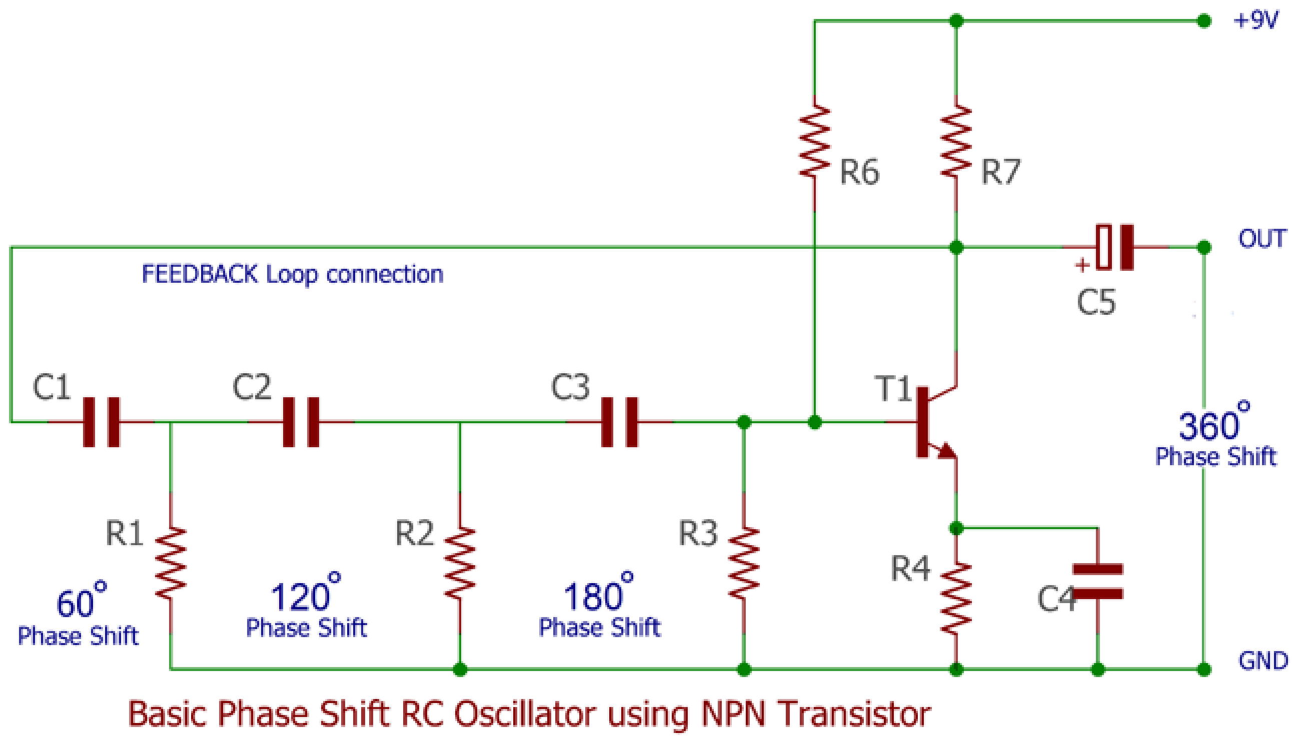
Oscilador por deslocamento de fase.

F540

Oscilador por deslocamento de fase. Transistor



Físico alemão Heinrich Georg **Barkhausen** (1881–1956)

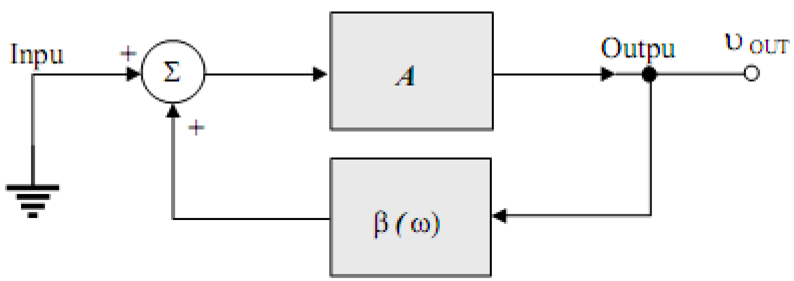
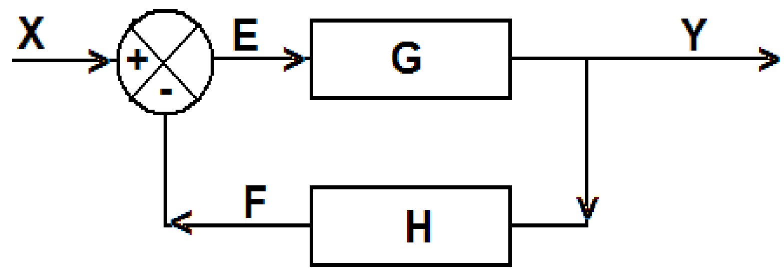


Figure . The block diagram of a phase shift oscillator



$$T = GH = -1$$

$$Y = \frac{G}{1+GH}X$$

Condiçoes de Barkhausen para um oscilador oscilar:

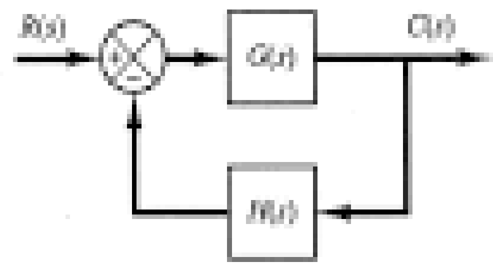
Modulo de T=1

Fase de T= 180º

Equaçao caracteristica

Considere o sistema mostrado na Figura. A função de transferência de malha fechada é:

$$\frac{C(s)}{R(s)} = \frac{G(s)}{1 + G(s)H(s)}$$



A equação característica desse sistema de malha fechada é obtida igualando a zero o denominador do lado direito da Equação. Ou seja,

$$1 + G(s)H(s) = 0 \qquad \text{ou} \qquad G(s)H(s) = -1$$

Condição angular: $\underline{/G(s)H(s)} = \pm 180^\circ(2k + 1) \qquad (k = 0, 1, 2, \dots)$

