







Vote for me



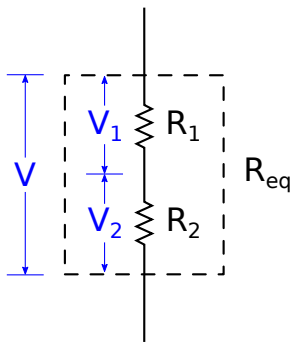




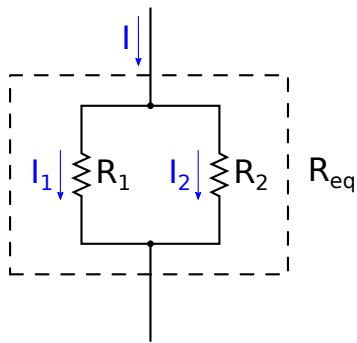




$$P_{\text{diss}} = I^2 R = \frac{V^2}{R}$$



Series
(a)



Parallel
(b)

Rea

Rep

→

R1

+

R2

+

R3

+

...

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

AR 1

AR 2

AR 3





R_1 V

 $R_1 + R_2$



R_2 V

 $R_1 + R_2$



R_2

1

R_1

+

R_2



$$R_1$$

$$1$$

$$R_1$$

$$+$$

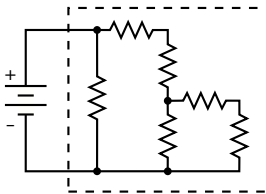
$$R_2$$



Pr1



















Σ v_i $=$ 0

loop

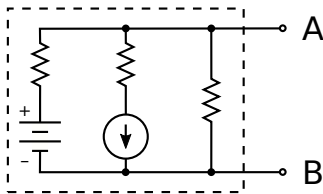


+	-
	
	

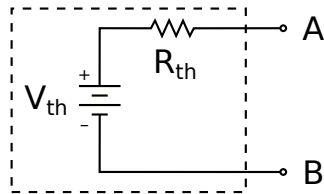
Σ

$$I_i = 0$$

junction



(a)



(b)























$$X_C = - \frac{j}{\omega C}$$







$$\operatorname{Re}(v e^{j(wt + \phi_v)}) = v \cos(wt + \phi_v)$$



$$\operatorname{Re}(e^{j\omega t + \phi_i}) = \cos(\omega t + \phi_i)$$









vejo



1990

Revised 1st

Realized

I

=

V

—

Z

PLEASE VISIT www.dod.gov

$$\langle P \rangle = \frac{N}{2} \cos(\phi_v - \phi_i) = \frac{\sqrt{2}}{2} \cos(\phi_v - \phi_i)$$

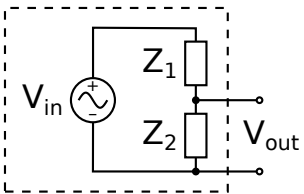
cos²(wt)











winning 1200



$$v_{\text{out}} = \frac{Z_2}{Z_1 + Z_2} v_{\text{in}}$$

v

out

$$V_{out} = \sqrt{V_{out} * V_{out}}$$



$$\tan \phi = \frac{\operatorname{Im} \left(\frac{Z_2}{Z_1 + Z_2} \right)}{\operatorname{Re} \left(\frac{Z_2}{Z_1 + Z_2} \right)}$$



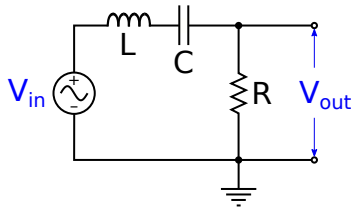
$$A_v = \frac{V_{out}}{V_{in}} = \frac{|V_{out}|}{|V_{in}|} = \left| \frac{Z_2}{Z_1 + Z_2} \right| = \sqrt{\left(\frac{Z_2}{Z_1 + Z_2} \right)^* \left(\frac{Z_2}{Z_1 + Z_2} \right)}$$



