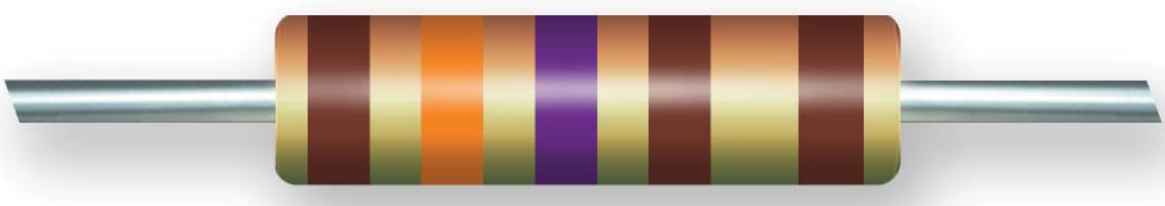
Association Connecting Electronics Industries

COMPONENT COLOR BAND CHARTS v.1

Use the following charts to calculate component values for color band resistors, capacitors and inductors. The charts are for 4, 5 and 6-band resistors; 4-band capacitors and inductors; and 3-band inductors.

In addition, there is a chart for surface mount inductors that use colored dots for component value. The sample components above each chart are oriented properly as they are read – left to right.

These charts can be used for the exercises in DVD-164C, for the Review Questions and for the IPC Training Certification Exam.



1,370Ω ±1%

From DVD-164C - Component Color Codes. See www.ipctraining.org for free and complete online reviews of the entire library of IPC video training, including related topics on Component ID, Component Number Codes, Print Reading and Stockroom Storage & Distribution.

4-BAND RESISTORS

100Ω ±5%

BAND	1	2	3	4
BLACK		0	no zeros	
BROWN	1	1	0	±1%
RED	2	2	00	±2%
ORANGE	3	3	000	
YELLOW	4	4	0000	
GREEN	5	5	00000	±.5%%
BLUE	6	6	000000	±.25%
VIOLET	7	7		±.1%
GRAY	8	8		
WHITE	9	9		
GOLD			x.1	± 5%
SILVER			x.01	± 10%
	VALUE	VALUE	MULTIPLIER	TOLERANCE

Resistance is measured in 'ohms.' The symbol for ohms is Ω. You may also see the value of a resistor expressed as 'K' ohms or 'M' ohms. K stands for Kilo-ohms or one thousand ohms, and M stands for Meg-ohms or one million ohms.

Therefore: a 10,000 ohm resistor can be abbreviated as 10K for 10 Kilo-ohms. In the same manner, a 6,000,000 ohm resistor can be abbreviated as 6M, for 6 Meg-ohms.

Equivalents: 1,000,000 ohms = 1,000K-ohms = 1M-ohm.
The decimal point moves three places to the left when using K, and six places to the left for M.

5-BAND RESISTORS

13.4KΩ ± 1%

BAND	1	2	3	4	5
BLACK		0	0	no zeros	
BROWN	1	1	1	0	±1%
RED	2	2	2	00	±2%
ORANGE	3	3	3	000	
YELLOW	4	4	4	0000	
GREEN	5	5	5	00000	±.5%
BLUE	6	6	6	000000	±.25%
VIOLET	7	7	7		±.1%
GRAY	8	8	8		
WHITE	9	9	9		
GOLD				x.1	± 5%
SILVER				x.01	± 10%
	VALUE	VALUE	VALUE	MULTIPLIER	TOLERANCE

Resistance is measured in ohms (Ω).

You may also see a 5-band resistor with white as the fifth band. Notice there is no white tolerance band on the 5-band color chart.

This 5th white band is a military identifier – meaning that the component has military solderable leads. A resistor with a white fifth band is read as a 4-band resistor. The fifth band is not used for calculating the tolerance and should be ignored.

Equivalents: 1,000,000 ohms = 1,000K-ohms = 1M-ohm.

6-BAND RESISTORS

4MΩ ± 2% 15ppm/°C

BAND	1	2	3	4	5	6
BLACK		0	0	no zeros		
BROWN	1	1	1	0	±1%	100ppm/°C
RED	2	2	2	00	±2%	50ppm/°C
ORANGE	3	3	3	000		15ppm/°C
YELLOW	4	4	4	0000		
GREEN	5	5	5	00000	±.5%	
BLUE	6	6	6	000000	±.25%	10ppm/°C
VIOLET	7	7	7		±.1%	5ppm/°C
GRAY	8	8	8			
WHITE	9	9	9			1ppm/°C
GOLD				x.1	± 5%	
SILVER				x.01	± 10%	
	VALUE	VALUE	VALUE	MULTIPLIER	TOLERANCE	TCR

Resistance is measured in ohms (Ω).

