immersion cooling – direct cooling	
5.17.2	Liquid jet impingement – direct cooling	
5.17.3	Spray cooling – direct cooling	
5.18	Microchannels and minichannels	218
5.19	Electrohydrodynamic and electrowetting cooling	220
5.20	Liquid metal cooling	221
5.21	Solid state cooling	222
5.21.1	Thermoelectric coolers	
Example 5.17:	Thermoelectric cooler design	224
Example 5.18:	Thermoelectrically enhanced heat sink	225
5.21.2	Superlattice and heterostructure cooling	
5.21.3	Thermionic and thermotunnelling cooling	
5.22	Cooling by phase change	228
5.23	Appendix: Comparison between aluminium oxide and aluminium nitride	231
5.24	Appendix: Properties of substrate and module materials	233
5.25	Appendix: Emissivity and heat transfer coefficient	235
5.26	Appendix: Ampacities and mechanical properties of rectangular copper busbars	237
5.27	Appendix: Isolated substrates for power modules	238

6

Load, Switch, and Commutation Considerations

245

6.1	Load types	245
6.1.1	The resistive load	
Example 6.1:	Resistive load switching losses	248
Example 6.2:	Transistor switching loss for non-linear electrical transitions	249
6.1.2	The inductive load	
Example 6.3:	Zener diode, switch voltage clamping	251
Example 6.4:	Inductive load switching losses	255
6.1.3	Diode reverse recovery with an inductive load	
Example 6.5:	Inductive load switching losses with device models	256
6.2	Switch characteristics	258
6.3	Switching classification	258
6.3.1	Hard switching	
6.3.2	Soft switching	
6.3.3	Resonant switching	
6.3.4	Naturally-commutated switching	
6.4	Switch configurations	260
6.5	Power converter configuration classification	261

7

Driving Transistors and Thyristors

265

7.1	Application of the power MOSFET and IGBT	265
7.1.1	Gate drive circuits	
7.1.1i	Negative gate drive	
7.1.1ii	Floating power supplies	
1	capacitive coupled charge pump	
2	diode bootstrap	
7.1.2	Gate drive design procedure	
Example 7.1:	MOSFET input capacitance and switching times	273
7.2	Application of the Thyristor	273
7.2.1	Thyristor gate drive circuits	
i.	Vacuum cleaner suction control circuit	
ii.	Lamp dimmer circuit	
iii.	Back EMF feedback circuits	
7.2.2	Thyristor gate drive design	
Example 7.2:	A light dimmer	281
7.3	Drive design for GCT and GTO thyristors	282

8

Protecting Diodes, Transistors, and Thyristors

287

8.1	The non-polarised R-C snubber	288
8.1.1	R-C switching aid circuit for the GCT, the MOSFET, and the diode	
Example 8.1:	R-C snubber design for MOSFETs	289
8.1.2	Non-polarised R-C snubber circuit for a converter grade thyristor and a triac	
Example 8.2:	Non-polarised R-C snubber design for a converter grade thyristor	291
8.2	The soft voltage clamp	292
Example 8.3:	Soft voltage clamp design	293
8.3	Polarised switching-aid circuits	295
8.3.1	The polarised turn-off snubber circuit - assuming a linear current fall	
8.3.2	The turn-off snubber circuit - assuming a cosinusoidal current fall	
Example 8.4:	Capacitive turn-off snubber design	302
8.3.3	The polarised turn-on snubber circuit - with air core (non-saturable) inductance	
Example 8.5:	Turn-on air-core inductor snubber design	308
8.3.4	The polarised turn-on snubber circuit - with saturable ferrite inductance	
Example 8.6:	Turn-on ferrite-core saturable inductor snubber design	311
8.3.5	The unified turn-on and turn-off snubber circuit	
8.4	Snubbers for bridge legs	314
8.5	Appendix: Non-polarised turn-off R-C snubber circuit analysis	317
8.6	Appendix: Polarised turn-off R-C-D switching aid circuit analysis	318

9

Switching-aid Circuits with Energy Recovery

323

9.1	Energy recovery for inductive turn-on snubber circuits-single ended	323
9.1.1	Passive recovery	
9.1.2	Active recovery	
9.2	Energy recovery for capacitive turn-off snubber circuits-single ended	327
9.2.1	Passive recovery	
9.2.2	Active recovery	
9.3	Unified turn-on and turn-off snubber circuit energy recovery	334
9.3.1	Passive recovery	
9.3.2	Active recovery	
9.4	Inverter bridge legs	340
9.4.1	Turn-on snubbers	
9.4.2	Turn-on and turn-off snubbers	
9.5	Snubbers for multi-level inverters	343
9.5.1	Snubbers for the cascaded H-bridge multi-level inverter	
9.5.2	Snubbers for the diode-clamped multi-level inverter	
9.5.3	Snubbers for the flying-capacitor clamped multi-level inverter	
9.6	Snubbers for series connected devices	344
9.6.1	Turn-off snubber circuit active energy recovery	
9.6.2	Turn-on snubber circuit active energy recovery	
9.6.3	Turn-on and turn-off snubber circuit active energy recovery	
9.6.4	General active recovery concepts	
9.7	Snubber energy recovery for magnetically coupled based switching circuits	351
9.7.1	Passive recovery	
9.7.2	Active recovery	
9.8	General passive snubber energy recovery concepts	353

10

Device Series and Parallel Operation, Protection, and Interference

361

10.1	Parallel and series connection and operation of power semiconductor devices	361
10.1.1	Series semiconductor device operation	
10.1.1i	Steady-state voltage sharing	
Example 10.1: Series device connection – static voltage balancing		363
10.1.1ii	Transient voltage sharing	
Example 10.2: Series device connection – dynamic voltage balancing		366
10.1.2	Parallel semiconductor device operation	
10.1.2i	Matched devices	
10.1.2ii	External forced current sharing	
Example 10.3: Resistive parallel current sharing – static current balancing		369
(a)	current sharing analysis for two devices:– $r_o = 0$	
(b)	current sharing analysis for two devices:– $r_o \neq 0$	
(c)	current sharing analysis for n devices:– $r_o = 0$	
Example 10.4: Transformer current sharing–static and dynamic current balancing		374

