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Practical Electronics for Inventors, Fourth Edition

by: Paul Scherz, Dr. Simon Monk

Abstract: A fully updated, no-nonsense guide to electronics. Advance your electronics knowledge and gain the skills necessary to develop and construct your own functioning gadgets. Written by a pair of experienced engineers and dedicated hobbyists, Practical Electronics for Inventors, Fourth Edition, lays out the essentials and provides step-by-step instructions, schematics, and illustrations. Discover how to select the right components, design and build circuits, use microcontrollers and ICs, work with the latest software tools, and test and tweak your creations. This easy-to-follow book features new instruction on programmable logic, semiconductors, operational amplifiers, voltage regulators, power supplies, digital electronics, and more. Coverage includes:

- Resistors, capacitors, inductors, and transformers
- Diodes, transistors, and integrated circuits
- Optoelectronics, solar cells, and phototransistors
- Sensors, GPS modules, and touch screens
- Op amps, regulators, and power supplies
- Digital electronics, LCDs, and logic gates
- Microcontrollers and prototyping platforms
- Combinational and sequential programmable logic
- DC motors, RC servos, and stepper motors
- Microphones, audio amps, and speakers
- Modular electronics and prototypes

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Description: A fully updated, no-nonsense guide to electronics. Advance your electronics knowledge and gain the skills necessary to develop and construct your own functioning gadgets. Written by a pair of experienced engineers and dedicated hobbyists, Practical Electronics for Inventors, Fourth Edition, lays out the essentials and provides step-by-step instructions, schematics, and illustrations. Discover how to select the right components, design and build circuits, use microcontrollers and ICs, work with the latest software tools, and test and tweak your creations. This easy-to-follow book

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1. <https://www.amazon.com/Practical-Electronics-Inventors-Fourth-Scherz/dp/1259587541> [back]

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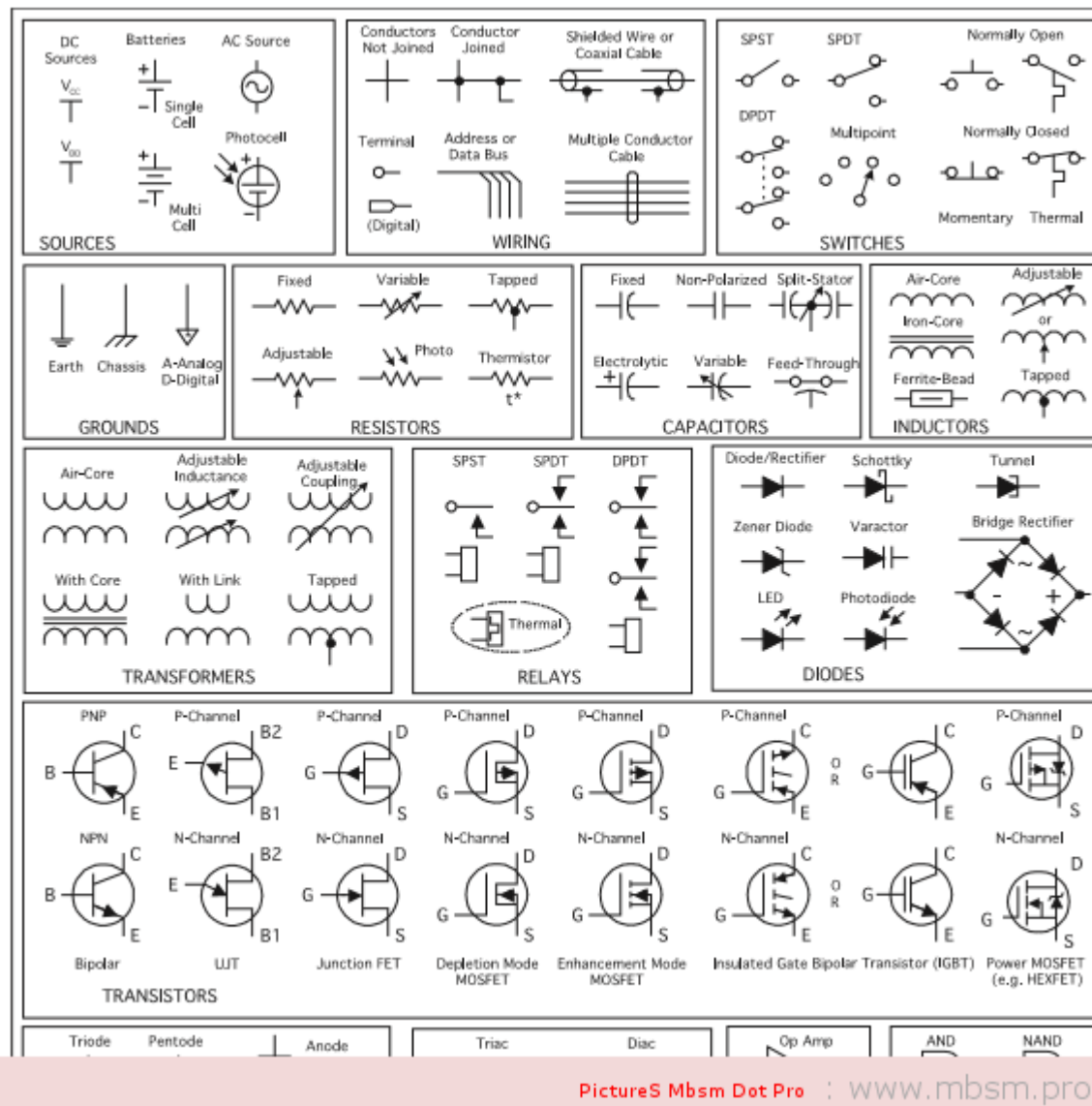


