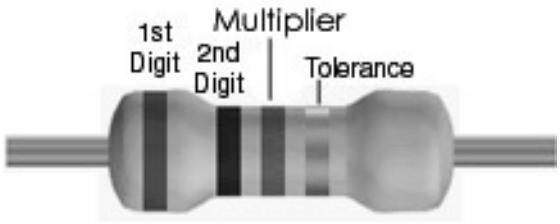
LAB #3: RESISTOR MARKINGS: THE COLOR CODE

This lab will familiarize you with the resistor color code. After the lab, you should be able to identify a resistor's value and tolerance from its color bands. Markings for surface mount (SMT) components is also covered as they are becoming more common than color bands. See appendix A in your textbook for more details.



Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Gray	White	Gold	Silver	No Band
0	1	2	3	4	5	6	7	8	9	5%	10%	20%

PART I (14 pts.)
Identify the following resistances given the color bands: (2 pts. Each)
USE THE FORMAT 4.7 kΩ ± 5%

1) BROWN – BLACK – RED – NO BAND = _____
2) ORANGE – ORANGE – RED – SILVER = _____
3) BROWN – RED – GREEN – SILVER = _____
4) YELLOW – VIOLET – BROWN – GOLD = _____
5) BROWN – GRAY – ORANGE – SILVER = _____
6) BLUE – GRAY – BLACK = GOLD = _____
7) GREEN – BLUE – YELLOW – SILVER = _____

PART II (14 pts.)
Give the color band identification for the following resistances: (2 pts. Each)

1) 3.7 kΩ ± 20% = _____
2) 2.2 MΩ ± 10% = _____
3) 820 kΩ ± 10% = _____
4) 18 kΩ ± 5% = _____
5) 1.5 Ω ± 5% = _____
6) 33 Ω ± 10% = _____
7) 120 Ω ± 5% = _____

PART III (14 pts.)
Identify the following surface mount resistances given the markings: (2 pts. Each)

1) 103 = _____
2) 474 = _____
3) 562 = _____
4) 390 = _____
5) 225 = _____
6) 821 = _____
7) 3R3 = _____

PART IV (45 pts.)
Find the following resistors and fill in the blanks provided. You will need your multimeter to measure the resistance of each.

1) BROWN – BLUE – RED = _____ (2 pts.)

What is the tolerance of the resistor that you have? (%) _____ (2 pts.)

What is the MAXIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MINIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MEASURED value of the resistor? (Ω) _____ (2 pts.)

Does the measured value of the resistor fall within the range of the maximum and minimum values? _____ (2 pts.)

What is the actual tolerance? (%) _____ (3 pts.)

Actual % Tolerance $= \left|1 - \left(\frac{Measured}{Calculated}\right)\right| * 100$

2) BROWN – BLACK – GREEN = _____ (2 pts.)

What is the tolerance of the resistor that you have? (%) _____ (2 pts.)

What is the MAXIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MINIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MEASURED value of the resistor? (Ω) _____ (2 pts.)

Does the measured value of the resistor fall within the range of the maximum and minimum values? _____ (2 pts.)

What is the actual tolerance? (%) _____ (3 pts.)

Actual % Tolerance = $= \left| 1 - \left(\frac{Measured}{Calculated} \right) \right| * 100$

3) YELLOW – VIOLET – BROWN = _____ (2 pts.)

What is the tolerance of the resistor that you have? (%) _____ (2 pts.)

What is the MAXIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MINIMUM value of resistance that you can have? (Ω) _____ (2 pts.)

What is the MEASURED value of the resistor? (Ω) _____ (2 pts.)

Does the measured value of the resistor fall within the range of the maximum and minimum values? _____ (2 pts.)

What is the actual tolerance? (%) _____ (3 pts.)

Actual % Tolerance $= \left| 1 - \left(\frac{Measured}{Calculated} \right) \right| * 100$

QUESTIONS

1) Name two factors that might affect your measured resistance values. (5 pts.)

2) What was the objective of this lab? (5 pts.)

3) What was the equipment used for this lab? (3 pts.)

Additional Resources:
There are online calculators available for determining the resistor color codes. A few are:
www.electrician.com/resist_calc/resist_calc.htm
www.dannyg.com/examples/res2/resistor.htm
www.seas.upenn.edu/ese/rca/calcjs.html

Standard Values for Resistors

Resistors have been sized according to their tolerance such that they just overlap with the value above and below when taking their MAX and MIN values into account. This is shown in the ±20% column but is true for all tolerances. Today 1% resistors are quite common and inexpensive so the range of values is also quite large.

±20%	±10%	±5%
1	1	1
MIN=0.8		1.1
MAX=1.2	1.2	1.2
		1.3
		1.4
1.5	1.5	1.5
MIN=1.2		1.6
MAX=1.8	1.8	1.8
		2
2.2	2.2	2.2
MIN=1.8		2.4
MAX=2.7	2.7	2.7
		3
3.3	3.3	3.3
MIN=2.7		3.6
MAX=3.9	3.9	3.9
		4.3
4.7	4.7	4.7
MIN=3.9		5.1
MAX=5.6	5.6	5.6
		6.2
6.8	6.8	6.8
MIN=5.6		7.5
MAX=8.2	8.2	8.2
		9.1