10.2	Protection overview - over-voltage and over-current	375
10.2.1	Ideal secondary level protection	
10.2.2	Overvoltage protection devices	
10.2.3	Over-current protection devices	
10.3	Over-current Protection	378
10.3.1	Protection with fuses	
10.3.1i	- Pre-arcing I^2t	
10.3.1ii	- Total I^2t let-through	
10.3.1iii	- Fuse link and semiconductor I^2t co-ordination	
10.3.1iv	- Fuse link derating and losses	
Example 10.5: AC circuit fuse link design		386
10.3.1v	- Pulse derating	
Example 10.6: AC circuit fuse link design for I^2t surges		388
10.3.1vi	- Other fuse link derating factors	
Example 10.7: AC circuit fuse link derating		389
10.3.1vii	- Fuse link dc operation	
Example 10.8: DC circuit fuse link design		391
10.3.1viii	- Alternatives to dc fuse operation	
10.3.2	Protection with resettable fuses	
10.3.2i	Polymeric PTC devices	
10.3.2ii	Ceramic PTC devices	
Example 10.9: Resettable ceramic fuse design		391
10.3.3	Summary of over-current limiting devices	
10.4	Overvoltage	403
10.4.1	Transient voltage suppression devices	
10.4.1i	- Comparison between Zener diodes and varistors	
Example 10.10: Non-linear voltage clamp		410
10.4.2	Transient voltage fold-back devices	
10.4.2i	The surge arrester	
10.4.2ii	Thyristor voltage fold-back devices	
10.4.2iii	Polymeric voltage variable material technologies	
10.4.2iv	The crowbar	
10.4.3	Protection coordination	
10.4.4	Summary of voltage protection devices	
10.5	Interference	419
10.5.1	Noise	
10.5.1i	- Conducted noise	
10.5.1ii	- Radiated electromagnetic field coupling	
10.5.1iii	- Electric field coupling	
10.5.1iv	- Magnetic field coupling	
10.5.2	Mains filters	
10.5.3	Noise filtering precautions	
10.6	Earthing	422

11

Naturally Commutating AC to DC Converters - Uncontrolled Rectifiers

427

11.1	Single-phase uncontrolled converter circuits - ac rectifiers	427
11.1.1	Half-wave circuit with a resistive load, R	
11.1.2	Half-wave circuit with a resistive and back emf R-E load	
Example 11.1: Half-wave rectifier with resistive and back emf load		429
11.1.3	Single-phase half-wave circuit with an R-L load	
11.1.3i	- Inductor equal voltage area criterion	
11.1.3ii	- Load current zero slope criterion	

11.1.4	Half-wave rectifier circuit with a R load and capacitor filter	
Example 11.2:	Half-wave rectifier with source resistance	434
11.1.5	Single-phase half-wave circuit with an R - L load and freewheel diode	
Example 11.3:	Half-wave rectifier – with load freewheel diode	438
11.1.6	Single-phase full-wave bridge rectifier circuit with a resistive load, R	
11.1.7	Single-phase full-wave bridge rectifier circuit with a resistive and back emf load	
Example 11.4:	Full-wave rectifier with resistive and back emf load	441
11.1.8	Single-phase full-wave bridge rectifier circuit with an R - L load	
11.1.8i	- Single-phase full-wave bridge rectifier circuit with an output L - C filter	
11.1.8ii	Single-phase, full-wave bridge rectifier circuit with an R - L - E load	
Example 11.5:	Full-wave diode rectifier with L-C filter and continuous load current	447
11.1.8ii	- Single-phase full-wave bridge rectifier with highly inductive loads—constant load current	
11.1.8iii	- Single-phase full-wave bridge rectifier circuit with a C -filter and resistive load	
Example 11.6:	Single-phase full-wave bridge circuit with C-filter and resistive load	450
11.1.8iv	- Other single-phase bridge rectifier circuit configurations	
11.2	Three-phase uncontrolled rectifier converter circuits	452
11.2.1	Three-phase half-wave rectifier circuit with an inductive R - L load	
11.2.2	Three-phase full-wave rectifier circuit with an inductive R - L load	
11.2.2i	- Three-phase full-wave bridge rectifier circuit with continuous load current	
11.2.2ii	- Three-phase full-wave bridge rectifier circuit with highly inductive load	
11.2.2iii	Three-phase full-wave bridge circuit with highly inductive load with an EMF source	
11.2.2iv	Three-phase full-wave bridge circuit with capacitively filtered load resistance	
Example 11.7:	Three-phase full-wave rectifier	459
Example 11.8:	Rectifier average load voltage	460
11.3	DC MMFs in converter transformers	461
11.3.1	Effect of multiple coils on multiple limb transformers	
11.3.2	Single-phase toroidal core mmf imbalance cancellation – zig-zag winding	
11.3.3	Single-phase transformer connection, with full-wave rectification	
11.3.4	Three-phase transformer connections	
11.3.5	Three-phase transformer, half-wave rectifiers - core mmf imbalance	
11.3.6	Three-phase transformer with hexa-phase rectification, mmf imbalance	
11.3.7	Three-phase transformer mmf imbalance cancellation – zig-zag winding	
11.3.8	Three-phase transformer full-wave rectifiers – zero core mmf	
11.4	Voltage multipliers	486
11.4.1	Half-wave series multipliers	
11.4.2	Half-wave parallel multipliers	
11.4.3	Full-wave series multipliers	
Example 11.9:	Half-wave voltage multiplier	490
Example 11.10:	Full-wave voltage multiplier	491
11.4.4	Three-phase voltage multipliers	
11.4.5	Series versus parallel voltage multipliers	
11.5	Marx voltage generator	491
11.6	Definitions	493
11.7	Output pulse number	494
11.8	AC-dc converter generalised equations	495

12

503

Naturally Commutating AC to DC Converters - Controlled Rectifiers

12.1	Single-phase full-wave half-controlled converter	504
12.1.1i	- Discontinuous load current	
12.1.1ii	- Continuous load current	
12.1.2	Single-phase, full-wave, half-controlled circuit with R - L and emf load, E	
Example 12.1:	Single-phase, full-wave half-controlled rectifier	511
12.2	Single-phase controlled thyristor converter circuits	511
12.2.1	Single-phase half-wave circuit with an R - L load	
12.2.1i	- Case 1: Purely resistive load	
12.2.1ii	- Case 2: Purely inductive load	
12.2.1iii	- Case 3: Back emf E and R - L load	
Example 12.2:	Half-wave controlled rectifier	515
12.2.2	Single-phase half-wave half-controlled	
12.2.2i	- discontinuous conduction	
12.2.2ii	- continuous conduction	
12.2.3	Single-phase full-wave controlled rectifier circuit with an R - L load	
12.2.3i	- $\alpha > \phi$, $\beta - \alpha < \pi$, discontinuous load current	
12.2.3ii	- $\alpha = \phi$, $\beta - \alpha = \pi$, verge of continuous load current	
12.2.3iii	- $\alpha < \phi$, $\beta - \pi = \alpha$, continuous load current (and also purely inductive load)	
12.2.3iv	Resistive load, $\beta = \pi$	
Example 12.3:	Controlled full-wave converter – continuous and discontinuous conduction	521
12.2.4	Single-phase full-wave, fully-controlled circuit with R - L and emf load, E	
12.2.4i	- Discontinuous load current	
12.2.4ii	- Continuous load current	
Example 12.4:	Controlled converter - continuous conduction and back emf	528
Example 12.5:	Controlled converter – constant load current, back emf, and overlap	529
12.3	Three-phase half-controlled converter	529
12.3i	- $\alpha \leq \frac{1}{2}\pi$	
12.3ii	- $\alpha \geq \frac{1}{2}\pi$	
12.4	Three-phase fully-controlled thyristor converter circuits	532
12.4.1	Three-phase half-wave, fully controlled circuit with an inductive load	
12.4.2	Three-phase half-wave converter with freewheel diode	
12.4.2i	- $\alpha < \pi/6$	
12.4.2ii	- $\alpha > \pi/6$	
12.4.2iii	- $\alpha > 5\pi/6$	
Example 12.6:	Three-phase half-wave rectifier with freewheel diode	534
12.4.3	Three-phase full-wave fully-controlled circuit with an inductive load	
12.4.3i	- Resistive load	
12.4.3ii	- Highly inductive load – constant load current	
12.4.3iii	- R - L load with load EMF, E	
Example 12.7:	Three-phase full-wave controlled rectifier with constant output current	540
12.4.4	Three-phase full-wave converter with freewheel diode	
Example 12.8:	Converter average load voltage	543
12.7	Overlap	544
12.6	Overlap – inversion	548
Example 12.9:	Converter overlap	549
12.7	Summary	550
(i)	Half-wave and full-wave, fully-controlled converter	
(ii)	Full-wave, half-controlled converter	
(iii)	Half-wave and full-wave controlled converter with load freewheel diode	