Condição de módulo: $|G(s)H(s)| = 1$

Por exemplo, se $G(s)H(s)$ for dado por:

$$G(s)H(s) = \frac{K(s+z_1)}{(s+p_1)(s+p_2)(s+p_3)(s+p_4)}$$

onde $-p_2$ e $-p_3$ são pólos complexos conjugados

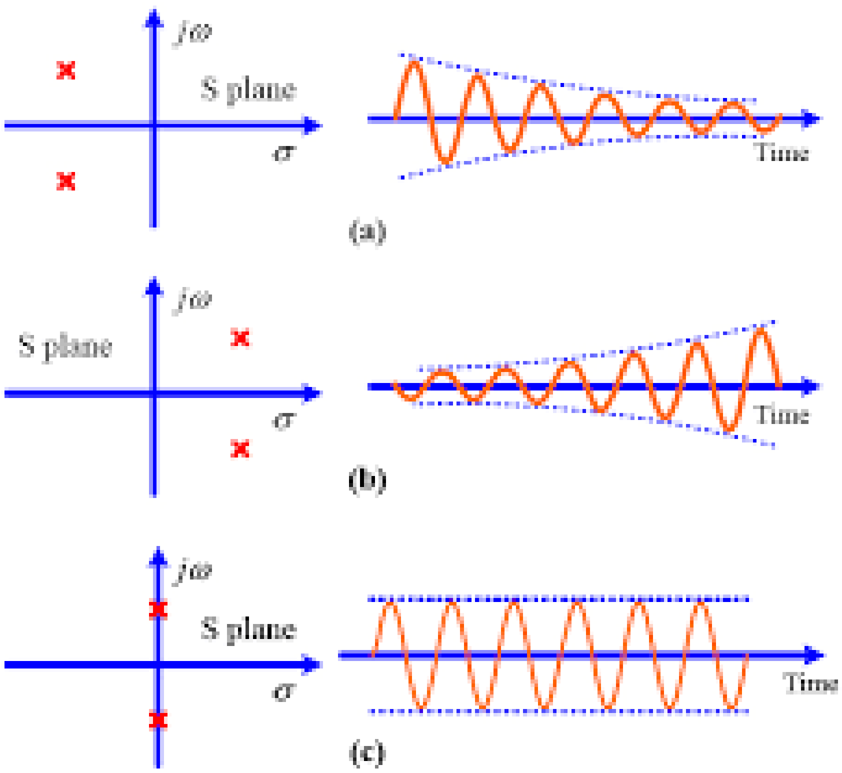
então o ângulo de $G(s)H(s)$ será: $\underline{/G(s)H(s)} = \phi_1 - \theta_1 - \theta_2 - \theta_3 - \theta_4$

onde $\phi_1, \theta_1, \theta_2, \theta_3$ e θ_4 são medidos no sentido anti-horário

O módulo de $G(s)H(s)$ para esse sistema é: $|G(s)H(s)| = \dfrac{KB_1}{A_1 A_2 A_3 A_4}$

onde A_1, A_2, A_3, A_4 e B_1 são os módulos das grandezas complexas $s + p_1, s + p_2, s + p_3, s + p_4$ e $s + z_1$, respectivamente

Resposta do sistema realimentado



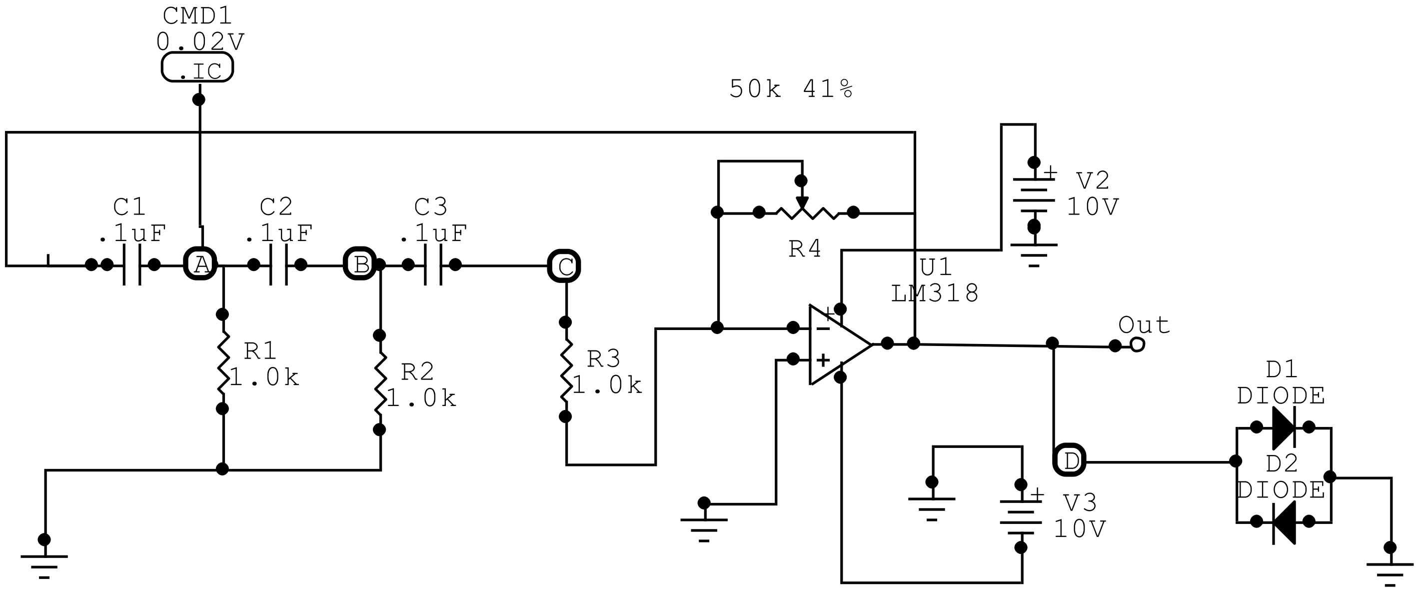
$$S = \sigma + j\omega t$$

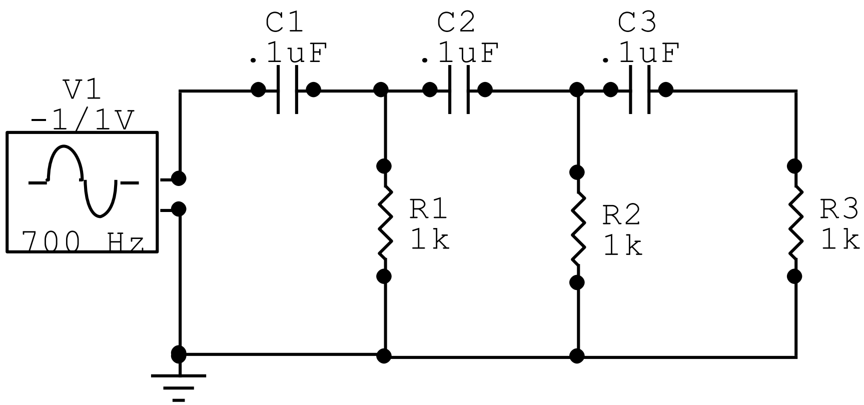
$$C(s) = \frac{K}{s^2 + ps + K} \cdot R(s)$$

$$(s + s_1)(s + s_2)$$

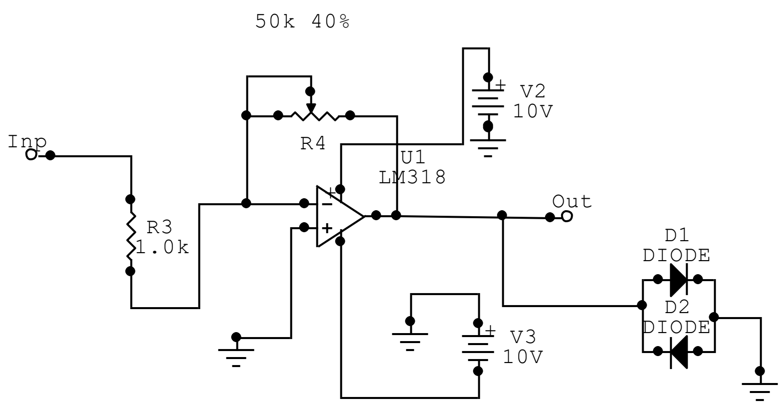
F(t)= K (e^{st}+ e^{-st})

