## 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 %	<sup>6</sup> √10≒1.46	
E12	±10 %	<sup>12</sup> √10≒1.21	Diagram of the standard mariety and sales
E24	± 5 %	<sup>24</sup> √10≒1.10	Please refer to standard resistance values shown on this catalog.
E48	± 2 %	<sup>48</sup> √10≒1.05	Shown on this catalog.
E96	± 1 %	<sup>96</sup> √10≒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 ohm.

The examples of a three digit number

The	examples	∩f	а	four	diait	numher	

Resistance Code	Value in ohms	Resistance Code	Value in ohms
R56	0.56	R562	0.562
5R6	5.6	5R62	5.62
100	10	56R2	56.2
271	270	1000	100
102	1 k	2711	2.71 k
273	27 k	1002	10 k
104	100 k	2713	271 k
275	2.7 M	1004	1 M
106	10 M	2715	27.1 M
107	100 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 $\Omega \pm 0.05$ %
B	±0.1	B1001: 1000 $\Omega \pm 0.1$ %
C	±0.25	C1001: 1000 $\Omega \pm 0.25$ %
D	±0.5	D1001: 1000 $\Omega \pm 0.5$ %
F	±1	F1001: 1000 $\Omega \pm 1$ %
G	±2	G1001: 1000 $\Omega \pm 2$ %
J	±5	J101: 100 $\Omega \pm 5$ %
K	±10	K101: 100 $\Omega \pm 10$ %

## ■ 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	
Coloi	T itst digit	Second digit	Trilla digit		%	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	С
Violet	7	7	7	10 <sup>7</sup>	±0.1	В
Gray	8	8	8			
White	9	9	9			
Gold				10 <sup>-1</sup>	±5	J
Silver				10 <sup>-2</sup>	±10	K
None					±20	М

## 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 k $\Omega$ .

#### Example 1

•	1st Color	2nd Color	3rd Color	4th Color	5th Color
	Brown	Green	Yellow	Orange	Brown
	(1)	(5)	(4)	(1000)	(±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 k $\Omega$ .

