

Electronic Color Code

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ELEX 50

One decade of the E12 series (there are twelve preferred values per decade of values) shown with their electronic color codes on resistors

RMA (Radio Manufacturers Association) Resistor Color Code Guide, c. 1945-1955.

Electronic Color Code



A 0 Ω resistor, marked with a single black band

Electronic Color Code

- The electronic color code is used to indicate the values or ratings of electronic components, usually for resistors, but also for capacitors, inductors, and others.

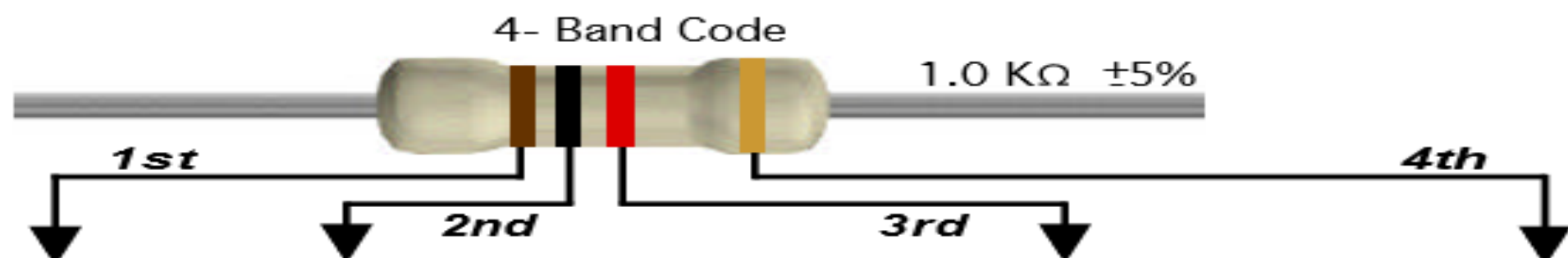
Electronic Color Code

- Carbon resistors are small, so their R value in ohms is marked using a color-coding system.

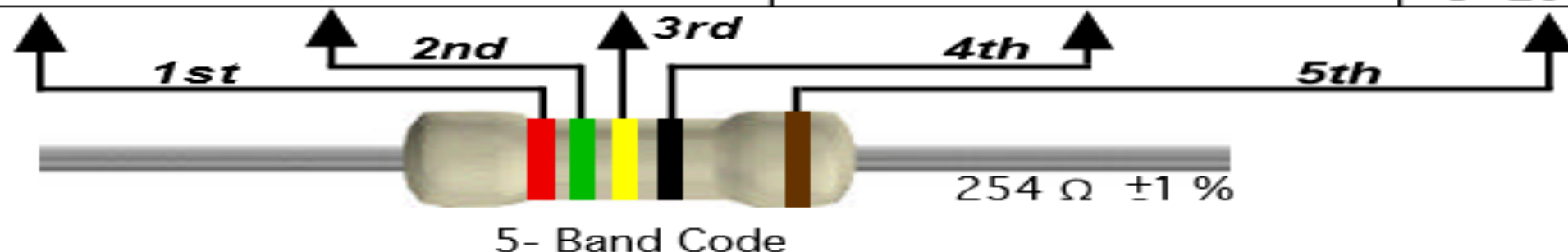
Electronic Color Code

- Coding is standardized by the Electronic Industries Alliance (EIA).

RESISTOR COLOR CODE GUIDE



Color	1st Band	2nd Band	3rd Band	Decimal Multiplier		Tolerance	
Black	0	0	0	1	1		
Brown	1	1	1	10	10	±	1 %
Red	2	2	2	100	100	±	2 %
Orange	3	3	3	1K	1,000		
Yellow	4	4	4	10K	10,000		
Green	5	5	5	100K	100,000		
Blue	6	6	6	1M	1,000,000		
Violet	7	7	7	10M	10,000,000		
Gray	8	8	8	100,000,000			
White	9	9	9	1,000,000,000			
Gold				0.1		±	5 %
Silver				0.01		±	10 %
None						±	20 %



Calculation



First Band	Red	-----	2
Second Band	Black	-----	0
Multiplier Band	Yellow	--	x10,000
Tolerance Band	Silver	-----	10 %

The Gold or Silver band is always placed to the right.
The resistor value is read from the left to right.

If there is no tolerance band, then find the side that has
a band closest to a lead and make that the first band.