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Resistor Labels

Conversion Calculator

$k = 1,000$; $M = 1,000,000$
 $1M\Omega = 1,000,000\ \Omega = 1 \times 10^6\ \Omega$
 $1k\Omega = 1,000\ \Omega = 1 \times 10^3\ \Omega$

Examples:

$3.3\ k\Omega = 3,300\ \Omega = 3.3 \times 10^3\ \Omega$
 $22\ k\Omega = 22,000\ \Omega = 22 \times 10^3\ \Omega$
 $2\ M\Omega = 2,000,000\ \Omega = 2 \times 10^6\ \Omega$
 $1.68\ M\Omega = 1,680,000\ \Omega = 1.68 \times 10^6\ \Omega$

Resistor Color Code

Color	Sig. Fig.	Decimal Multiplier	Tolerance (%)
Black	0	1	-
Brown	1	10	1
Red	2	100	2
Orange	3	1,000	-
Yellow	4	10,000	-
Green	5	100,000	0.5
Blue	6	1,000,000	0.25
Purple	7	10,000,000	0.1
Gray	8	100,000,000	-
White	9	1,000,000,000	-
Gold	-	0.1	5
Silver	-	0.01	10
No Color	-	-	20

Body Color

The body color of a resistor typically doesn't carry meaning, except in some instances where it may specify temperature coefficient. However, if you find resistors within a circuit that are white/gray or blue in color, they may be non-flammable or fusible resistors. Care must be taken when replacing such resistors.

4-Band Resistor Code (Most Common)

Label Meaning

Red Black Orange Gold
 $20 \times 1,000 = 20k\ \Omega \pm 5\%$

First Digit Second Digit Multiplier (#of zeros) % Tolerance

5-Band Resistor Code (3-digit)

Label Meaning

Purple Blue Green Brown Brown
 $675 \times 10 = 6750\ \Omega \pm 1\%$

First Digit Second Digit Third Digit Multiplier (#of zeros) % Tolerance

5-Band Resistor Code (Reliability)

Label Meaning

Yellow Purple Silver Green Brown
 $47 \times 100,000 = 4.7\ M\Omega \pm 10\%$

First Digit Second Digit Third Digit Multiplier (#of zeros) Reliability

Color	Reliability (%/1000 Hr)
Brown	1
Red	0.1
Orange	0.01
Yellow	0.001

6-Band Resistor Code

Label Meaning

Purple Red Black Blue Brown Red
 $276 \times 1 = 276\ \Omega \pm 1\%$

First Digit Second Digit Third Digit Multiplier (#of zeros) % Tolerance Temp. Coeff.

Color	Temp. Coeff.
Brown	100 ppm
Red	50 ppm

Surface Mount Resistor Code

3-digit Label

Label Meaning

101 10 and 1 zero = 100 Ω
105 10 and 5 zero = 1,000,000 Ω
224 22 and 4 zeros = 220,000 Ω
1R0 1.0 and no zeros = 1 Ω
22R 22.0 and no zeros = 22 Ω
R10 0.1 and no zeros = 0.1 Ω

The first two digits represent significant figures; the last digit specifies the multiplier. For values under 100 Ω , the letter R is substituted for one of the significant digits and represents a decimal point.

4-digit Label

Label Meaning

1001 100 and 1 zero = 1000 Ω
22R0 22.0 and no zeros = 22 Ω

The first three digits represent significant figures; the last digit specifies the multiplier. R represents a decimal point.

Tolerance Label

Label Meaning

101F 100 $\Omega \pm 1\%$

Letter	Tolerance
D	$\pm 0.5\%$
F	$\pm 1.0\%$

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