Oscilador com opAmp

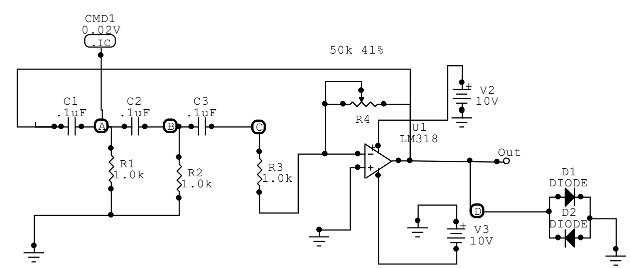




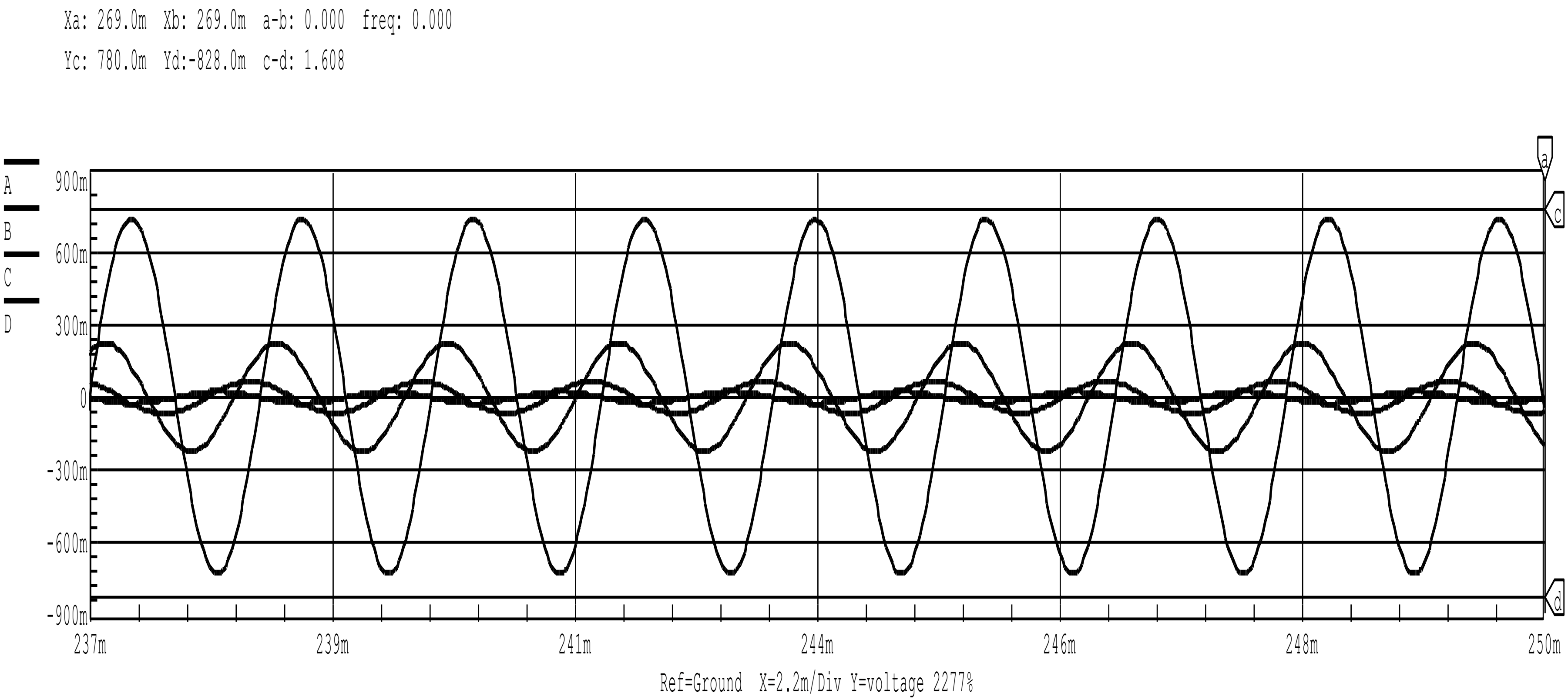
C1
.1uF
C2
.1uF
C3
.1uF
V1
-1/1V
700 Hz
R1
1k
R2
1k
R3
1k



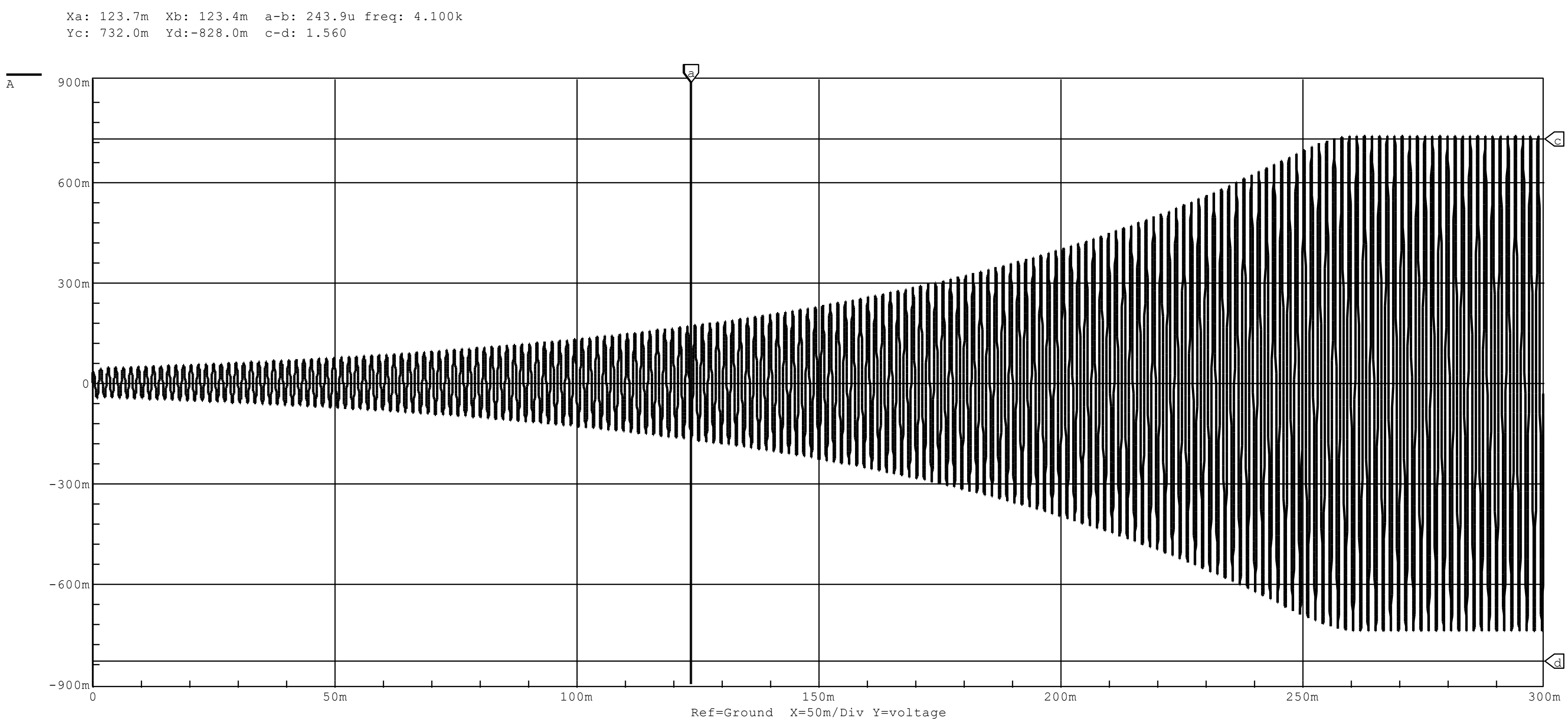
50k 40%
Inp
R3
1.0k
R4
U1
LM318
V2
10V
V3
10V
Out
D1
DIODE
D2
DIODE