12.8	Definitions	552
12.9	Output pulse number	552
12.10	AC-dc converter generalised equations	554

13

AC Voltage Regulators

567

13.1	Single-phase ac regulator	567
13.1.1	Single-phase ac regulator – phase control with line commutation	
	Case 1: $\alpha > \phi$	
	Case 2: $\alpha \leq \phi$	
	13.1.1i - Resistive Load	
	13.1.1ii - Pure inductive Load	
	13.1.1iii - Load sinusoidal back emf	
	13.1.1iv - Semi-controlled single-phase ac regulator	
	Example 13.1a: Single-phase ac regulator – 1	577
	Example 13.1b: Single-phase ac regulator - 2	579
	Example 13.1c: Single-phase ac regulator – pure inductive load	579
	Example 13.1d: Single-phase ac regulator – 1 with ac back emf composite load	581
13.1.2	Single-phase ac regulator – integral cycle control – line commutated	
	Example 13.2: Integral cycle control	584
13.1.3	The solid-state relay (SSR)	
	13.1.3i Principle of operation	
	13.1.3ii Key power elements in solid-state relays	
	13.1.3iii Solid-state relay overvoltage fault modes	
	13.1.3iv Standard transient voltage protection devices, reviewed in terms of SSR requirements	
	13.1.3v Solid-state relay internal protection methods	
	13.1.3vi Application considerations	
	Example 13.3: Solid-state relay turn-on	593
	Example 13.4: Solid-state relay heatsink requirements	593
	13.1.3vii DC output solid-state relays	
13.2	Single-phase transformer tap-changer – line commutated	595
	Example 13.5: Tap changing converter	597
13.3	Single-phase ac chopper regulator – commutable switches	598
13.3.1	Single-phase ac chopper regulator – version 1	
13.3.2	Single-phase ac chopper regulator – version 2	
13.4	Three-phase ac regulator	602
13.4.1	Fully-controlled three-phase ac regulator with wye load and isolated neutral	
	Purely resistive load	
	i. $0 \leq \alpha \leq \frac{1}{2}\pi$ [mode 3/2]	
	ii. $\frac{1}{2}\pi \leq \alpha \leq \frac{1}{2}\pi$ [mode 2/2]	
	iii. $\frac{1}{2}\pi \leq \alpha \leq \frac{2}{3}\pi$ [mode 2/0]	
	Inductive-resistive load	
	Purely inductive load	
	i. $\frac{1}{2}\pi \leq \alpha \leq \frac{1}{2}\pi$ [mode 3/2]	
	ii. $\frac{1}{2}\pi \leq \alpha \leq \frac{2}{3}\pi$ [mode 2/0]	
13.4.2	Fully-controlled three-phase ac regulator with wye load and neutral connected	
13.4.3	Fully-controlled three-phase ac regulator with delta load	
13.4.4	Half-controlled three-phase ac regulator	
	Resistive load	
	i. $0 \leq \alpha \leq \frac{1}{2}\pi$	
	ii. $\frac{1}{2}\pi \leq \alpha \leq \frac{1}{2}\pi$	
	iii. $\frac{1}{2}\pi \leq \alpha \leq 7\pi/6$	
	Purely inductive load	

13.4.5	Other thyristor three-phase ac regulators	
	i. Delta connected fully controlled regulator	
	ii. Three-thyristor delta connected regulator	
Example 13.6:	Star-load three-phase ac regulator – untapped neutral	615
13.4.6	Solid-state soft starters	
	13.4.6i The induction motor	
	13.4.6ii Background to induction machine starting	
	13.4.6iii Solid-state soft-starter	
	13.4.6iv Soft-starter control and application	

13.5	Cycloconverter	631
13.6	The matrix converter	633
13.6.1	High frequency resonant dc to ac matrix converter	
13.7	Power Quality: load efficiency and supply current power factor	639
13.7.1	Load waveforms	
13.7.2	Supply waveforms	
Example 13.7:	Power quality - load efficiency	641
Example 13.8:	Power quality – squarewave distortion	642
Example 13.9:	Power quality - sinusoidal source and constant current load	642
Example 13.10:	Power quality - sinusoidal source and non-linear load	643

14

DC Choppers

645

14.1	DC chopper variations	645
14.2	First Quadrant dc chopper	646
14.2.1	Continuous load current	
	Steady-state time domain analysis of first quadrant chopper	
	- with load back emf and continuous output current	
	i. Fourier coefficients	
	ii. Time domain differential equations	
14.2.2	Discontinuous load current	
	Steady-state time domain analysis of first quadrant chopper	
	- with load back emf and discontinuous output current	
	i. Fourier coefficients	
	ii. Time domain differential equations	
Example 14.1:	DC chopper (first quadrant) with load back emf	654
Example 14.2:	DC chopper with load back emf - verge of discontinuous conduction	658
Example 14.3:	DC chopper with load back emf - discontinuous conduction	659
14.3	Second Quadrant dc chopper	662
14.3.1	Continuous load inductor current	
14.3.2	Discontinuous load inductor current	
Example 14.4:	Second quadrant DC chopper - continuous inductor current	667
14.4	Two quadrant dc chopper - Q I and Q II	669
Example 14.5:	Two quadrant DC chopper with load back emf	672
14.5	Two quadrant dc chopper – Q I and Q IV	676
14.5.1	dc chopper: – Q I and Q IV – multilevel output voltage switching (three level)	
14.5.2	dc chopper: – Q I and Q IV – bipolar voltage switching (two level)	
14.5.3	Multilevel output voltage states, dc chopper	
Example 14.6:	Asymmetrical, half H-bridge, dc chopper	681