A_v

$=$

$\frac{1}{\sqrt{2}}$





$$Z_1 = j \left(\omega L - \frac{1}{\omega C} \right)$$

$$\frac{V_{out}}{V_{in}} = \sqrt{\frac{R^2}{R^2 + (\omega L - 1/\omega C)^2}}$$



$$\frac{Z_2}{Z_1 + Z_2} = \frac{R}{R + j\left(\omega L - \frac{1}{\omega C}\right)} = \frac{R^2 - jR\left(\omega L - \frac{1}{\omega C}\right)}{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

$$\tan \phi = \frac{\frac{1}{\omega C} - \omega L}{R}$$

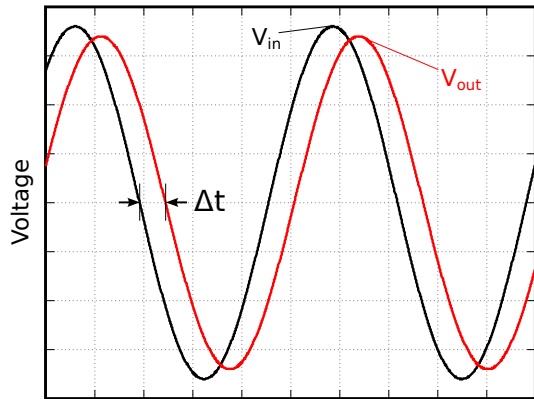
Vote for
the

Went to

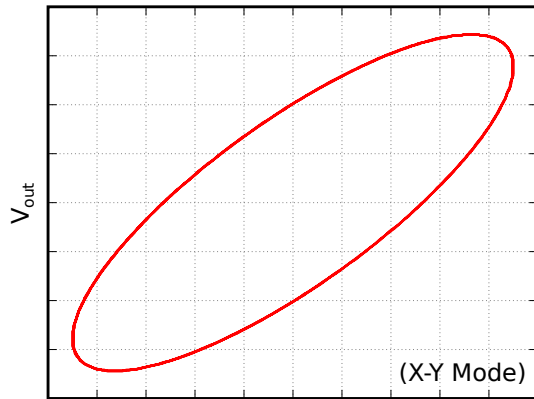


$$\Delta t = \frac{\phi}{\omega} = \frac{\phi}{2\pi f} = \frac{\phi}{2\pi} T$$

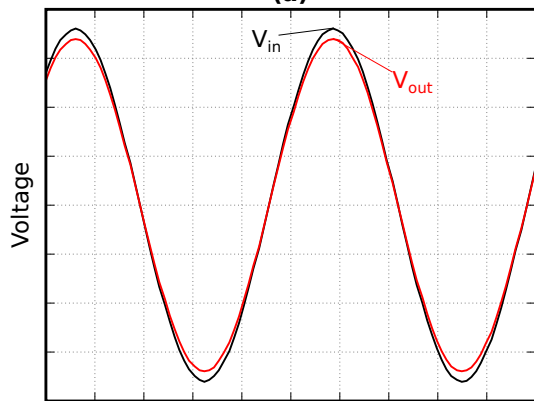




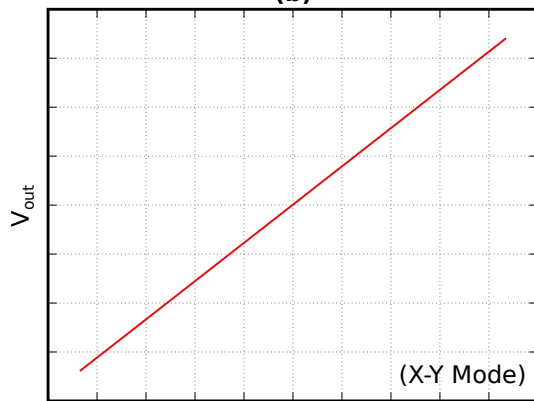
(a)



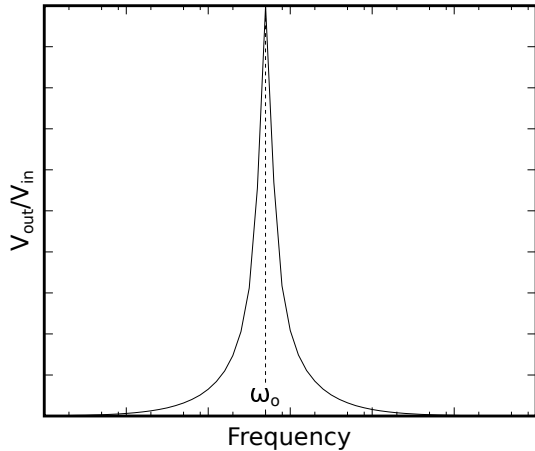
(b)