Equation

$$20 \times 10,000 = 200,000$$

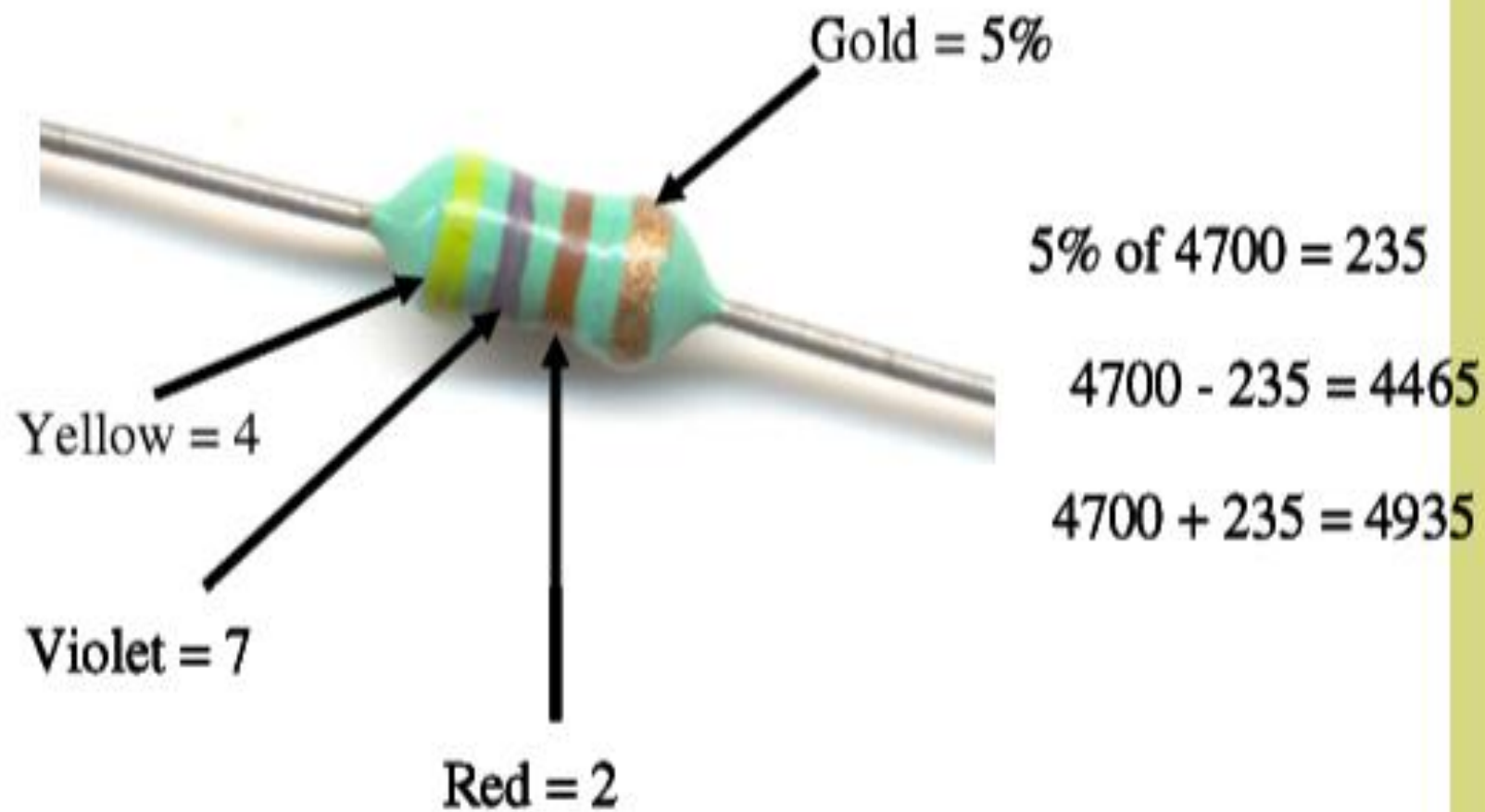
$$1,000 = 1K$$

Resistor = 200 K Ω

with a \pm 10 % Tolerance

■ Applying the Color Code

- The amount by which the actual R can differ from the color-coded value is its **tolerance**. Tolerance is usually stated in percentages.