CMD1
0.02V
50k 41%
C1
.1uF
C2
.1uF
C3
.1uF
R1
1.0k
R2
1.0k
R3
1.0k
R4
U1
LM318
V2
10V
V3
10V
Out
D1
DIODE
D2
DIODE

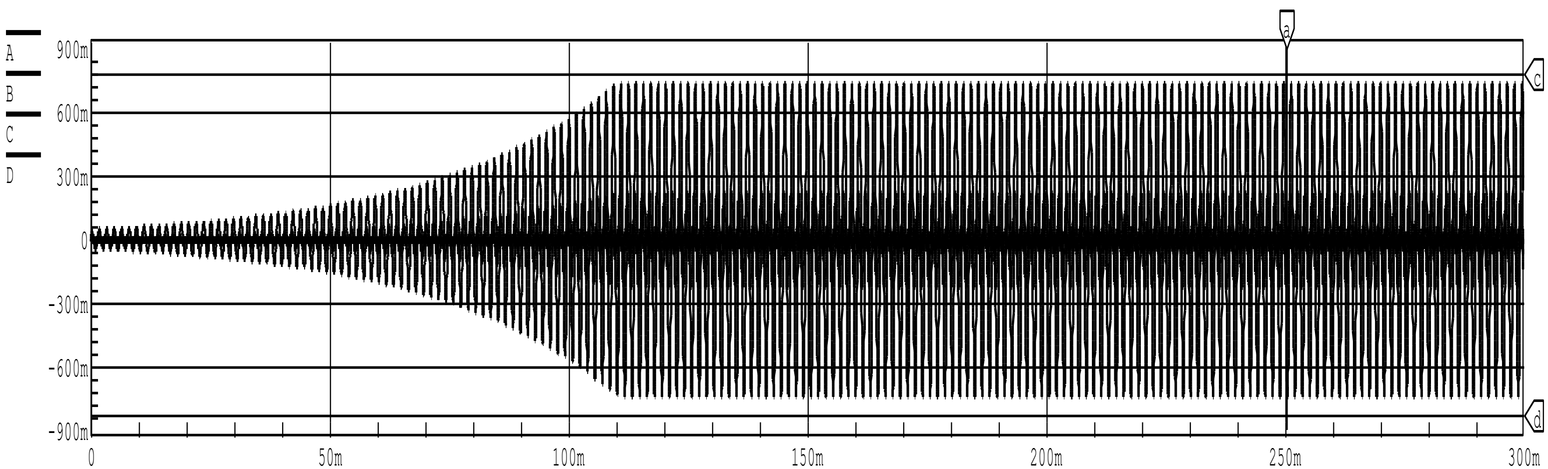


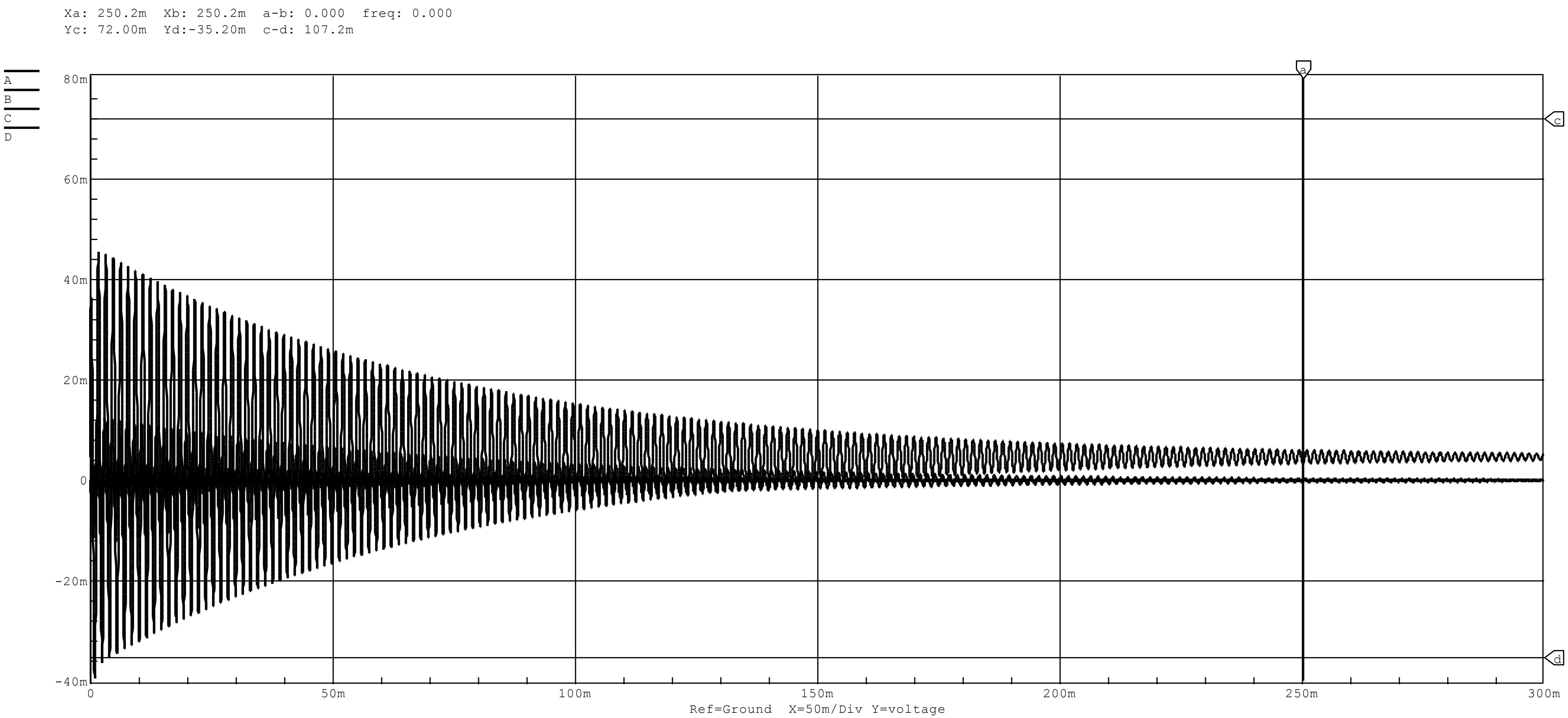
Xa: 269.0m Xb: 269.0m a-b: 0.000 freq: 0.000
Yc: 780.0m Yd:-828.0m c-d: 1.608
A
B
C
D
900m
600m
300m
0
-300m
-600m
-900m
237m
239m
241m
244m
246m
248m
250m
a
c
d
Ref=Ground X=2.2m/Div Y=voltage 2277%