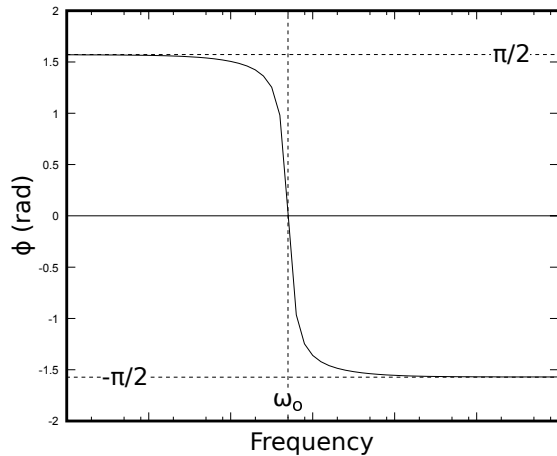
(c)



(d)



(a)



(b)

love

—

win





$$\omega_0 = \frac{1}{\sqrt{LC}}$$

love



A

v

=

v

o

v

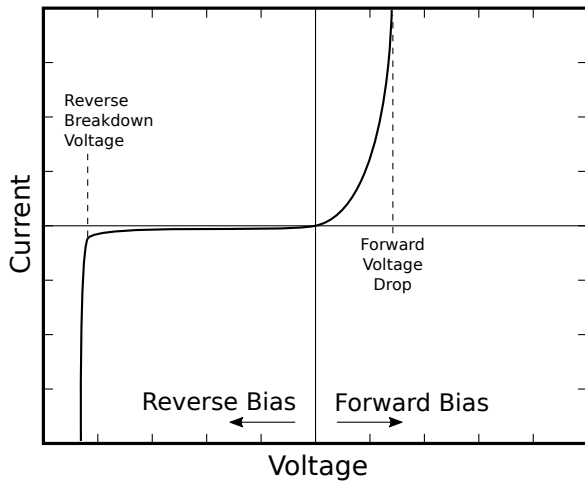
t

/

v

in





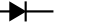


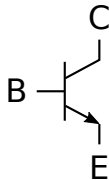
1

0

→

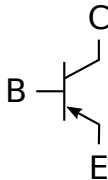
0





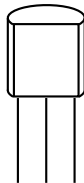
NPN

(a)



PNP

(b)



E B C

(c)



WBE

$$I_C = I_0 \left(e^{\frac{V_{BE}}{kT/e}} - 1 \right)$$



9

=

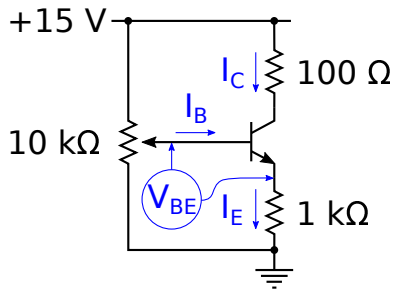
10

x

10 =

10

130x10-22







$$r_e = \frac{dV_{BE}}{dI_C} = \frac{kT/e}{I_C}$$

2522/2021

VE

WCE

se

0.

25





10

11

12

13





VERSES

10

11

12

13

h

FE

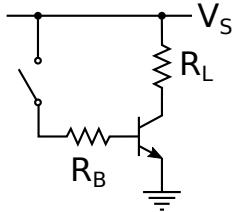
se

100

VERGE OF



re=2522/252m









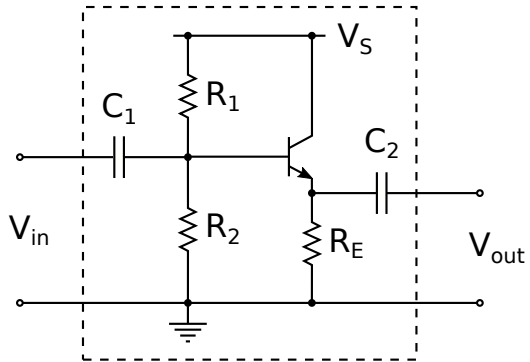




A large, pixelated black and white graphic of the number '10'. The '1' is on the left, composed of a thick vertical bar and a horizontal base. The '0' is on the right, a large circle with a thick border. The entire graphic has a low-resolution, dithered appearance.

A pixelated, black and white representation of the number 5. The digit is composed of a grid of black and gray pixels on a white background, giving it a blocky, digital appearance. The number 5 is positioned in the center of the image.

A pixelated, black and white graphic of the letters 'H' and 'E'. The 'H' is on the left, and the 'E' is on the right. Both letters are composed of a grid of black and white pixels, giving them a blocky, digital appearance. The 'H' has a vertical stem on the left and a horizontal bar that extends to the right. The 'E' has a vertical stem on the left and a horizontal bar that extends to the right, with a small gap in the middle of the horizontal bar. The overall style is reminiscent of early computer graphics or digital art.