14.6	Four quadrant dc chopper	653
14.6.1	Unified four quadrant dc chopper - bipolar voltage output switching	
14.6.2	Unified four quadrant dc chopper - multilevel voltage output switching	
Example 14.7:	Four quadrant dc chopper	690

15

DC to AC Inverters - Switched Mode

695

15.1	dc-to-ac voltage-source inverter bridge topologies	695
15.1.1	Single-phase voltage-source inverter bridge	
15.1.1i	- Square-wave (bipolar) output	
15.1.1ii	- Quasi-square-wave (multilevel) output	
Example 15.1:	Single-phase H-bridge with an L-R load	701
Example 15.2:	H-bridge inverter ac output factors	702
Example 15.3:	Harmonic analysis of H-bridge with an L-R load	704
Example 15.4:	Single-phase half-bridge with an L-R load	705
15.1.1iii	- PWM-wave output	
15.1.2	Three-phase voltage-source inverter bridge	
15.1.2i	- 180° (π) conduction	
15.1.2ii	- 120° ($\frac{2}{3}\pi$) conduction	
15.1.3	Inverter ac output voltage and frequency control techniques	
15.1.3i	- Variable voltage dc link	
15.1.3ii	- Single-pulse width modulation	
Example 15.5:	Single-pulse width modulation	715
15.1.3iii	- Multi-pulse width modulation	
15.1.3iv	- Multi-pulse, selected notching modulation – selected harmonic elimination	
15.1.3v	- Sinusoidal pulse-width modulation (pwm)	
1	- Natural sampling	
2	- Regular sampling	
3	- Frequency spectra of pwm waveforms	
15.1.3vi	- Phase dead-banding	
15.1.3vii	- Triplen Injection modulation	
1	- Triplens injected into the modulation waveform	
2	- Voltage space vector pwm	
15.1.4	Common mode voltage	
15.1.5	DC link voltage boosting	
15.2	dc-to-ac controlled current-source inverters	732
15.2.1	Single-phase current source inverter	
15.2.2	Three-phase current source inverter	
15.3	Multi-level voltage-source inverters	736
15.3.1	Diode clamped multilevel inverter	
15.3.2	Flying capacitor multilevel inverter	
15.3.3	Cascaded H-bridge multilevel inverter	
15.3.4	Capacitor clamped multilevel inverter	
15.3.5	PWM for multilevel inverters	
15.3.4i	- Multiple offset triangular carriers	
15.3.4ii	- Multilevel rotating voltage space vector	
15.4	Reversible dc link converters	746
15.4.1	Independent control	
15.4.2	Simultaneous control	
15.4.3	Inverter regeneration	
15.5	Standby inverters and uninterruptible power supplies	749
15.5.1	Single-phase UPS	
15.5.2	Three-phase UPS	

15.6	Power filters	751
Example 15.6:	L-C filter design	752

16

DC to AC Inverters - Resonant Mode

755

16.1	Resonant dc-ac inverters	755
16.2	L-C resonant circuits	756
16.2.1	- Series resonant L-C-R circuit	
16.2.2	- Parallel resonant L-C-R circuit	
16.3	Series resonant inverters	760
16.3.1	Series resonant inverter – single inverter leg	
1	- Lagging operation (advancing the switch turn-off angle)	
2	- Leading operation (delaying the switch turn-on angle)	
16.3.2	Series resonant inverter – H-bridge voltage-source inverter	
16.3.3	Circuit variations	
16.4	Parallel-resonant voltage-source inverter – single inverter leg	764
16.5	Series-parallel-resonant voltage-source inverter – single inverter leg	764
	Summary of voltage source resonant inverters	
16.6	Parallel resonant current-source inverters	767
16.6.1	- Parallel resonant inverter – single inverter leg	
16.6.2	- Parallel resonant inverter – H-bridge current-source inverter	
Example 16.1:	Half-bridge with a series L-C-R load	769
16.7	Single-switch, current source, series resonant inverter	772

17

DC to DC Converters - Switched Mode

775

17.1	The forward converter	776
17.1.1	Continuous inductor current	
17.1.2	Discontinuous inductor current	
17.1.3	Load conditions for discontinuous inductor current	
17.1.4	Control methods for discontinuous inductor current	
17.1.4i	- fixed on-time t_r , variable switching frequency f_{var}	
17.1.4ii	- fixed switching frequency f_s , variable on-time t_{Tvar}	
17.1.5	Output ripple voltage	
17.1.6	Apparent load resistance	
Example 17.1:	Buck (step-down forward) converter	781
17.1.6	Underlying operational mechanisms of the forward converter	
Example 17.2:	Hysteresis controlled buck converter	788
17.2	Flyback converters	789

17.3	The boost converter	790
17.3.1	Continuous inductor current	
17.3.2	Discontinuous capacitor charging current in the switch off-state	
17.3.3	Discontinuous inductor current	
17.3.4	Load conditions for discontinuous inductor current	
17.3.5	Control methods for discontinuous inductor current	
17.3.5i	- fixed on-time t_T , variable switching frequency f_{var}	
17.3.5ii	- fixed switching frequency f_s , variable on-time t_{Tvar}	
17.3.6	Output ripple voltage	
Example 17.3:	Boost (step-up flyback) converter	794
Example 17.4:	Alternative boost (step-up flyback) converter	796
17.4	The buck-boost converter	798
17.4.1	Continuous choke (inductor) current	
17.4.2	Discontinuous capacitor charging current in the switch off-state	
17.4.3	Discontinuous choke current	
17.4.4	Load conditions for discontinuous inductor current	
17.4.5	Control methods for discontinuous inductor current	
17.4.5i	- fixed on-time t_T , variable switching frequency f_{var}	
17.4.5ii	- fixed switching frequency f_s , variable on-time t_{Tvar}	
17.4.6	Output ripple voltage	
17.4.7	Buck-boost, flyback converter design procedure	
Example 17.5:	Buck-boost flyback converter	803
17.5	Flyback converters – a conceptual assessment	805
17.6	The output reversible converter	808
17.6.1	Continuous inductor current	
17.6.2	Discontinuous inductor current	
17.6.3	Load conditions for discontinuous inductor current	
17.6.4	Control methods for discontinuous inductor current	
17.6.4i	- fixed on-time t_T , variable switching frequency f_{var}	
17.6.4ii	- fixed switching frequency f_s , variable on-time t_{Tvar}	
Example 17.6:	Reversible forward converter	811
17.6.5	Comparison of the reversible converter with alternative converters	
17.7	The Ćuk converter	813
17.7.1	Continuous inductor current	
17.7.2	Discontinuous inductor current	
17.7.3	Optimal inductance relationship	
17.7.4	Output voltage ripple	
Example 17.7:	Ćuk converter	815
17.8	Comparison of basic converters	816
17.8.1	Critical load current	
17.8.2	Bidirectional converters	
17.8.3	Isolation	
17.8.3i	- The isolated output, forward converter	
17.8.3ii	- The isolated output, flyback converter	
Example 17.8:	Transformer coupled flyback converter	822
Example 17.9:	Transformer coupled forward converter	824
17.9	Multiple-switch, balanced, isolated converters	826
17.9.1	The push-pull converter	
17.9.2	Bridge converters	
17.10	Basic generic smps transfer function mapping	829
17.11	Appendix: Analysis of non-continuous inductor current operation	831
	Operation with constant input voltage, E_i	
	Operation with constant output voltage, v_o	