#### Example 2

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

# ■ Standard Resistance Values

E6     E12     E24     E48     E96       10     10     100     100       105     105     105       107     11     110     113       115     115     115     118       12     12     121     121       127     127     127     127       13     133     133     137       140     140     140     143       147     147     150     150       15     15     15     150     150       162     162     162     162       169     169     174       174     178     178     187       18     18     18     187     187       190     196     200     200       20     205     205       210     205     210				ance \	
102   105   105   107   110   110   110   113   115   115   115   124   127   127   127   130   133   133   137   140   140   143   147   147   150   154   158   160   162   162   165   169   169   174   178   178   178   181   181   182   187   196   196   196   200	E6	E12	E24	E48	E96
105   105     107   11   110   110     113   115   115   115     115   115   118   118     12   12   121   121     124   127   127   127     13   133   133   133     137   140   140   143     147   147   147   150     15   15   150   154   154     165   162   162   165     169   169   174   178   178     18   18   18   182   187   191     196   196   200   200   200   205   205	10	10	10	100	
11   110   110     11   115   115     115   115   118     12   12   121   121     12   127   127     13   130   133   133     137   140   140   143     147   147   147     15   15   150   154   158     16   162   162   165     169   169   174   178   178     18   18   18   182     187   187   191   196   196     20   200   200   200					102
11   110   110     115   115     118   118     12   12   121   121     127   127   127     13   133   133   133     137   140   140   143     147   147   147   154     15   15   150   154   154     16   162   162   165     169   169   174   178   178     18   18   18   182     187   191   196   196     20   200   200     205   205   205				105	105
12   12   12   115   115     12   12   121   121   124     127   127   127   127   130   133   133   133   133   137   140   140   140   143   147   147   147   150   154   154   158   16   162   162   165   165   169   169   174   178   178   187   191   196   196   200   200   205 <td></td> <td></td> <td></td> <td></td> <td>107</td>					107
12   12   12   121   121     12   121   121   124     127   127   130   133   133     133   133   137   140   140     140   140   143   147   147     15   15   15   150   154   158     16   162   162   165   169   169     169   169   174   178   178   187   187   191   196   196   200   200   205			11	110	110
12   12   12   121   121     124   127   127   127     13   133   133   133     137   140   140   143     147   147   147   150     15   15   15   150   154   154     162   162   165   169   169   174     18   18   18   187   187   191   196   196     20   205   205   205   205   205   205					113
12   12   121   121     124   127   127     127   127   130     133   133   133     137   140   140     143   147   147     15   15   15   150     154   154   158     16   162   162     165   169   169     174   178   178     18   18   187   187     196   196   200   200     20   205   205				115	115
121   121     124   127     127   127     13   130     133   133     137   140   140     143   147   147     15   15   150   154     16   162   162   165     169   169   174   178   178     18   18   187   187   191   196   196     20   205   205   205   205   205		12	12	-	118
13   127   127     13   133   133     137   140   140     143   147   147     15   15   15   150     16   162   162     169   169   174     174   178   178     18   18   187   187     191   196   196     20   205   205		12	12	121	121
13   130     133   133     137   140   140     143   147   147     15   15   15   150     16   162   162   165     169   169   174     174   178   178   187     187   187   191   196   196     20   205   205   205					124
133   133     140   140     143   147     147   147     15   15   150     16   162   162     169   169     174   178   178     18   18   187     187   191   196   196     20   205   205				127	127
137     140   140     143   147   147     15   15   150   150     154   154   158     16   162   162   165     169   169   174     174   178   178   182     187   187   191   196   196     20   205   205   205			13		130
140   140     143   147     15   15   150     154   154     158   16   162   162     165   169   169     174   178   178     18   18   187   187     191   196   196     20   205   205				133	133
15   15   15   150     15   15   154   154     16   162   162   165     169   169   174     174   178   178   182     187   187   191   196   196     20   205   205   205					137
15 15 15 150   154 154   16 162 162   169 169   174 178 178   18 18 187 187   191 196 196   20 205 205				140	140
15 15 15 150   154 154   158   16 162 162   169 169   174 178 178   18 18 187 187   191 196 196   20 200   205 205					143
16 154 154   16 162 162   169 169   174 178 178   18 18 187 187   191 196 196 200   20 205 205				147	147
16 158   16 162 162   165 169 174   178 178 178   18 18 187 187   191 196 196 200   20 205 205	15	15	15		150
16 162 162   165 169 169   174 178 178   18 18 182   187 187 191   196 196 200   20 205 205				154	154
162 162   165 169   169 174   178 178   18 18   187 187   191 196 196   20 200   205 205			16	-	158
169 169   174 178   18 18   187 187   191 196   20 200   205 205			10	162	162
18 18 18 178 178 182 187 191 196 196 200 200 205					165
18 18 18 188 182 187 187 191 196 196 200 200 205				169	169
18 18   187 187   191 196   20 200   205 205					174
182 187 187 191 196 196 200 200 205 205		18	18	178	178
191 196 196 200 205 205					182
20 200 205 205				187	187
20 200 200 205					191
205 205				196	196
			20	1	200
210				205	205
					210

E6	E12	E24	E40	EOG
E6	E12	E24	<b>E48</b> 215	<b>E96</b> 215
22	22	22	1 2.0	
				221
			226	226
				232
		24	237	237
				243
			249	249
				255
			261	261
	27	27	-	267
			274	274
				280
			287	287
				294
		30	301	301
				309
			316	316
33	33	33		324
			332	332
				340
			348	348
		36		357
			365	365
				374
	39	39	383	383
				392
			402	402
				412
		43	422	422
				432
			442	442
				453

E6	E12	E24	E48	E96
47	47	47	464	464
77	7,	-77		475
			487	487
				499
		51	511	511
				523
			536	536
				549
	56	56	562	562
				576
			590	590
				604
		62	619	619
				634
			649	649
				665
68	68	68	681	681
				698
			715	715
				732
		75	750	750
				768
			787	787
	82	82		806
			825	825
				845
			866	866
				887
		91	909	909
				931
			953	953
				976