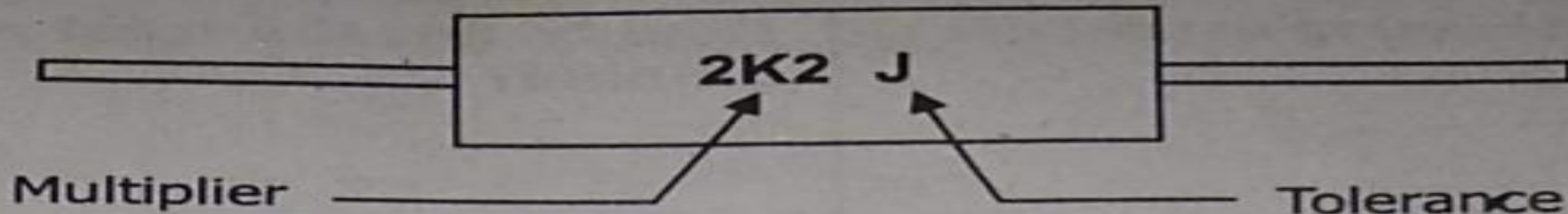


The **actual** value can range from 4465 to 4935 Ω .

4700 Ω

is the **nominal** value.

Wire-Wound Resistor Reading



The value is **2.2 kilo ohms $\pm 5\%$**

Figure 3-12 - Wire-wound Resistor Coding

CODES	MULTIPLIER	TOLERANCE
F	---	$\pm 1\%$
G	---	$\pm 2\%$
J	---	$\pm 5\%$
K	1000	$\pm 10\%$
M	1000000	$\pm 20\%$
R	---	---

Table 3-4 - Wire-wound Resistor Code Table

Measuring Resistance



OHMMETER

- The ohmmeter is an instrument which is generally part of a multimeter (usually including a voltmeter and an ammeter) and is used to measure the resistance of a component.

OHMMETER

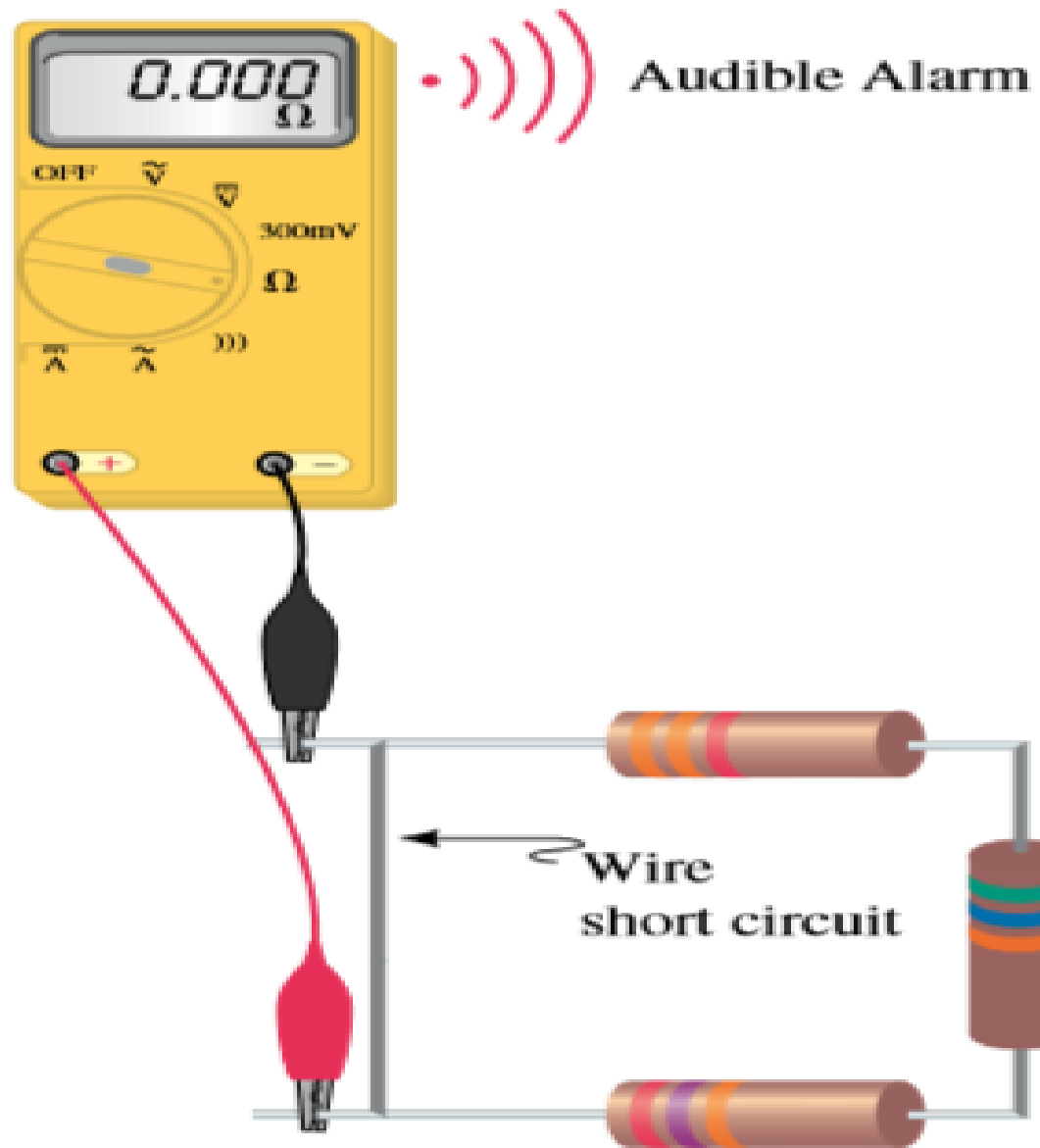
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OHMMETER SYMBOL