Xa: 123.7m Xb: 123.4m a-b: 243.9u freq: 4.100k
Yc: 732.0m Yd:-828.0m c-d: 1.560
A
900m
600m
300m
0
-300m
-600m
-900m
0
50m
100m
150m
200m
250m
300m
a
c
d
Ref=Ground X=50m/Div Y=voltage

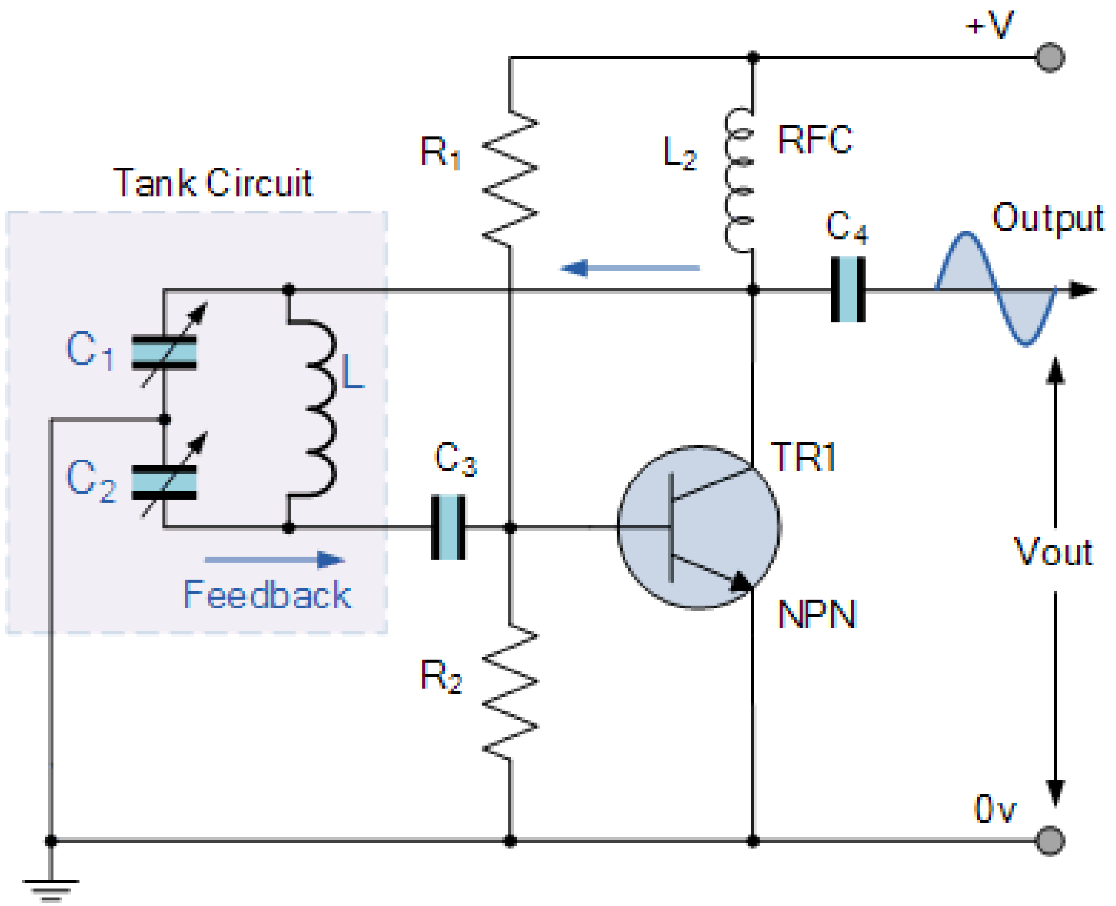
Xa: 250.2m Xb: 250.2m a-b: 0.000 freq: 0.000
Yc: 780.0m Yd:-828.0m c-d: 1.608