AR 12

VB

es

VE

+

0

.

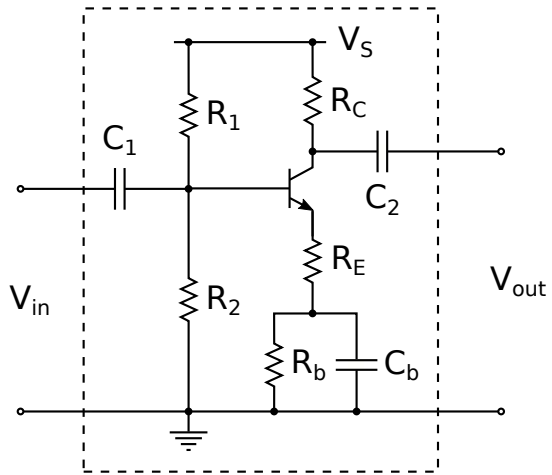
0

v

APPAREL

Q1





$$A_v = -\frac{R_C}{R_E}$$











Ab
10



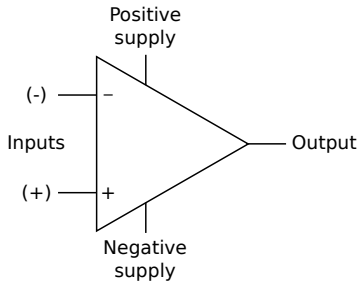
AR1|AR2|AR3|AR4|AR5|AR6|AR7|AR8|AR9|AR10

R1

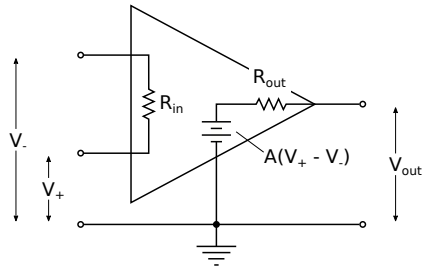
||

R2

REPAIR + REPAIR



(a)



(b)



A pixelated, black and white graphic of the letters 'V' and 'S'. The 'V' is on the left, and the 'S' is on the right. The letters are composed of a grid of black and white pixels, giving them a jagged, digital appearance. The 'V' is formed by a vertical line on the left and a diagonal line on the right. The 'S' is formed by a horizontal line at the top, a vertical line on the right, and a horizontal line at the bottom. The background is white.

A pixelated, black and white graphic of the letters 'V' and 'S'. The 'V' is on the left, and the 'S' is on the right. The letters are composed of a grid of black and white pixels, giving them a jagged, digital appearance. The 'V' is formed by a series of black pixels on a white background, with some gray pixels at the edges. The 'S' is similarly formed, with a thick black stroke and a white background. The overall style is reminiscent of early computer graphics or low-resolution digital art.

A pixelated, black and white graphic of the letters 'V' and 'S'. The 'V' is on the left, and the 'S' is on the right. The letters are composed of a grid of black and white pixels, giving them a jagged, digital appearance. The 'V' is formed by a vertical stroke on the left and a diagonal stroke on the right. The 'S' is formed by a horizontal stroke at the top, a curved stroke in the middle, and a horizontal stroke at the bottom. The overall style is reminiscent of early computer graphics or video game sprites.

The figure is a 15x15 grayscale heatmap. The x-axis is labeled 'x' and the y-axis is labeled 'y', both ranging from 0 to 14. The plot shows a strong diagonal band of high values (black) running from the bottom-left to the top-right. In the upper-right region, there is a triangular pattern of lower values (gray) that tapers off towards the top-right corner. The rest of the plot area is white, indicating zero values.

A 15x15 grayscale heatmap visualization. The x and y axes are both labeled from 1 to 15. The plot shows a strong diagonal pattern, with the highest values (black) concentrated along the main diagonal (where x=y). There is also a secondary, slightly offset band of high values, suggesting a correlation between adjacent indices. The off-diagonal elements are generally lighter gray, indicating lower values.

A pixelated, black and white graphic of the letters 'SE' in a stylized, blocky font. The letters are composed of a grid of black and white pixels, giving them a digital or retro aesthetic. The 'S' is on the left and the 'E' is on the right. The background is white.







