

## Standard for Resistance Value, Resistance Tolerance and Color Code

### Basis Standard

IEC Publication 60062 : Marking codes for resistors and capacitors.  
 IEC Publication 60063 : Preferred number series for resistors and capacitors.  
 JIS C 5062 : Marking codes for resistors and capacitors.  
 JIS C 5063 : Preferred number series for resistors and capacitors.

### Resistance Values

The resistance values are notched by "Ratio" below in each series.

Series	Resistance Tolerance (Standard)	Ratio	Remarks
E6	±20 %	$\sqrt[6]{10} \approx 1.46$	Please refer to standard resistance values shown on this catalog.
E12	±10 %	$\sqrt[12]{10} \approx 1.21$	
E24	± 5 %	$\sqrt[24]{10} \approx 1.10$	
E48	± 2 %	$\sqrt[48]{10} \approx 1.05$	
E96	± 1 %	$\sqrt[96]{10} \approx 1.02$	

### How to express the resistance value with a Panasonic part number

The resistance value expressed in ohms is identified by a three digit number or a four digit number.  
 The last digit specifies the number of zeroes to follow.  
 The letter "R" shall be used as the decimal point for less than 10  $\Omega$ .

The examples of a three digit number

Resistance Code	Value in ohms
R56	0.56
5R6	5.6
100	10
271	270
102	1 k
273	27 k
104	100 k
275	2.7 M
106	10 M
107	100 M

The examples of a four digit number

Resistance Code	Value in ohms
R562	0.562
5R62	5.62
56R2	56.2
1000	100
2711	2.71 k
1002	10 k
2713	271 k
1004	1 M
2715	27.1 M
1006	100 M

## How to express the resistance tolerance with a Panasonic part number

The resistance tolerance is identified by a single letter in accordance with the following table and the code is placed just before the resistance code in the following examples.

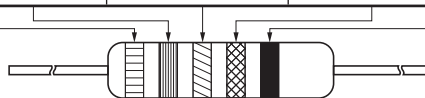
Tolerance Code	Tolerance (%)	Examples
W	±0.05	W1001 : 1000 Ω±0.05 %
B	±0.1	B1001 : 1000 Ω±0.1 %
C	±0.25	C1001 : 1000 Ω±0.25 %
D	±0.5	D1001 : 1000 Ω±0.5 %
F	±1	F1001 : 1000 Ω±1 %
G	±2	G1001 : 1000 Ω±2 %
J	±5	J101 : 100 Ω±5 %
K	±10	K101 : 100 Ω±10 %
M	±20	M101 : 100 Ω±20 %

## Color code indication for the resistance value and the tolerance

Fixed resistors whose resistance value and tolerance are indicated by color code follow the standard below.

Color code

Color	First digit	Second digit	Third digit	Multiplier	Resistance tolerance	
					%	Code
Black	0	0	0	1		
Brown	1	1	1	10	±1	F
Red	2	2	2	10 <sup>2</sup>	±2	G
Orange	3	3	3	10 <sup>3</sup>	±0.05	W
Yellow	4	4	4	10 <sup>4</sup>		
Green	5	5	5	10 <sup>5</sup>	±0.5	D
Blue	6	6	6	10 <sup>6</sup>	±0.25	C
Violet	7	7	7	10 <sup>7</sup>	±0.1	B
Gray	8	8	8			
White	9	9	9			
Gold				10 <sup>-1</sup>	±5	J
Silver				10 <sup>-2</sup>	±10	K
None					±20	M



### Indication example

#### Color code of 5 color bands

When the standard resistance value follows E48 series or 96 series, color code of the resistors are indicated by five color bands. Example below is 154 kΩ.

#### Example 1

1st Color	2nd Color	3rd Color	4th Color	5th Color
Brown (1)	Green (5)	Yellow (4)	Orange (1000)	Brown (±1 %)

#### Color code of 4 color bands

When the standard resistance value follows E6 series, 12 series or 24 series, color code of the resistors are indicated by four color bands. Example below is 15 kΩ.

#### Example 2

1st Color	2nd Color	3rd Color	4th Color
Brown (1)	Green (5)	Orange (1000)	Gold (±5 %)

## Standard Resistance Values

E6	E12	E24	E48	E96	E6	E12	E24	E48	E96	E6	E12	E24	E48	E96
10	10	10	100	100				215	215				464	464
			102		22	22	22		221			47		475
			105	105				226	226				487	487
			107						232					499
		11	110	110				237	237			51	511	511
			113				24		243					523
			115	115				249	249				536	536
			118						255					549
	12	12	121	121				261	261		56	56	562	562
			124						267					576
			127	127		27	27	274	274				590	590
		13		130					280					604
			133	133				287	287			62	619	619
			137						294					634
			140	140			30	301	301				649	649
			143						309					665
			147	147				316	316		68	68	681	681
			150						324					698
15	15	15		154	154	33	33	33	332	332			715	715
				158					340					732
		16	162	162				348	348			75	750	750
			165						357					768
			169	169			36	365	365				787	787
			174						374					806
			178	178				383	383		82	82	825	825
	18	18		182		39	39		392					845
			187	187				402	402				866	866
			191						412					887
			196	196				422	422			91	909	909
		20		200			43		432					931
			205	205				442	442				953	953
			210						453					976