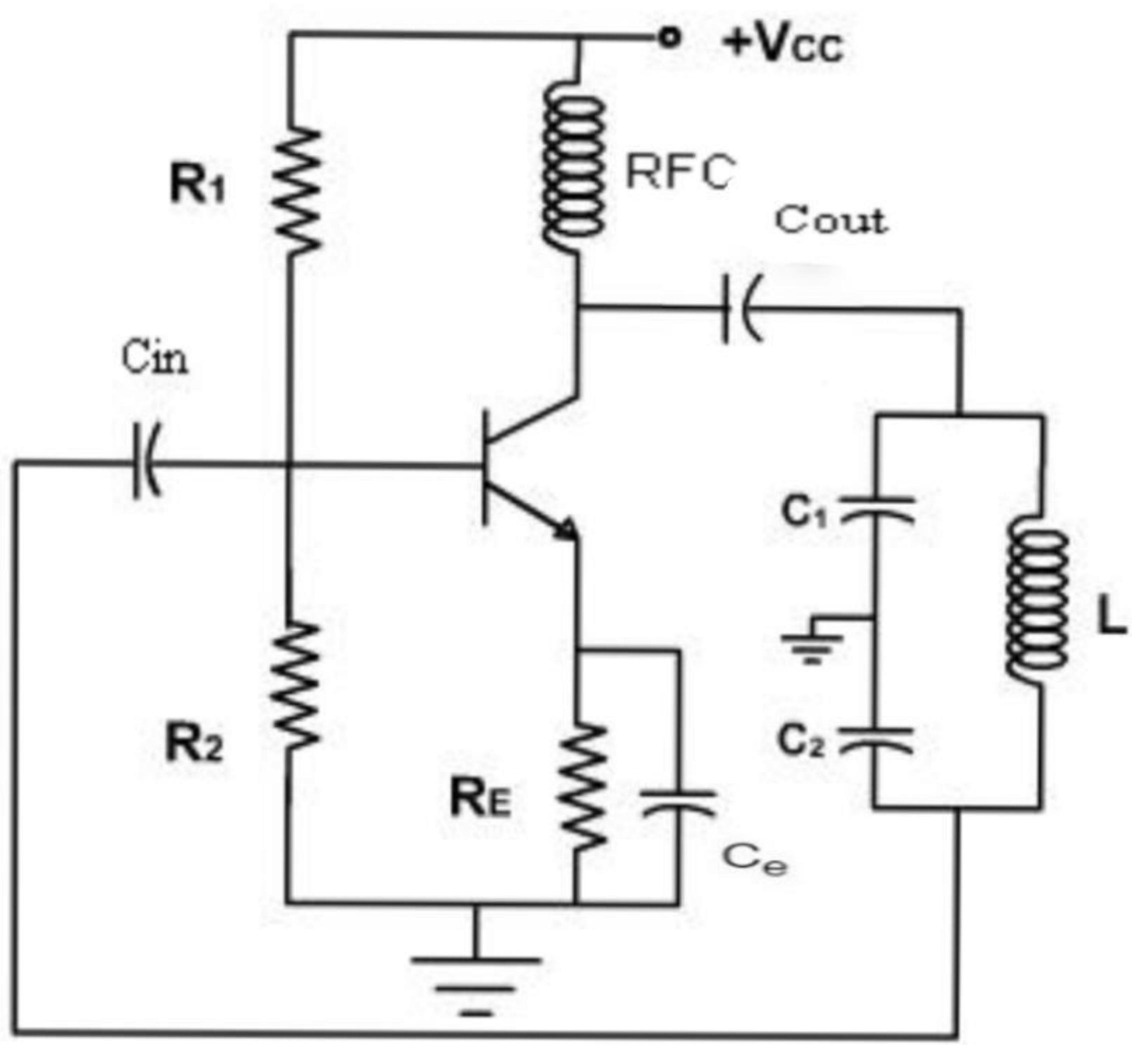
Xa: 250.2m Xb: 250.2m a-b: 0.000 freq: 0.000
Yc: 72.00m Yd:-35.20m c-d: 107.2m
A
B
C
D
80m
60m
40m
20m
0
-20m
-40m
0
50m
100m
150m
200m
250m
300m
a
c
d
Ref=Ground X=50m/Div Y=voltage