18

DC to DC Converters - Resonant Mode

849

18.1	Series loaded resonant dc to dc converters	850
18.1.1	Modes of operation - series resonant circuit	
18.1.2	Circuit variations	
18.2	Parallel loaded resonant dc to dc converters	855
18.2.1	Modes of operation- parallel resonant circuit	
18.2.2	Circuit variations	
18.3	Series–parallel load resonant dc to dc converters	858
18.3.1	LCC resonant tank circuit	
18.3.2	LLC resonant tank circuit	
18.4	Resonant coupled-load configurations	861
Example 18.1:	Transformer-coupled, series-resonant, dc-to-dc converter	863
18.5	Resonant switch, dc to dc step-down voltage converters	865
18.5.1	Zero-current, resonant-switch, dc-to-dc converter	
	-½ wave, C_R parallel with load version	
18.5.1i	- Zero-current, full-wave resonant switch converter	
18.5.2	Zero-current, resonant-switch, dc-to-dc converter	
	-½ wave, C_R parallel with switch version	
18.5.3	Zero-voltage, resonant-switch, dc-to-dc converter	
	-½ wave, C_R parallel with switch version	
18.5.3i	- Zero-voltage, full-wave resonant switch converter	
18.5.4	Zero-voltage, resonant-switch, dc-to-dc converter	
	-½ wave, C_R parallel with load version	
Example 18.2:	Zero-current, resonant-switch, dc-to-dc converter - ½ wave	878
Example 18.3:	Zero-current, resonant-switch, dc-to-dc converter - full-wave	880
Example 18.4:	Zero-voltage, resonant-switch, dc-to-dc converter - ½ wave	881
18.6	Resonant switch, dc to dc step-up voltage converters	882
18.6.1	ZCS resonant-switch, dc-to-dc step-up voltage converters	
18.6.2	ZVS resonant-switch, dc-to-dc step-up voltage converters	
	Summary and comparison of ZCS and ZVS Converters	
18.7	Appendix: Matrices of resonant switch buck, boost, and buck/boost converters	886

19

HV Direct-Current Transmission

893

19.1	HVDC electrical power transmission	893
19.2	HVDC Configurations	894
19.2i	- Monopole and earth return	
19.2ii	- Bipolar	
19.2iii	- Tripole	
19.2iv	- Back-to-back	
19.2v	- Multi-terminal	
19.3	Typical HVDC transmission system	896

19.4	Twelve-pulse ac line frequency converters	897
	19.4.1 Rectifier mode	
	19.4.2 Inverter mode	
19.5	Twelve-pulse ac line frequency converter operation control	906
	19.5.1 Control and protection	
	19.5.2 HVDC Control objectives	
19.6	Delta/Delta/Double Polygon 18 pulse converter	910
	19.6.1 Analysis of Double-Wound Polygon	
19.7	Filtering and power factor correction	913
	Example 19.1: Basic six-pulse converter based hvdc transmission	893
	Example 19.2: 12-pulse hvdc transmission	915
19.8	VSC-Based HVDC	916
	19.8.1 VSC-Based HVDC control	
	19.8.2 Power control concept	
19.9	HVDC Components	920
	Example 19.3: HVDC transmission with voltage source controlled dc-link	922
19.10	Twelve-pulse transformer based HVDC	924
19.11	VSC-HVDC transmission systems - modular multilevel converter, M²C	924
19.12	HVDC VSC Features	927
19.13	Features of conventional HVDC and HVAC transmission	927

20

FACTS Devices and Custom Controllers

931

20.1	Flexible AC Transmission Systems - FACTS	931
20.2	Power Quality	932
20.3	Principles of Power Transmission	932
	Example 20.1: AC transmission line VAr	934
20.4	The theory of instantaneous power (p-q) in three-phase	935
20.5	FACTS Devices	939
20.6	Static Reactive Power Compensation	940
20.7	Static Shunt Reactive Power Compensation	941
	20.7.1 - Thyristor controlled reactor TCR	
	20.7.2 - Thyristor switched capacitor TSC	
	20.7.3 - Shunt Static VAr compensator SVC (TCR//TSC)	
	Example 20.2: Shunt thyristor controlled reactor specification	946

20.8	Static Series Reactive Power Compensation	947
	20.8.1 - Thyristor switched series capacitor TSSC	
	20.8.2 - Thyristor controlled series capacitor TCSC	
	20.8.3 - Series Static VAr compensator SVC (TCR//C)-TCSC	
	Example 20.3: Series thyristor controlled reactor specification – integral control	952
	Example 20.4: Series thyristor controlled reactor specification – Vernier control	954
	20.8.4 Static series phase angle reactive power compensation/shift SPS	
20.9	Self Commutating FACTS Devices - Custom Power	959
	20.9.1 - Static synchronous series compensator or Dynamic Voltage Restorer - DVR	
	20.9.2 - Static synchronous shunt compensator – STATCOM	
	20.9.3 - Unified power flow controller - UPFC	
20.10	Combined Active and Passive Filters	975
	20.10.1 - Current compensation – shunt filtering	
	20.10.2 - Voltage compensation – series filtering	
	20.10.3 – Hybrid Arrangements	
	20.10.4 - Active and passive combination filtering	
20.11	Summary of Compensator Comparison and Features	978
20.12	Summary of General Advantages of AC Transmission over DC Transmission	980

21

Inverter Grid Connection for Embedded Generation

981

21.1	Distributed generation	981
	21.1.1 DG Possibilities	
	21.1.2 Integration and Interconnection Requirements	
21.2	Interfacing conversion methods for dc energy sources	985
21.3	Interfacing conversion methods for ac energy sources	987
	21.3.1 Unity Power Factor Current Control of a Sinusoidal Current Active Boost Rectifier	

22

Energy Sources and Storage - Primary Sources

989

22.1	Hydrocarbon attributes	989
22.2	The fuel cell	991
22.3	Materials and cell design	993
	22.3.1 Electrodes	
	22.3.2 Catalyst	
	22.3.3 Electrolyte	
	22.3.4 Interconnect	
	22.3.5 Stack design	

