



Association Connecting Electronics Industries

COMPONENT NUMBER CODE CHARTS v.1

Use the following charts to calculate component values for number coded resistors, capacitors and inductors. The charts included are for 3- and 4-digit chip resistors; chip resistor decimals and symbols; numbered resistors with tolerance letter codes; E96 series, 0603 resistors; 3-digit capacitors; 2-digit alphanumeric chip capacitors; 3-digit inductors; and capacitor and inductor decimals.

These charts can be used for the *exercises* in DVD-165C, for the *Review Questions* and for the IPC *Training Certification* Exam.



$2,500\Omega \pm 1\%$

From DVD-165C - Component Number Codes. See www.ipctraining.org for free and complete online reviews of the entire library of IPC video training, including topics on Component ID, Component Color Codes, Print Reading, and Stockroom Storage & Distribution.

3-DIGIT CHIP RESISTOR NUMBER CODE CHART



$100\Omega \pm 5\%$

3-DIGIT VALUE CODE $\pm 5\%$ Tolerance

1st and 2nd numbers SIGNIFICANT VALUE	3rd number MULTIPLIER (number of zeros)
Use as is in the order written	0 = no zeros 1 = add 1 zero 2 = add 2 zeros 3 = add 3 zeros 4 = add 4 zeros 5 = add 5 zeros 6 = add 6 zeros 7 = add 7 zeros 8 = add 8 zeros 9 = add 9 zeros

Resistors are 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-oh

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4-DIGIT CHIP RESISTOR NUMBER CODE CHART



100K Ω \pm 1%

4-DIGIT VALUE CODE \pm 1% Tolerance

1st, 2nd and 3rd numbers SIGNIFICANT VALUE	4th number MULTIPLIER (number of zeros)
Use as is in the order written	0 = no zeros 1 = add 1 zero 2 = add 2 zeros 3 = add 3 zeros 4 = add 4 zeros 5 = add 5 zeros 6 = add 6 zeros 7 = add 7 zeros 8 = add 8 zeros 9 = add 9 zeros

Resistors are 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 100,000 ohm resistor can be abbreviated as 100K for 100 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.

DECIMALS AND SYMBOLS FOR 3- AND 4-DIGIT RESISTORS



$7.6\Omega \pm 5\%$

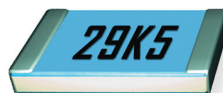


$15.2\Omega \pm 1\%$

When the letter R is used as part of a 3- or 4-digit number code, it indicates the position of a decimal point. For example, a 3-digit code of 4R3 would be decoded as 4.3 Ω . If the code is R43, the value would be .43 Ω . And a 4-digit number code of 65R5 would be decoded as 65.5 Ω . When a letter code is used to indicate a decimal point, there is no multiplier.



$3.2K\Omega \pm 5\%$



$29.5K\Omega \pm 1\%$

The letter K also indicates the position of a decimal point in 3- and 4-digit number codes. The difference is that the value will be measured in kilo-ohms. For example, 8K9 would be 8.9K Ω . When a letter code is used to indicate a decimal point, there is no multiplier.

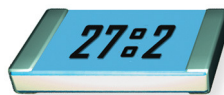


$1.5M\Omega \pm 5\%$



$20m\Omega \pm 1\%$

Decimal points can also be indicated by the letters M and L. M is used when the value is measured in meg-ohms and L is used when the value will be measured in milli-ohms. When a letter code is used to indicate a decimal point, there is no multiplier.



$27,800\Omega$ or $27.8K\Omega \pm 1\%$

Some number codes use the *colon* symbol, or two small boxes to represent the number 8. For example, the 3-character code:53 equals 853. The two value numbers are 85. The multiplier is 3 – so three zeros added after 85 gives the value 85,000 Ω , or 85K Ω . As long as there is no letter indicating a decimal point, 3- and 4-character codes containing a colon symbol are calculated the same as 3- and 4-digit number codes.