The sixth band on this color chart is the TCR, or Temperature Coefficient of Resistance. TCR is a measurement of how much the resistance is modified by changes in temperature. TCR is measured in units of parts per million (PPM) per degrees Celsius.

Equivalents: 1,000,000 ohms = 1,000K-ohms = 1M-ohm.

4-BAND CAPACITORS

200,000pF (200nF) ± 5%

BAND	1	2	3	4
BLACK		0	no zeros	±1%
BROWN	1	1	0	±1%
RED	2	2	00	±2%
ORANGE	3	3	000	±3%
YELLOW	4	4	0000	±4%
GREEN	5	5	00000	±5%
BLUE	6	6	000000	±6%
VIOLET	7	7	0000000	±7%
GRAY	8	8	00000000	±8%
WHITE	9	9	000000000	±9%
GOLD				±5%
SILVER				±10%
	VALUE	VALUE	MULTIPLIER	TOLERANCE

Capacitance is measured in "farads." There are picofarads (pF), nanofarads (nF), and microfarads (µF).

Color coded capacitors always have 4 bands, and are measured in picofarads – the smallest unit of measurement.

Equivalents: 1,000,000pF (picofarads) = 1,000nF (nanofarads) = 1µF (microfarad)

4-BAND INDUCTORS

700µH ± 2%

BAND	1	2	3	4
BLACK		0	no zeros	
BROWN	1	1	0	±1%
RED	2	2	00	±2%
ORANGE	3	3	000	
YELLOW	4	4	0000	
GREEN	5	5	00000	±.5%%
BLUE	6	6	000000	±.25%
VIOLET	7	7		±.1%
GRAY	8	8		
WHITE	9	9		
GOLD			x.1	± 5%
SILVER			x.01	± 10%
	VALUE	VALUE	MULTIPLIER	TOLERANCE

Inductance is measured in "henries." There are nanohenries (nH), microhenries (µH), and millihenries (mH).

Axial (leaded) inductors with color bands are always measured in microhenries (µH).

Some inductors may have an additional silver band to the left of the first value band. This silver band indicates an inductor with military solderable leads. It should be read as a normal 4-band inductor, ignoring the first silver band.

Equivalents: 1,000,000nH (nanohenries) = 1,000µH (microhenries) = 1mH (millihenry)

3-BAND INDUCTORS

97µH ± 10%

BAND	1	2	3
BLACK		0	
BROWN	1	1	±1%
RED	2	2	±2%
ORANGE	3	3	
YELLOW	4	4	
GREEN	5	5	±.5%
BLUE	6	6	±.25%
VIOLET	7	7	±.1%
GRAY	8	8	
WHITE	9	9	
GOLD			+5%
SILVER			±10%
	VALUE	VALUE	TOLERANCE

Occasionally there will be a 3-band inductor. Notice that 3-band inductors do not have a multiplier band – just two value bands and a third band for tolerance.

Axial (leaded) inductors with color bands are always measured in microhenries (µH).

Equivalents: 1,000,000nH (nanohenries) = 1,000µH (microhenries) = 1mH (millihenry).

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SMT INDUCTORS - COLOR DOTS

52,000nH (52µH) ± 20%

BAND	1	2	3
BLACK		0	no zeros
BROWN	1	1	0
RED	2	2	00
ORANGE	3	3	000
YELLOW	4	4	0000
GREEN	5	5	00000
BLUE	6	6	000000
VIOLET	7	7	
GRAY	8	8	
WHITE	9	9	
GOLD			x.1
SILVER			x.01
	VALUE	VALUE	MULTIPLIER

SMT inductors with color dots are measured in nanohenries (nH) because the values are typically smaller than other inductors.

With the middle dot oriented at the top, the colors are read left to right.

Equivalents: 1,000,000nH (nanohenries) = 1,000µH (microhenries) = 1mH (millihenry).

When the tolerance is not specified, it is assumed to be ± 20%.