Power

—

0



103

105



Pinpoint, Asport, Rort

vs + = vs = vs

+

+

+

+

+

+

+

+

+

+

1

2

3

4

5

6

7

8

9

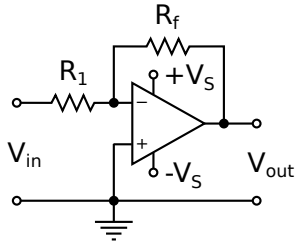
1

0

1

2

2





$$I = \frac{V_{in}}{R_1} = \frac{-V_{out}}{R_f}$$

$$A_v = -\frac{R_f}{R_1}$$

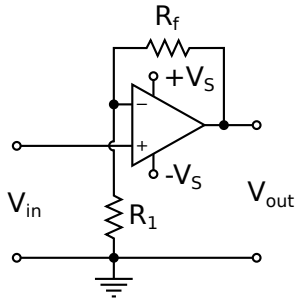
ROZ

||

RF

Rece

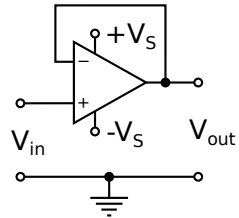




$$V_{in} = \frac{R_1}{R_1 + R_f} V_{out}$$

$$A_v = 1 + \frac{R_f}{R_1}$$

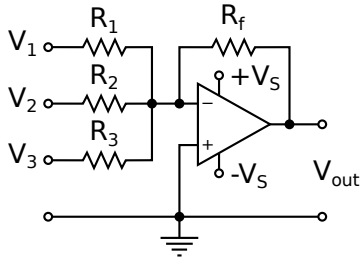
ARCADE + ARCADE











V1

R1

V2

R2



V3

R3



V_{out}



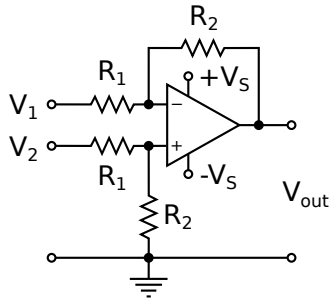
R_f



$$V_{out} = - \left(\frac{R_1}{R_f} V_1 + \frac{R_2}{R_f} V_2 + \frac{R_3}{R_f} V_3 \right)$$