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AXIAL RESISTOR VALUE AND TOLERANCE CODES



6M Ω \pm 1%

1st, 2nd and 3rd numbers SIGNIFICANT VALUE	4th number MULTIPLIER (number of zeros)	TOLERANCE letter code	
Use as is in the order written	0 = add no zeros	A	\pm .05%
	1 = add 1 zero	B	\pm .1%
	2 = add 2 zeros	C	\pm .25%
	3 = add 3 zeros	D	\pm .5%
	4 = add 4 zeros	F	\pm 1%
	5 = add 5 zeros	G	\pm 2%
	6 = add 6 zeros	H	\pm 3%
	7 = add 7 zeros	J	\pm 5%
	8 = add 8 zeros	K	\pm 10%
	9 = add 9 zeros	L	\pm 15%
		M	\pm 20%

Resistors are 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 100,000 ohm resistor can be abbreviated as 100K for 100 Kilo-ohms. In the same manner a 6,000,000 ohm resistor can be abbreviated as 6M, for 6 Meg-ohms.

These axial resistors typically have a single letter code to the right of the number code to indicate tolerance.

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

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E96 SERIES, 0603, $\pm 1\%$ CHIP RESISTORS



$340\Omega \pm 1\%$

E96 Value Code Chart

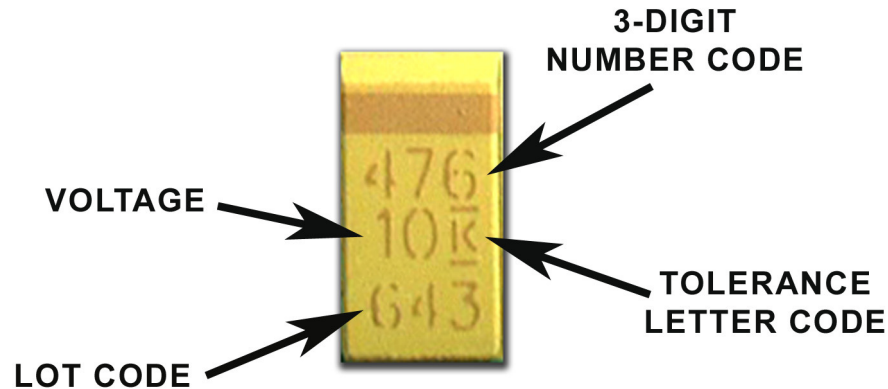
# 1%	# 1%	# 1%	# 1%	# 1%	# 1%
01 10.0	17 14.7	33 21.5	49 31.6	65 46.4	81 68.1
02 10.2	18 15.0	34 22.1	50 32.4	66 47.5	82 69.8
03 10.5	19 15.4	35 22.6	51 33.2	67 48.7	83 71.5
04 10.7	20 15.8	36 23.2	52 34.0	68 49.9	84 73.2
05 11.0	21 16.2	37 23.7	53 34.8	69 51.1	85 75.0
06 11.3	22 16.5	38 24.3	54 35.7	70 52.3	86 76.8
07 11.5	23 16.9	39 24.9	55 36.5	71 53.6	87 78.7
08 11.8	24 17.4	40 25.5	56 37.4	72 54.9	88 80.6
09 12.1	25 17.8	41 26.1	57 38.3	73 56.2	89 82.5
10 12.4	26 18.2	42 26.7	58 39.2	74 57.6	90 84.5
11 12.7	27 18.7	43 27.4	59 40.2	75 59.0	91 86.6
12 13.0	28 19.1	44 28.0	60 41.2	76 60.4	92 88.7
13 13.3	29 19.6	45 28.7	61 42.2	77 61.9	93 90.9
14 13.7	30 20.0	46 29.4	62 43.2	78 63.4	94 93.1
15 14.0	31 20.5	47 30.1	63 44.2	79 64.9	95 95.3
16 14.3	32 21.0	48 30.9	64 45.3	80 66.5	96 97.6

Multiplier Chart

Letter Code	Explanation
Y	Add no zeros, move decimal 1 place to the left
X	Leave number as is
A	Add 1 zero, move decimal 1 place to the right
B	Add 2 zeros, move decimal 2 places to the right
C	Add 3 zeros, move decimal 3 places to the right
D	Add 4 zeros, move decimal 4 places to the right
E	Add 5 zeros, move decimal 5 places to the right
F	Add 6 zeros, move decimal 6 places to the right

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CAPACITOR VALUE AND TOLERANCE CHART



47,000,000pF or 47μF, 10V, ± 10%

1st and 2nd numbers SIGNIFICANT VALUE	3rd number MULTIPLIER (number of zeros)	TOLERANCE letter code	
Use as is in the order written	0 = add no zeros	A	±.05%
	1 = add 1 zero	B	±.1%
	2 = add 2 zeros	C	±.25%
	3 = add 3 zeros	D	±.5%
	4 = add 4 zeros	F	±1%
	5 = add 5 zeros	G	±2%
	6 = add 6 zeros	H	±3%
	7 = add 7 zeros	J	±5%
	8 = add 8 zeros	K	±10%
	9 = add 9 zeros	L	±15%
		M	±20%

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

3-digit capacitors are always calculated in picofarads – the smallest unit of measurement.

