

Contents in Detail

<i>Acknowledgments</i>	9	Power Supply Transformer	52
		Low-Power Cartridge Fuses	54
Introduction	10	Axial Lead Fuse	56
		Liquid Power Fuse	57
1 Passive Components	13	Compact Power Fuse	58
32 kHz Quartz Crystal	14	Thermal Fuse	60
Carbon Film Resistor	16		
High-Stability Film Resistor	18	2 Semiconductors	63
Wirewound Power Resistor	19	1N4002 Diode	64
Thick-Film Resistor Array	20	Glass-Encapsulated Diodes	66
Surface-Mount Chip Resistor	22	Rectifier Bridge	68
Thin-Film Resistor Array	23	2N2222 Transistor	70
Wirewound Potentiometer	24	2N3904 Transistor	72
Trimmer Potentiometer	26	LM309K Voltage Regulator	74
15-Turn Trimmer Potentiometer	28	Dual In-Line Package (DIP) ICs	76
10-Turn Potentiometer	30	ATmega328 Microcontroller	78
Ceramic Disc Capacitor	32	Small Outline Integrated Circuit	80
Glass Capacitor	34	Thin Quad Flat Pack	82
Multilayer Ceramic Capacitor	36	Ball Grid Array	84
Aluminum Electrolytic Capacitor	37	Microprocessor SoC	86
Film Capacitor	38	Through-Hole Red LED	88
Dipped Tantalum Capacitor	40	Surface-Mount LED	90
Polymer Tantalum Chip Capacitor	42	Red Green Bicolor LED	91
Polymer Aluminum Chip Capacitor	43	White LED	92
Axial Inductor	44	Laser Diode	94
Surface-Mount Inductor	46	Optocoupler	96
Sintered Ferrite Inductor	47	Optical Tilt Sensor	97
Ferrite Bead	48	Optical Encoders	98
Three-Terminal Filter Capacitor	49	Ambient Light Sensor	100
Toroidal Transformer	50	CMOS Image Sensor	102

3 Electromechanics

Toggle Switch	106
Slide Switch	108
Pushbutton Switch	109
DIP Switch	110
Tactile Switch	112
Microswitch	114
Electromagnetic Relay	116
Thermal Switch	118
Brushed DC Motor	120
Stepper Motor	122
Magnetic Buzzer	124
Speaker	126
Smartphone Camera	128
Inside the Camera Module	130
Rotary Voice Coil Motor	132
Optical Drive Focusing Motors	133
Electret Microphone	134

4 Cables and Connectors

Solid and Stranded Wire	138
AC Power Cable	139
IDC Ribbon Cable	140
Modular Telephone Cable	141
DIP Sockets	142
Barrel Plug and Jack	144
Quarter-Inch Audio Plug and Jack	146
3.5 mm Audio Connector	148
LMR-195 Coaxial Cable	150
Laptop Power Cable	151

105

RG-6 Coaxial Cable	152
Cable TV RG-59	153
F Connector	154
BNC Plug and Jack	156
SMA Connector	158
DE-9 Connector	160
Category 6 Ethernet Cable	162
SATA Cable	163
HDMI Cable	164
VGA Cable	166
Basic USB Cable	168
USB Jack	170
SuperSpeed USB Cable	172

5 Retro Tech

175

Neon Lamp	176
Nixie Tube	178
Inside the Nixie Tube	180
12AX7 Vacuum Tube	182
Vacuum Fluorescent Display Tube	184
Cathode Ray Tube	186
Inside the CRT	188
Mercury Tilt Switch	190
Vintage Wirewound Resistors	191
Carbon Composition Resistor	192
Cornell-Dubilier 9LS Capacitor	194
Dipped Silver Mica Capacitor	196
Axial Multilayer Ceramic Capacitor	197
IF Transformer	198
Incandescent Light Bulb	200

Camera Flashbulb	202	Ethernet Transformer	248
Photoresistor	204	DC-DC Converter	249
Point Contact Diode	206	Seven-Segment LED Display	250
Germanium Diode	207	Thick-Film LED Numeric Display	252
μA702 Integrated Circuit	208	5×7 LED Dot Matrix Display	254
Windowed EPROM	210	Vintage LED Bubble Display	256
Core Memory	212	Alphanumeric LED Display	258
IBM SLT Module	214	Temperature-Compensated Clock	260
Analog Panel Meter	216	Crystal Oscillator	262
Magnetic Tape Head	218	Avalanche Photodiode Module	264
Thin-Film Hard Drive Head	220	3656HG Isolation Amplifier	266
GMR Hard Drive Head	222	Inside the Isolation Amplifier	268
6 Composite Devices	225	Afterword	271
LED Filament Light Bulb	226	Cutting and Polishing	272
Single-Side Printed Circuit Board	228	Cleaning	274
Two-Layer Printed Circuit Board	230	Potting	275
Multilayer Circuit Boards	232	Mounting	276
Flex and Rigid-Flex Circuit Boards	234	Photographic Equipment	278
Elastomeric Connector	236	Retouching	280
MicroSD Card	238	About Macro Photography	281
Glob-Top Packaging	240	Focus Stacking	282
EMV Credit Card Chip	241		
NFC Key Card	242	<i>Glossary</i>	285
Smartphone Logic Board	244	<i>Index</i>	291
Inside the Logic Board	246		