22.4	Fuel Cell Chemistries	996
	22.4.1 Proton H^+ Cation Conducting Electrolyte	
	22.4.2 Anion (OH^- , CO_3^{2-} , O^{2-}) Conducting Electrolyte	
22.5	Six different Fuel Cells	999
22.6	Low-temperature Fuel Cell Types	999
	22.6.1 Polymer exchange membrane fuel cell	
	22.6.2 Alkaline fuel cell	
	22.6.3 Direct-methanol fuel cell	
22.7	High-temperature Fuel Cell Types	1002
	22.7.1 Phosphoric-acid fuel cell	
	22.7.2 Molten-carbonate fuel cell	
	22.7.3 Solid oxide fuel cell	
22.8	Fuel Cell Summary	1006
22.9	Fuels	1006
22.10	Fuel Reformers	1008
	22.10.1 Natural gas reforming	
22.11	Hydrogen storage and generation from hydrides	1010
22.12	Fuel Cell Emissions	1012
22.13	Fuel Cell Electrical characteristics	1012
22.14	Thermodynamics	1013
	Example 22.1: Formation of water vapour	1015
	Example 22.2: Derivation of Ideal Fuel Cell Voltage	1015
	Example 22.3: Carbon fuel cell	1017
22.15	Fuel Cell features	1018
22.16	Fuel Cell Challenges	1019
	22.16.1 Chemical Technology Challenges	
	22.16.2 System Technology Challenges	
22.17	Fuel cell summary	1020
22.18	Photovoltaic Cells: Converting Photons to Electrons	1023
22.19	Silicon structural physics	1023
	Example 22.4: Photons to create hole-electron pairs in silicon	
22.20	Semiconductor materials and structures	1025
	22.20.1 Silicon	
	22.20.2 Polycrystalline thin films	
	22.20.3 Single-Crystalline Thin Film	
	22.20.4 Nanocrystalline	
22.21	PV Cell Structures	1034
	22.21.1 Homojunction Device	
	22.21.2 Heterojunction Device	
	22.21.3 p-i-n and n-i-p Devices	
	22.21.4 Multi-junction Devices	
22.22	Equivalent circuit of a PV cell	1037
	22.22.1 Ideal PV cell model	
	22.22.2 Practical PV cell model	

	22.22.3 Maximum-power point	
22.23	Photovoltaic cell efficiency factors	1040
	Example 22.5: Solar cell characteristics	1041
22.24	Module (or array) series and parallel PV cell connection	1042
	Example 22.6: PV cell and module characteristics	1043
	Example 22.7: PV module Temperature characteristics	1045
22.25	Battery storage	1046
22.26	The organic photovoltaic cell	1047
22.27	Summary of PV cell technology	1049

23

Energy Sources and Storage - Secondary Sources

1055

23.1	Batteries	1055
23.2	The secondary electro-chemical cell	1056
	23.2.1 REDOX Galvanic Action	
	23.2.2 Intercalation Action	
23.3	Characteristics of Secondary Batteries	1060
23.4	The lead-acid battery	1063
	23.4.1 Basic lead-acid cell theory	
	23.4.2 Cell/battery construction	
	23.4.3 Characteristics of the flooded lead-acid cell	
	23.4.4 Different lead-acid cell and battery arrangements	
	23.4.5 Lead acid battery charging and storage regimes	
	23.4.6 Valve-regulated battery discharge characteristics	
	Example 23.1: Lead-acid battery discharge characteristics	1079
	Example 23.2: Lead acid battery life	1081
	23.4.7 Gassing and internal recombination	
	23.4.8 User properties and cell type comparisons	
23.5	The nickel-cadmium battery	1089
	Example 23.3: NiCd battery electrolyte life	1094
	Example 23.4: NiCd battery requirement	1096
	23.5.1 Nickel-Cadmium battery properties	
23.6	The nickel-metal-hydride battery	1098
	23.6.1 Nickel-metal-hydride battery properties	
	23.6.2 Nickel-metal-hydride battery characteristics	
	23.6.3 Comparison between NiCd and NiMH Cells	
23.7	The lithium-ion battery	1105
	23.7.1 Cathode variants cells	
	23.7.2 General Lithium-ion Cell characteristics	
	23.7.3 General Lithium-ion Cell properties	
	23.7.4 Cell protection circuits	

23.8	Battery Thermodynamics	1117
	Example 23.5: <i>Electrochemistry – battery thermodynamics</i>	1119
23.9	Summary of key primary and secondary cell technologies	1120
23.10	The Electrochemical Double Layer Capacitor - supercapacitor	1121
	23.10.1 <i>Double layer capacitor model</i>	
	Example 23.6: <i>Ultracapacitor module design using a given cell</i>	1125
	23.10.2 <i>Cell parameter specification and measurement methods</i>	
	23.10.3 <i>Cell characteristics</i>	
	23.10.4 <i>Thermal Properties</i>	
	23.10.5 <i>Estimated life duration</i>	
	23.10.6 <i>Cell Voltage Equalization in a Series Stack of Ultracapacitors</i>	
	23.10.7 <i>Supercapacitor general properties</i>	
	23.10.8 <i>Pseudocapacitors</i>	
	Example 23.7: <i>Ultracapacitor constant current characteristics</i>	1135
23.11	Thermoelectric modules	1137
	23.11.1 <i>Background</i>	
	23.11.2 <i>Thermoelectric materials</i>	
	23.11.3 <i>Mathematical equation for a thermoelectric module</i>	
	23.11.4 <i>Features of Thermoelectric Cooling - Peltier elements</i>	
	23.11.5 <i>TE cooling design</i>	
	Example 23.8: <i>Thermoelectric cooler design</i>	1149
	23.11.6 <i>Thermoelectric power generation</i>	
	Example 23.9: <i>Thermoelectric generator design</i>	1153
	23.11.7 <i>Thermoelectric performance</i>	
23.12	Appendix: Primary cells	1156
23.13	Appendix: Empirical Battery Model	1158

24

Capacitors

1161

24.1	Capacitor general properties	1162
	24.1.1 <i>Capacitance</i>	
	24.1.2 <i>Volumetric efficiency</i>	
	24.1.3 <i>Equivalent circuit</i>	
	24.1.4 <i>Lifetime and failure rate</i>	
	Example 24.1: <i>Failure rate</i>	1166
	Example 24.2: <i>Capacitor reliability</i>	1167
	24.1.5 <i>Self-healing</i>	
	24.1.6 <i>Temperature range and capacitance dependence</i>	
	24.1.7 <i>Dielectric absorption</i>	
24.2	Liquid (organic) and solid, metal oxide dielectric capacitors	1169
	24.2.1 <i>Construction</i>	
	24.2.2 <i>Voltage ratings</i>	
	24.2.3 <i>Leakage current</i>	
	24.2.4 <i>Ripple current</i>	
	Example 24.3: <i>Capacitor ripple current rating</i>	1173
	24.2.5 <i>Service lifetime and reliability</i>	
	24.2.5i - <i>Liquid, oxide capacitors</i>	
	Example 24.4: <i>A1₂O₃ capacitor service life</i>	1175
	24.2.5ii - <i>Solid, oxide capacitors</i>	
	Example 24.5: <i>Lifetime of tantalum capacitors</i>	1176