Tolerance is typically indicated by a letter code. When tolerance is not specified, it is assumed to be ± 20%.

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

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2-DIGIT ALPHANUMERIC CHIP CAPACITOR CHART



1,800pF \pm 20%

Chip Capacitor Letter Values

LETTER	EQUALS	LETTER	EQUALS	LETTER	EQUALS
A	1.0	M	3.0	Y	8.2
B	1.1	N	3.3	Z	9.1
C	1.2	P	3.6	a	2.5
D	1.3	Q	3.9	b	3.5
E	1.5	R	4.3	d	4.0
F	1.6	S	4.7	e	4.5
G	1.8	T	5.1	f	5.0
H	2.0	U	5.6	m	6.0
J	2.2	V	6.2	n	7.0
K	2.4	W	6.8	t	8.0
L	2.7	X	7.5	y	9.0

Chip Capacitor Multiplier Chart

Number	Explanation
0	Leave number as is
1	Add 1 zero, move decimal 1 place to the right
2	Add 2 zeros, move decimal 2 places to the right
3	Add 3 zeros, move decimal 3 places to the right
4	Add 4 zeros, move decimal 4 places to the right
5	Add 5 zeros, move decimal 5 places to the right
6	Add 6 zeros, move decimal 6 places to the right
7	Add 7 zeros, move decimal 7 places to the right
9	Add no zeros, move decimal 1 place to the left

2-digit alphanumeric chip capacitors are always calculated in picofarads – the smallest unit of measurement. Unless otherwise indicated, tolerance is \pm 20%.

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

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INDUCTOR VALUE AND TOLERANCE CHART



270 μ H \pm 2%

1st and 2nd numbers SIGNIFICANT VALUE	3rd number MULTIPLIER (number of zeros)	TOLERANCE letter code	
Use as is in the order written	0 = add no zeros	A	\pm .05%
	1 = add 1 zero	B	\pm .1%
	2 = add 2 zeros	C	\pm .25%
	3 = add 3 zeros	D	\pm .5%
	4 = add 4 zeros	F	\pm 1%
	5 = add 5 zeros	G	\pm 2%
	6 = add 6 zeros	H	\pm 3%
	7 = add 7 zeros	J	\pm 5%
	8 = add 8 zeros	K	\pm 10%
	9 = add 9 zeros	L	\pm 15%
		M	\pm 20%

Inductors are measured in "henries."

There are nanohenries (nH), microhenries (μ H), and millihenries (mH). The value of numbered inductors is calculated in microhenries, unless otherwise indicated.

Tolerance may be indicated by a letter code. When tolerance is not specified, it is assumed to be \pm 20%.

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

DECIMALS FOR CAPACITORS AND INDUCTORS



.47μF ± 20%

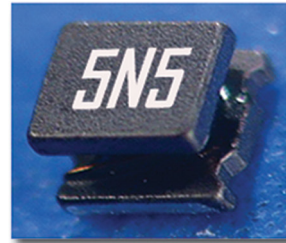
Capacitors are measured in “farads.” There are picofarads (pF), nanofarads (nF), and microfarads (μF). Unless otherwise indicated, the default tolerance is ± 20%.

On capacitors, μ or N is used to indicate the position of a decimal point. A μ symbol means the measurement is calculated in microfarads. The letter N means the measurement will be in nanofarads. For example, the code 9N5 would be decoded to 9.5nF ± 20%.

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



.79μH ± 20%



5.5nH ± 20%

On inductors, the letters R or K are used to indicate the position of a decimal point. For example, R37 is decoded as .37μH ± 20%.

The letter N is used to indicate the position of a decimal point when the measurement is calculated in nanohenries. For example, 9N5 is decoded as 9.5nH ± 20%.

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

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