Colpitts

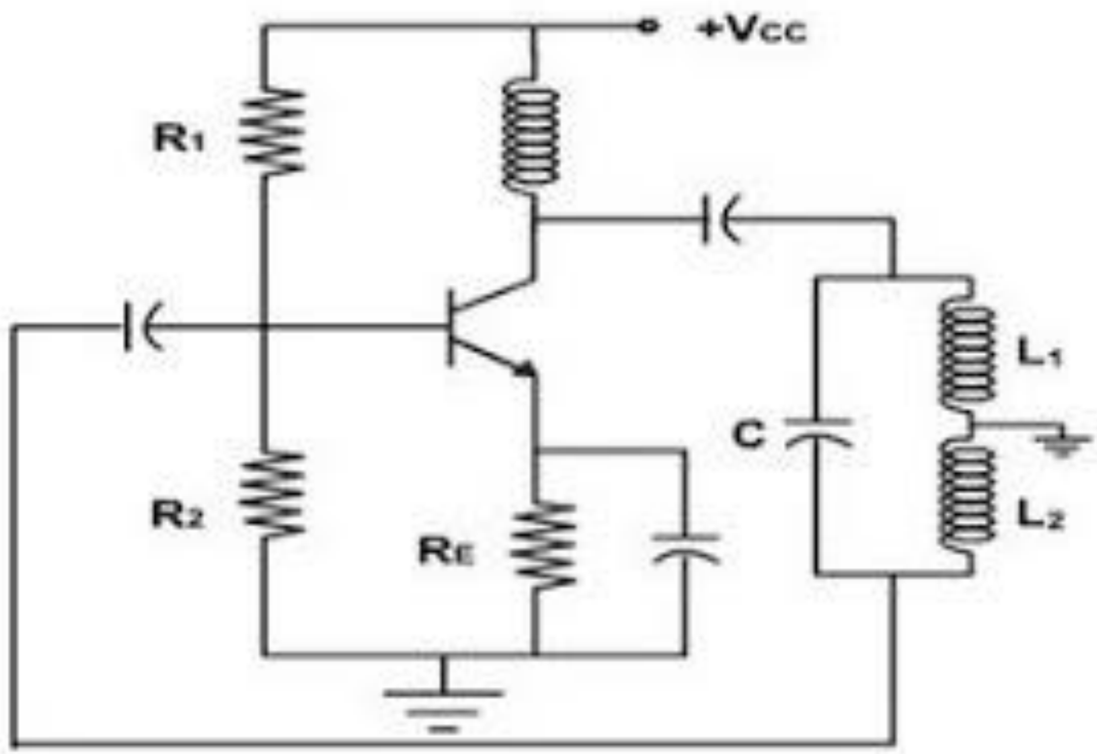


+V
Tank Circuit
R1
L2
RFC
C4
Output
C1
L
C2
C3
TR1
Feedback
NPN
Vout
R2
0v

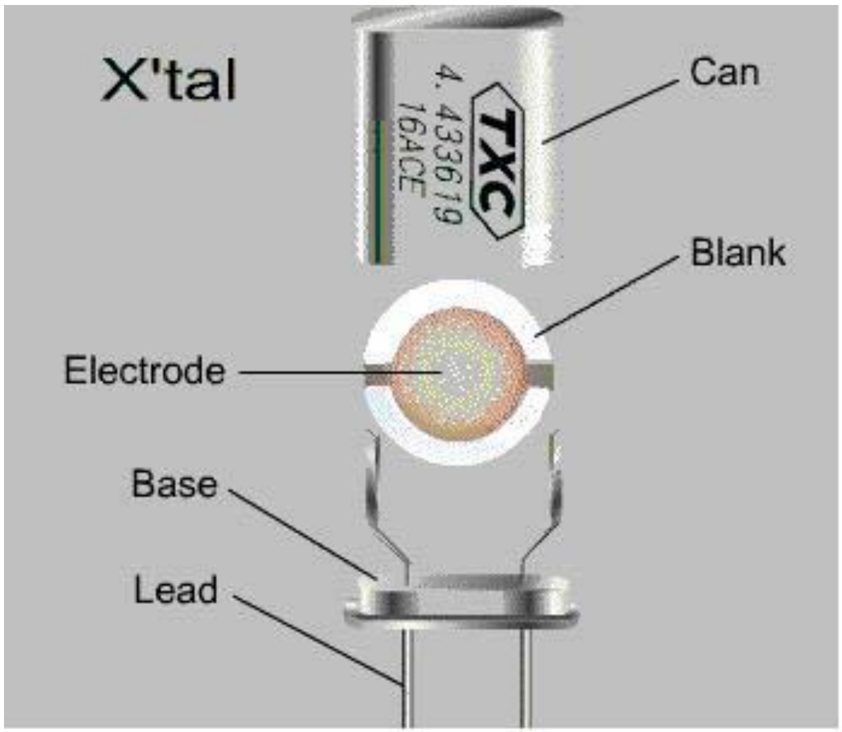
Colpitts

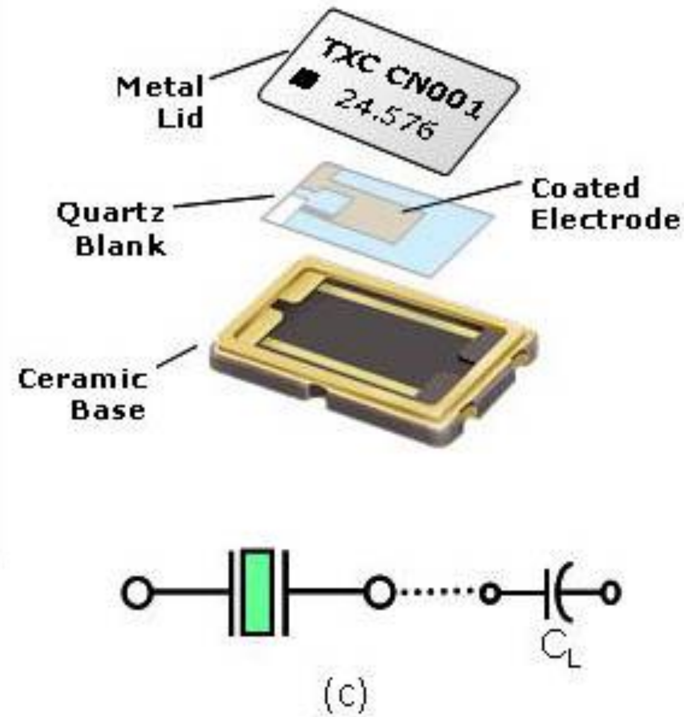


Hartley



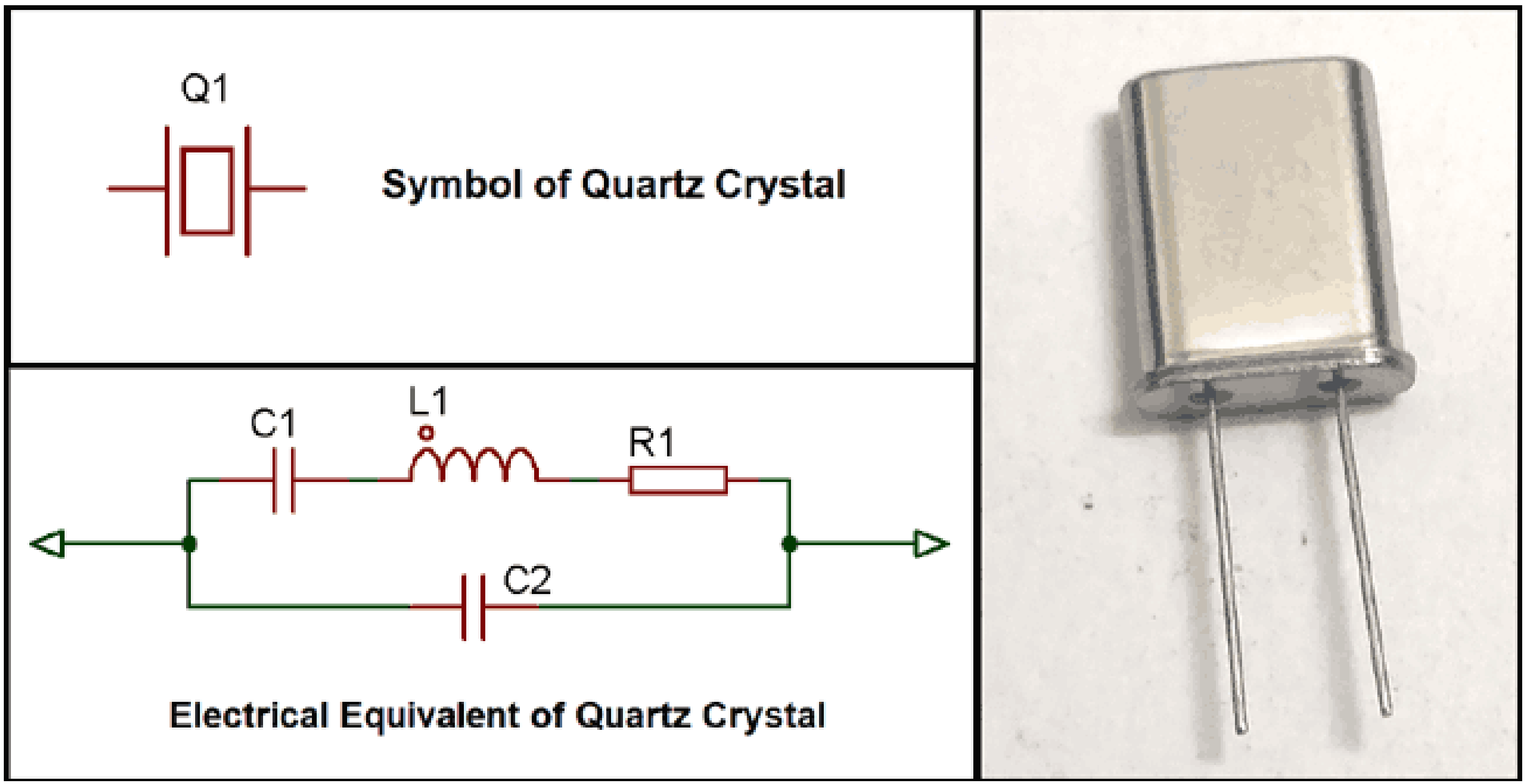
Radio oscillators (Quartz Crystal)



