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 %	$\sqrt[6]{10} \fallingdotseq 1.46$	
E12	±10 %	$\sqrt[12]{10} \fallingdotseq 1.21$	
E24	± 5 %	$\sqrt[24]{10} \fallingdotseq 1.10$	Please refer to standard resistance values shown on this catalog.
E48	± 2 %	$\sqrt[48]{10} \fallingdotseq 1.05$	
E96	± 1 %	$\sqrt[96]{10} \fallingdotseq 1.02$	

■ 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

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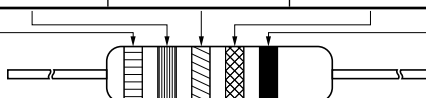
Tolerance Code	Tolerance (%)	Examples
W	±0.05	W1001 : 1000 Ω±0.05 %
B	±0.1	B1001 : 1000 Ω±0.1 %
C	±0.25	C1001 : 1000 Ω±0.25 %
D	±0.5	D1001 : 1000 Ω±0.5 %
F	±1	F1001 : 1000 Ω±1 %
G	±2	G1001 : 1000 Ω±2 %
J	±5	J101 : 100 Ω±5 %
K	±10	K101 : 100 Ω±10 %
M	±20	M101 : 100 Ω±20 %

■ 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	10^2	±2	G
Orange	3	3	3	10^3	±0.05	W
Yellow	4	4	4	10^4		
Green	5	5	5	10^5	±0.5	D
Blue	6	6	6	10^6	±0.25	C
Violet	7	7	7	10^7	±0.1	B
Gray	8	8	8			
White	9	9	9			
Gold				10^{-1}	±5	J
Silver				10^{-2}	±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.

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 1

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

Example 2

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

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■ Standard Resistance Values

E6	E12	E24	E48	E96
10	10	10	100	100
				102
			105	105
				107
		11	110	110
				113
			115	115
				118
	12	12	121	121
				124
			127	127
		13		130
			133	133
				137
			140	140
				143
			147	147
15	15	15		150
			154	154
				158
		16	162	162
				165
			169	169
				174
	18	18	178	178
				182
			187	187
				191
			196	196
		20		200
			205	205
				210

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

E6	E12	E24	E48	E96
			464	464
47	47	47		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
				806
	82	82	825	825
				845
			866	866
				887
		91	909	909
				931
			953	953
				976