Pr

Pr





V_1

—

V_2

R_1

V_2

$-$

V_+

R_1

$$V_{-} - V_{out}$$

$$R_2$$



V

+

—

R₂

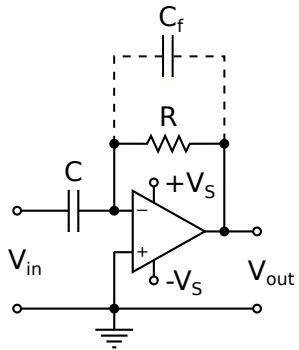
$$V_+ = \frac{R_2}{R_1 + R_2} V_2$$



$$v_{out} = -\frac{R_2}{R_1}(v_1 - v_2)$$











W

out

—

—

R

$$V_{in} = \frac{Q}{C}$$

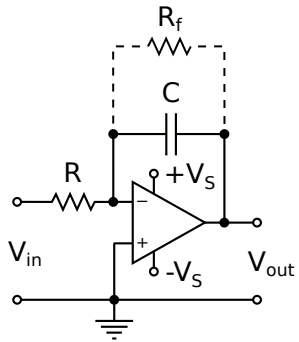
1

=

$\frac{dQ}{dt}$

$$V_{out} = -RC \frac{dV_{in}}{dt}$$





I

$=$

$$\frac{V_{in}}{R}$$

$$V_{out} = -\frac{Q}{C}$$



$$Q = \int dq = \frac{1}{R} \int v_{in} dt$$

$$V_{out} = -\frac{1}{RC} \int V_{in} dt$$



DC
Voltage
Source



Resistor



Capacitor



Inductor



DC
Current
Source



Potentiometer



Ground



Diode



AC
Source



NPN
Transistor



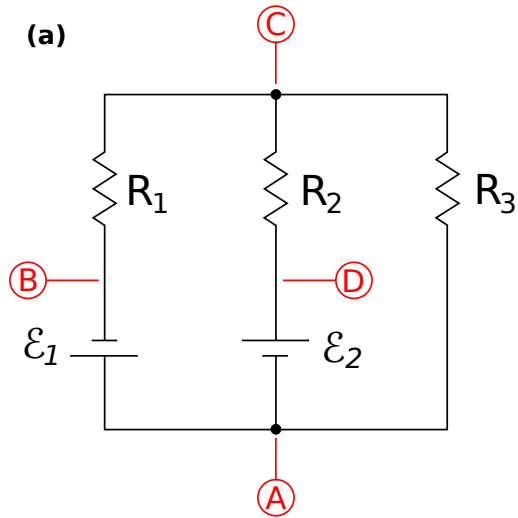
PNP
Transistor



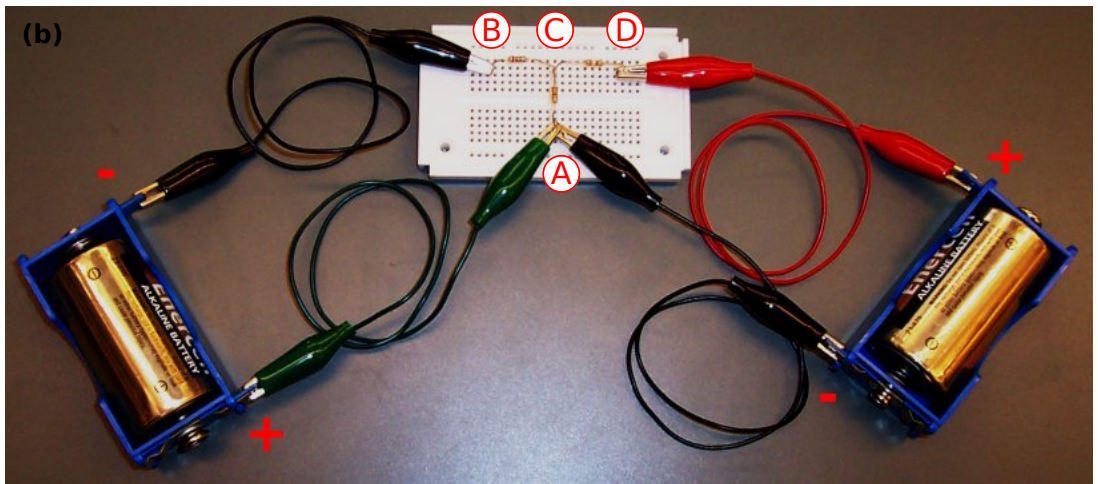
Op Amp

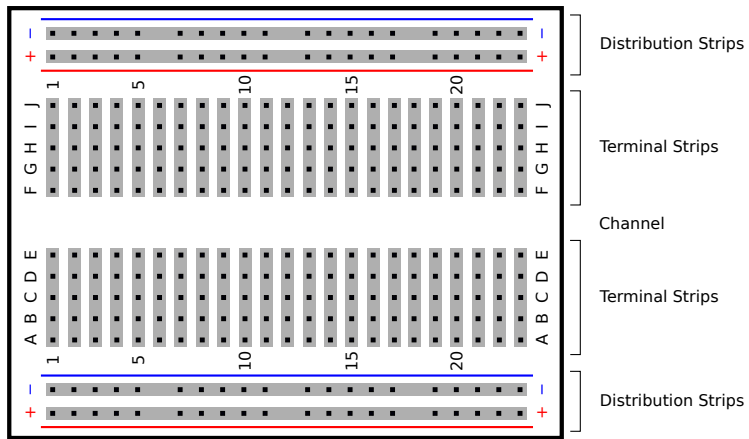


(a)



(b)



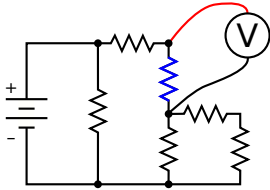


color	black	brown	red	orange	yellow	green	blue	violet	gray	white
digit	0	1	2	3	4	5	6	7	8	9
multiplier	1	10	100	1k	10k	100k	1M	10M	100M	1000M

$$R = [\text{band1}][\text{band2}] \times 10^{[\text{band3}]} \quad \begin{array}{l} \pm 5\% \text{ (gold)} \\ \pm 10\% \text{ (silver)} \end{array}$$

$$A \equiv 64 \times 10^2 \quad 2 \equiv 64 \times 100 \quad 2 \equiv 6400 \quad 2$$

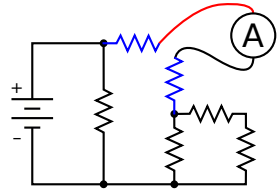
13202



(a)



(b)



(c)

T n n n n e 1

T H N E S

$$dB = 10 \log \left(\frac{\text{Thing}_2}{\text{Thing}_1} \right)$$

Thinner

100

Thinning 1

1

0

—

1

2



$$10 \log \left(\frac{P_{out}}{P_{in}} \right) = 10 \log \left(\frac{1}{2} \right) = 10(-0.3010) = -3.01$$

W W W W W

1

2

3

4