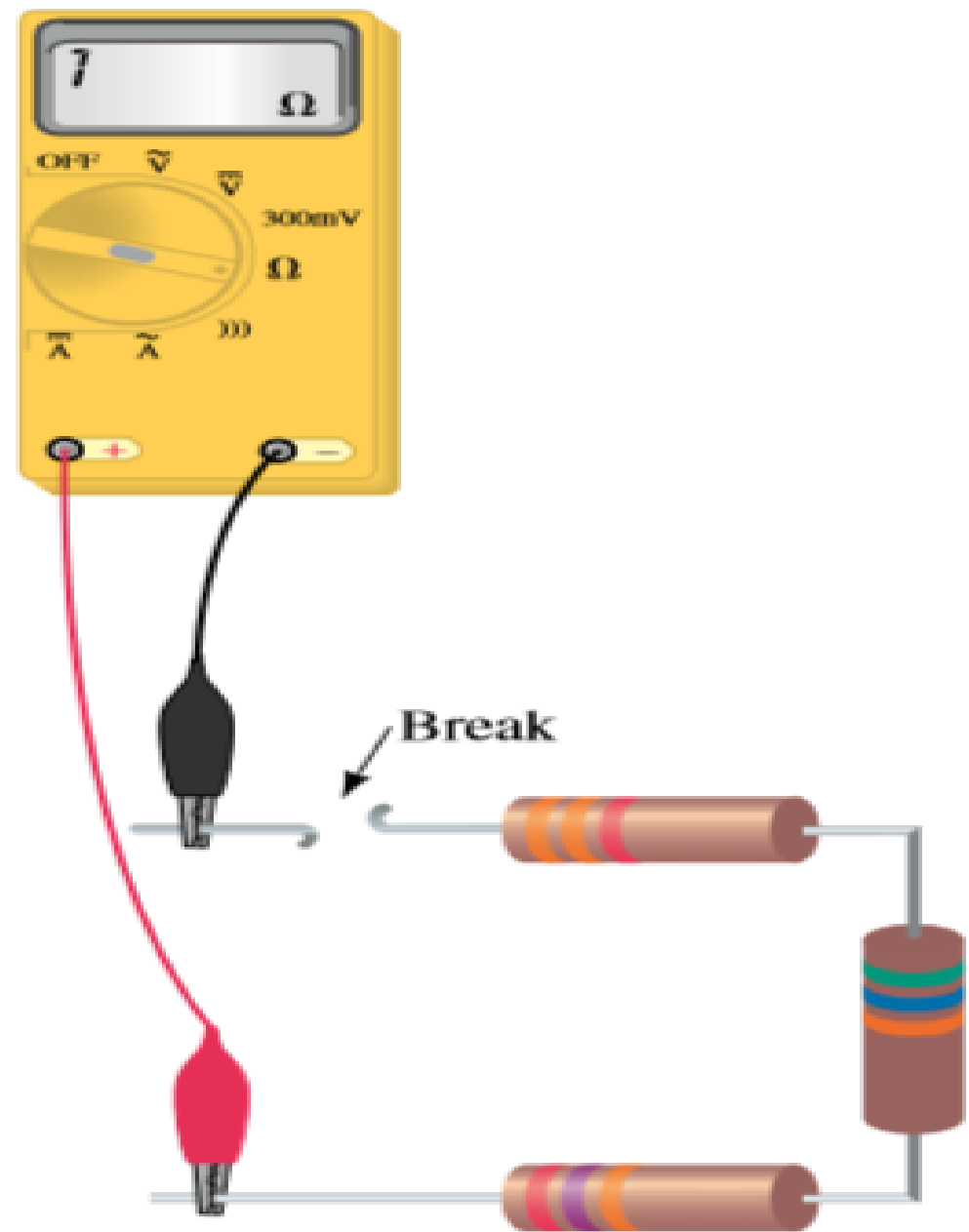








(a) Short circuit



(b) Open circuit