24.3	Plastic film dielectric capacitors	1177
	24.3.1 <i>Construction</i>	
	24.3.1i - <i>Metallised plastic film dielectric capacitors</i>	
	24.3.1ii - <i>Foil and plastic film capacitors</i>	
	24.3.1iii - <i>Mixed dielectric capacitors</i>	
	24.3.2 <i>Insulation</i>	
	24.3.3 <i>Electrical characteristics</i>	
	24.3.3i - <i>Temperature dependence</i>	
	24.3.3ii - <i>Humidity dependence</i>	
	24.3.3iii - <i>Time dependence</i>	
	24.3.3iv - <i>Dissipation factor and impedance</i>	
	24.3.3v - <i>Voltage derating with temperature</i>	
	24.3.3vi - <i>Voltage and current derating with frequency</i>	
	Example 24.6: <i>Power dissipation limits - ac voltage</i>	1187
	24.3.3vii - <i>Pulse dV_R/dt rating</i>	
	24.3.4 <i>Non-sinusoidal repetitive voltages</i>	
	Example 24.7: <i>Capacitor non-sinusoidal voltage rating</i>	1189
	Example 24.8: <i>Capacitor power rating for non-sinusoidal voltages</i>	1189
	24.3.5 <i>DC plastic capacitors</i>	
24.4	Emi suppression capacitors	1192
	24.4.1 <i>Class X capacitors</i>	
	24.4.2 <i>Class Y capacitors</i>	
	24.4.3 <i>Feed-through capacitors</i>	
24.5	Ceramic dielectric capacitors	1194
	24.5.1 <i>Class I dielectrics</i>	
	24.5.2 <i>Class II dielectrics</i>	
	24.5.3 <i>Applications</i>	
24.6	Mica dielectric capacitors	1197
	24.6.1 <i>Properties and applications</i>	
24.7	Capacitor type comparison based on key properties	1199
24.8	Appendix: Minimisation of stray capacitance	1199
24.9	Appendix: Capacitor lifetime derating	1200

25

Resistors

1203

25.1	Resistor types	1204
25.2	Resistor construction	1204
	25.2.1 <i>Film resistor construction</i>	
	25.2.2 <i>Carbon composition film resistor construction</i>	
	Example 25.1: <i>Carbon film resistor</i>	1206
	25.2.3 <i>Solid Carbon ceramic resistor construction</i>	
	25.2.4 <i>Wire-wound resistor construction</i>	

25.3	Electrical properties	1207
25.3.1	Resistor/Resistance coefficients	
25.3.1i	Temperature coefficient of resistance	
Example 25.2:	Temperature coefficient of resistance for a thick film resistor	1210
25.3.1ii	Voltage coefficient of resistance	
25.3.2	Maximum working voltage	
25.3.3	Residual capacitance and residual inductance	
Example 25.3:	Coefficients of resistance for a solid carbon ceramic resistor	1213
25.4	Thermal properties	1213
25.4.1	Resistors with heatsink	
Example 25.4:	Derating of a resistor mounted on a heatsink	1216
25.4.2	Short time or overload ratings	
Example 25.5:	Non-repetitive pulse rating	1217
25.5	Repetitive pulsed power resistor behaviour	1217
Example 25.6:	Pulsed power resistor design	1218
25.5.1	Empirical pulse power	
25.5.2	Mathematical pulse power models	
Example 25.7:	Solid carbon ceramic resistor power rating	1219
25.6	Stability and endurance	1221
Example 25.8:	Power resistor stability	1222
25.7	Special function power resistors	1222
25.7.1	Fusible resistors	
25.7.2	Circuit breaker resistors	
25.7.3	Temperature sensing resistors	
25.7.4	Current sense resistors	
25.7.5	Thermistors	
25.7.6	Other specialised resistors	
25.8	Appendix: Carbon ceramic electrical and mechanical data and formula	1230
25.9	Appendix: Characteristics of resistance wire	1230
25.10	Appendix: Preferred resistance values of resistors (and capacitors)	1230

26

Soft Magnetic Materials - Inductors and Transformers

1233

26.1	Inductor and transformer electrical characteristics	1234
26.1.1	Inductors	
26.1.2	Transformers or magnetically coupled circuits	
26.2	Magnetic material types	1236
26.2.1	Ferromagnetic materials	
26.2.1i	Steel	
26.2.1ii	Iron powders	
26.2.1iii	Alloy powders	
26.2.1iv	Nanocrystalline	
26.2.2	Ferrimagnetic materials- soft ferrites	
26.3	Comparison of material types	1237

26.4	Ferrite characteristics	1238
26.4.1	Dimensions and parameters	
26.4.2	Permeability	
26.4.2i	Initial or intrinsic permeability, μ_i	
26.4.2ii	Amplitude permeability, μ_a and maximum permeability, $\hat{\mu}$	
26.4.2iii	Reversible or incremental permeability, μ_{rev} , μ_Δ	
26.4.2iv	Effective permeability, μ_e	
26.4.2v	Complex permeability, $\hat{\mu}$	
26.4.3	Coercive force and remanence	
26.4.4	Core losses	
26.4.4i	Core losses at low H	
26.4.4ii	Core losses at high H	
26.4.5	Temperature effects on core characteristics	
26.4.6	Inductance stability	
26.4.6i	Parameter effects	
26.4.6ii	Time effects	
Example 26.1:	Inductance variation with time	1248
26.4.6iii	Temperature effects	
Example 26.2:	Temperature effect on inductance	1248
26.4.7	Stored energy in inductors	
26.5	Ferrite inductor and choke design, when carrying dc current	1250
26.5.1	Linear inductors and chokes	
Example 26.3:	Inductor design with Hanna curves	1252
26.5.1i	Core temperature and size considerations	
Example 26.4:	Inductor design including copper loss	1255
26.5.2	Saturable inductors	
26.5.3	Saturable inductor design	
Example 26.5:	Saturable inductor design	1259
26.6	Power ferrite transformer design	1259
26.6.1	Ferrite voltage transformer design	
Example 26.6:	Ferrite voltage transformer design	1263
26.6.2	Ferrite current transformer	
26.6.3	Current transformer design requirements	
26.6.4	Current transformer design procedure	
Example 26.7:	Ferrite current transformer design	1269
26.6.5	Current measurement: closed loop ferrite transformer	
26.6.6	Current measurement: Rogowski Coil	
26.7	Auto-transformers	1275
26.8	Appendix: Soft ferrite general technical data	1279
26.9	Appendix: Technical data for a ferrite applicable to power applications	1279
26.10	Appendix: Technical data for iron, nickel, and cobalt applicable to power applications	1280
26.11	Appendix: Eddy currents, skin effect and proximity effect	1281
26.12	Appendix: Cylindrical inductor design	1282
Example 26.8:	Wound strip air core inductor	1283
Example 26.9:	Multi-layer air core inductor	1284
26.13	Appendix: Copper wire design data	1284
26.14	Appendix: Minimisation of stray inductance	1284
26.14.1	Reduction in wiring residual inductance	
26.14.2	Reduction in component residual inductance	
26.11.2i	Capacitors	
26.11.2ii	Capacitors - parallel connected	
26.11.2iii	Transformers	