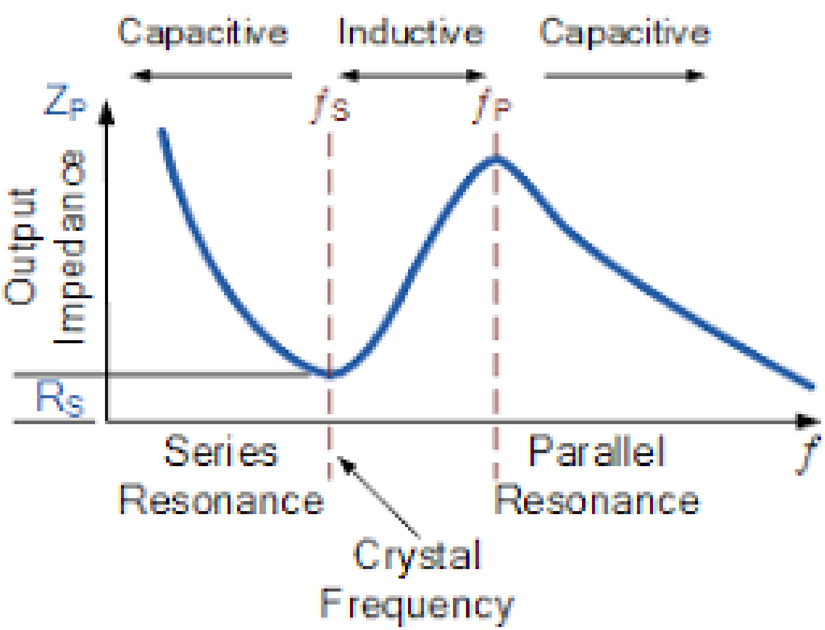


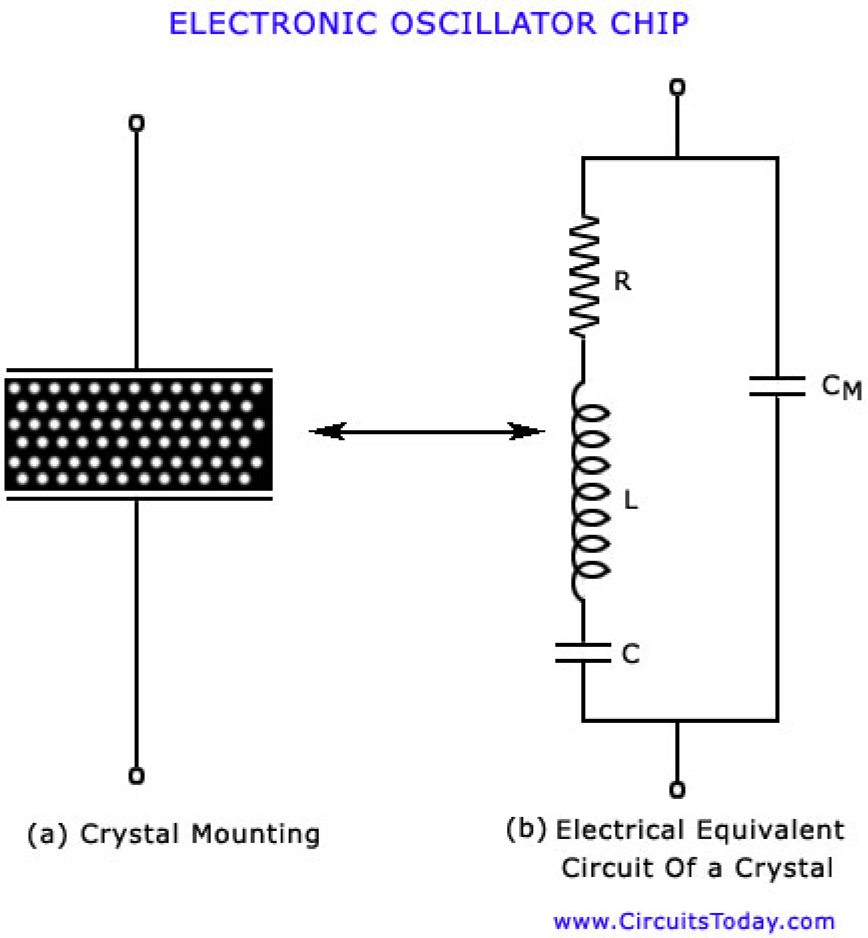
(Fig.7) (a) Metal can type resonator
(b) Ceramic SMD type resonator
(c) Symbol of crystal unit

Quartz Crystal

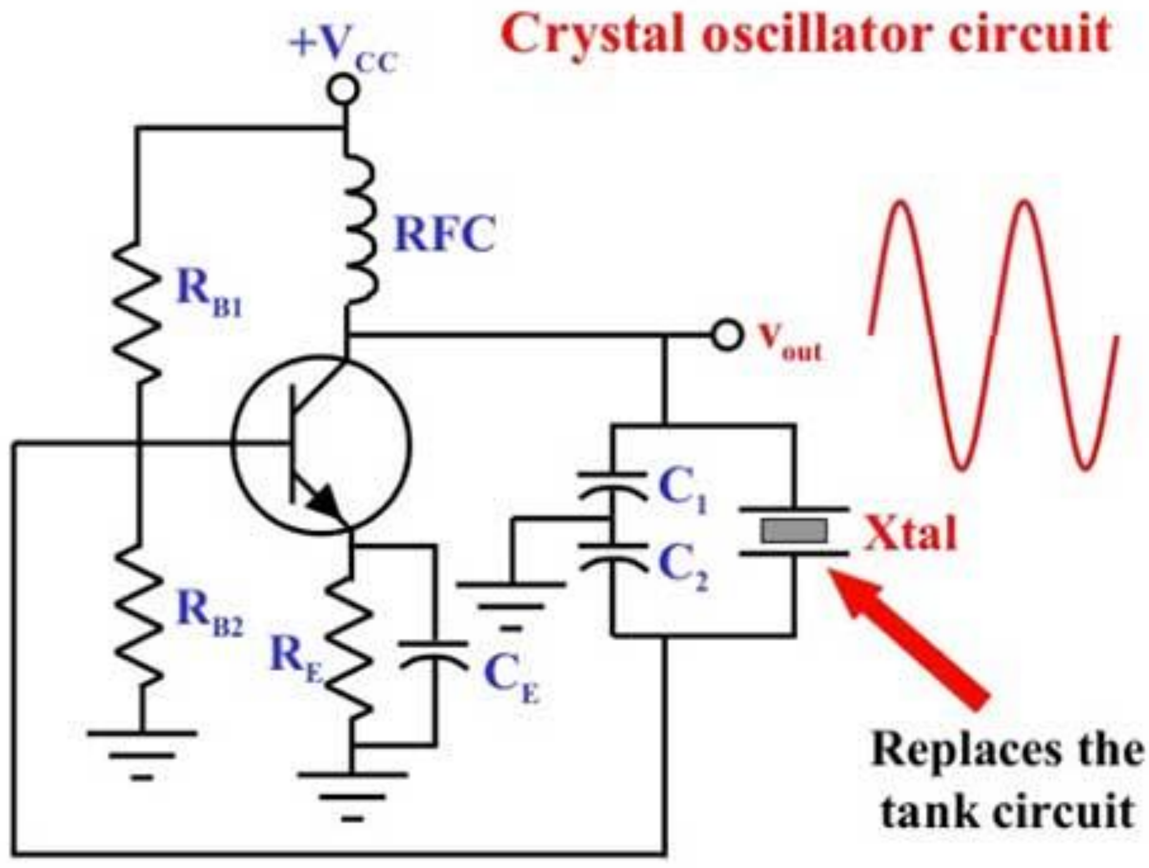


Analog circuit- Impedance curve.





Colpitts crystal oscillator



Fim