



	1st Band	2nd Band	3rd Band Multiplier	4th Band Tolerance
Gold	–	–	÷10	5% tolerance
Silver	–	–	÷100	10% tolerance
Black	0	0		
Brown	1	1	0	1% tolerance
Red	2	2	00	
Orange	3	3	000	
Yellow	4	4	0000	
Green	5	5	00000	
Blue	6	6	000000	
Violet	7	7	0000000	
Grey	8	8		
White	9	9		

### Multiplication factors and symbols

M	mega	1 000 000	(10 <sup>6</sup> )
K	kilo	1 000	(10 <sup>3</sup> )
m	milli	0.001	(10 <sup>-3</sup> )
μ	micro	0.000 001	(10 <sup>-6</sup> )

### EXAMPLES



1K (1,000Ω) 5%



4R7 (4.7Ω) 5%



1M8 (1,800,000Ω) 5%

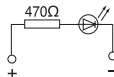


220K (220,000Ω) 5%

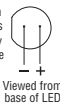
Resistor values for red LEDs assuming approximately 20mA is required

Suggested values for resistors when using LEDs with batteries or power supplies

Voltage	Value
3V	120Ω
5V	220Ω
9V	470Ω
12V	560Ω



Flat on body is usually cathode



# Capacitors

Capacitance (picofarad pf)
10
15
47
82
100
330
470
1000
1500
2200
4700
6800
10000
22000
47000
100000
220000
470000

Capacitance (picofarad nf)
0.01
0.015
0.047
0.082
0.1
0.33
0.47
1.0
1.5
2.2
4.7
6.8
10
22
47
100
220
470

Capacitance (picofarad $\mu$ f)
0.00047
0.001
0.0015
0.0022
0.0047
0.0068
0.01
0.022
0.047
0.1
0.22
0.47

Capacitance Code
100
150
470
820
101
331
471
102
152
222
472
682
103
223
473
104
224
474

Total of capacitors in series

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} \dots \text{etc.}$$

Total of capacitors in parallel

$$C_T = C_1 + C_2 + C_3 \dots \text{etc.}$$

First two digits  
significant figures  
– third digit is number  
of zeros