26.15	Appendix: Laminated bus bar design	1288
26.16	Appendix: Insulating material for between bus bar conductors	1290
26.17	Appendix: Materials by types of magnetization	1291
26.18	Appendix: Magnetic Behaviour of Stainless Steels	1293

27

Hard Magnetic Materials - Permanent Magnets

1297

27.1	Magnetic properties	1301
27.2	Classification of magnetic materials	1302
	27.2.1 Alloys	
	27.2.2 Ceramics	
	27.2.3 Bonded	
	27.2.4 Flexible (rubber)	
27.3	Properties of hard magnetic materials	1315
27.4	Permanent Magnet Magnetization Curve (hysteresis loop) and recoil	1320
27.5	Permanent Magnet model	1322
27.6	Load lines	1325
	27.6.1 Magnetic Circuit Equations	
	27.6.2 Intrinsic permeance coefficient	
	Example 27.1: Magnet load dependant operating point	1329
	27.6.3 Demagnetizing field	
27.7	Generalising equivalent magnetic circuits	1334
27.8	Permanent magnet stability - Loss of magnetism	1336
27.9	Recoil operation and associated losses	1339
	27.9.1 Losses due to reverse magnetic fields	
	27.9.2 Demagnetisation due to temperature increase	
	Example 27.2: Magnet load and temperature dependant operating point	1323
27.10	Energy transfer	1345
27.11	Force of attraction within an air gap	1348
27.12	Appendix: Magnet processing and properties	1349
27.13	Appendix: Magnetic Basics	1351
27.14	Appendix: Magnetic properties for Sintered NdFeB and SmCo Magnets	1351
27.15	Appendix: Magnetic Axioms	1353

28

1355

Contactors and relays

28.1	Mechanical requirements for relay operation	1355
28.2	Relay Contacts	1356
	28.2.1 Contact characteristics	
	28.2.2 Contact materials	
	28.2.3 Contact life – material loss and transfer	
28.3	Defining relay performance	1360
28.4	AC and DC relay coils	1362
28.5	Temperature consideration of the coils in dc relays	1363
	Example 28.1: Relay coil thermal properties	1364
28.6	Relay voltage transient suppression	1365
	28.6.1 Types of transient suppression utilized with dc relay coils	
	28.6.2 Relay contact arc suppression protection with dc power switching relays	
28.7	DC power switching	1370
28.8	Miniature Circuit Breakers	1374
	28.8.1 AC MCBs	
	Example 28.2: MCB properties	1379
	28.8.2 DC MCBs	
	28.8.3 Residual Current Circuit Breaker	
28.9	The physics of vacuum high-voltage relays	1387
28.10	Gas filled relays	1388
	28.10.1 SF6 as a dielectric	
	28.10.2 Hydrogen as a dielectric	
28.11	High voltage relay designs	1389
28.12	Contact ratings	1392
28.13	High voltage relay grounding	1393
28.14	A LV voltage, 750V dc, high-current, 350A dc, make and break relay	1395
28.15	X-ray emissions in vacuum relays	1396
28.16	Power reconstitution conservation method	1396
28.17	MV AC vacuum Interrupts for contactor, switch, and circuit-breaker application	1398
	28.17.1 Basic Interruption Principle	
	28.17.2 Medium-Voltage AC Vacuum circuit breaker characteristics	
	28.17.3 Altitude derating	
	Example 28.3: Vacuum circuit breaker altitude properties	1405
28.18	Corona	1406
28.19	Appendix: Contact metals	1408

Nomenclature and symbols	1411
Degrees of protection	1427
IP codes according to IEC 60529 standard	
IEC 947 and IEC 947-3 Standards	1428
Selecting contactors according to IEC 947-3 standard	
Glossary of terms	1429
Glossary of Wafer Processing terminology	1429
Glossary of Fuselink terminology (Fuseology)	1433
Glossary of Relay terminology	1437
Glossary of Varistor terminology	1448
Glossary of PTC and NTC Thermistor terminology	1449
Glossary of Electrochemical Battery terminology	1452
Glossary of Fuel Cell terminology	1458
Glossary of Solar Electric terminology	1461
Glossary of Capacitor terminology	1467
Glossary of Thermoelectric terminology	1472
Glossary of Fan Cooling and other Heating and Cooling terminology	1475
Glossary of Magnetic terminology	1481
Glossary of FACTS Terminology	1493
Glossary of Resistor Terminology	1494
Bibliography	1496
Physical constants	1508
INDEX	1509

PREFACE

The book is in four parts.

Part 1 covers power semiconductor switching devices, their static and dynamic electrical and thermal characteristics and properties. Part 2 describes device driving and protection, while Part 3 presents a number of generic applications. The final part, Part 4, introduces capacitors, magnetic components, resistors, and dc relays and their characteristics relevant to power electronic applications.

- 1 Basic Semiconductor Physics and Technology
- 2 The pn Junction
- 3 Power Switching Devices and their Static Electrical Characteristics
- 4 Electrical Ratings and Characteristics of Power Semiconductor Switching Devices
- 5 Cooling of Power Switching Semiconductor Devices
- 6 Load, Switch, and Commutation Considerations
- 7 Driving Transistors and Thyristors
- 8 Protecting Diodes, Transistors, and Thyristors
- 9 Switching-aid Circuits with Energy Recovery
- 10 Series and Parallel Device Operation, Protection, and Interference
- 11 Naturally Commutating AC to DC Converters – Uncontrolled Rectifiers
- 12 Naturally Commutating AC to DC Converters – Controlled Rectifiers
- 13 AC Voltage Regulators
- 14 DC Choppers
- 15 DC to AC Inverters – Switched Mode
- 16 DC to AC Inverters – Resonant Mode
- 17 DC to DC Converters - Switched-mode
- 18 DC to DC Converters - Resonant-mode
- 19 HV Direct-Current Transmission
- 20 FACTS Devices and Custom Controllers
- 21 Inverter Grid Connection for Embedded Generation
- 22 Energy Sources and Storage: Primary Sources
- 23 Energy Sources and Storage: Secondary Sources
- 24 Capacitors
- 25 Resistors
- 26 Soft Magnetic Materials: Inductors and Transformers
- 27 Hard Magnetic Materials: Permanent Magnets
- 28 Contactors and Relays

The 162 non-trivial worked examples cover the key issues in power electronics.

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