Experiment: TIA simple Z1 ZL

Filter 1

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_L R_L g_m}{R_1 g_m + 1}$

Filter 2

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{1}{C_L s}\right)$

$H(s)$: $\frac{R_1 g_m}{C_L s (R_1 g_m + 1)}$

Filter 3

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

$H(s)$: $\frac{R_1 R_L g_m}{(R_1 g_m + 1)(C_L R_L s + 1)}$

Filter 4

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{R_1 g_m (C_L R_L s + 1)}{C_L s (R_1 g_m + 1)}$

Filter 5

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{R_1 g_m (C_L L_L s^2 + 1)}{C_L s (R_1 g_m + 1)}$

Filter 6

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$H(s)$: $\frac{L_L R_1 g_m s}{(R_1 g_m + 1)(C_L L_L s^2 + 1)}$

Filter 7

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{R_1 g_m (C_L L_L s^2 + C_L R_L s + 1)}{C_L s (R_1 g_m + 1)}$

Filter 8

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$H(s)$: $\frac{L_L R_1 R_L g_m s}{(R_1 g_m + 1)(C_L L_L R_L s^2 + L_L s + R_L)}$

Q: $C_L R_L \sqrt{\frac{1}{C_L L_L}}$

ω_0: $\sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{1}{C_L R_L}$

Filter 9

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$H(s)$: $\frac{R_1 g_m (C_L L_L R_L s^2 + L_L s + R_L)}{(R_1 g_m + 1)(C_L L_L s^2 + 1)}$

Filter 10

Filter Type: BS

$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$H(s)$: $\frac{R_1 R_L g_m (C_L L_L s^2 + 1)}{(R_1 g_m + 1)(C_L L_L s^2 + C_L R_L s + 1)}$

Q: $\frac{L_L \sqrt{\frac{1}{C_L L_L}}}{R_L}$

ω_0: $\sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{R_L}{L_L}$

Filter 11

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ R_L\right)$

$H(s)$: $\frac{L_1 R_L g_m s}{L_1 g_m s + 1}$

Filter 12

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m}{C_L (L_1 g_m s + 1)}$

Filter 13

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

$H(s)$: $\frac{L_1 R_L g_m s}{(C_L R_L s + 1)(L_1 g_m s + 1)}$

Q: $\frac{C_L L_1 R_L g_m \sqrt{\frac{1}{C_L L_1 R_L g_m}}}{C_L R_L + L_1 g_m}$

ω_0: $\sqrt{\frac{1}{C_L L_1 R_L g_m}}$

Bandwidth: $\frac{C_L R_L + L_1 g_m}{C_L L_1 R_L g_m}$

Filter 14

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m (C_L R_L s + 1)}{C_L (L_1 g_m s + 1)}$

Filter 15

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m (C_L L_L s^2 + 1)}{C_L (L_1 g_m s + 1)}$

Filter 16

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_L s},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$H(s)$: $\frac{L_L L_L g_m s^2}{(C_L L_L s^2 + 1)(L_L g_m s + 1)}$

Q: $\frac{C_L L_L \sqrt{\frac{1}{C_L L_L}}}{L_L g_m}$

ω_0: $\sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{L_L g_m}{C_L L_L}$

Filter 17

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_L s},\ \infty,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_L g_m \left(C_L L_L s^2 + C_L R_L s + 1\right)}{C_L (L_L g_m s + 1)}$

Filter 18

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_L s},\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{C_L s}}}\right)$

$H(s)$: $\frac{L_L L_L R_L g_m s^2}{(L_L g_m s + 1)(C_L L_L R_L s^2 + L_L s + R_L)}$

Q: $\frac{L_L \sqrt{\frac{R_L}{L_L (C_L R_L + L_L g_m)}}(C_L R_L + L_L g_m)}{L_L R_L g_m + L_L}$

ω_0: $\sqrt{\frac{R_L}{L_L (C_L R_L + L_L g_m)}}$

Bandwidth: $\frac{L_L R_L g_m + L_L}{L_L (C_L R_L + L_L g_m)}$

Filter 19

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_L s},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$H(s)$: $\frac{L_L g_m s \left(C_L L_L R_L s^2 + L_L s + R_L\right)}{(C_L L_L s^2 + 1)(L_L g_m s + 1)}$

Filter 20

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_L s},\ \infty,\ \infty,\ \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$H(s)$: $\frac{L_L R_L g_m s \left(C_L L_L s^2 + 1\right)}{(L_L g_m s + 1)(C_L L_L s^2 + C_L R_L s + 1)}$

Filter 21

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_L g_m}{C_1 s + g_m}$

Filter 22

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m}{C_L s (C_1 s + g_m)}$

Filter 23

Filter Type: LP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

$H(s)$: $\frac{R_L g_m}{(C_1 s + g_m)(C_L R_L s + 1)}$

Q: $\frac{C_1 C_L R_L \sqrt{\frac{g_m}{C_1 C_L R_L}}}{C_1 + C_L R_L g_m}$

ω_0: $\sqrt{\frac{g_m}{C_1 C_L R_L}}$

Bandwidth: $\frac{C_1 + C_L R_L g_m}{C_1 C_L R_L}$

Filter 24

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m (C_L R_L s + 1)}{C_L s (C_1 s + g_m)}$

Filter 25

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m \left(C_L L_L s^2 + 1\right)}{C_L s (C_1 s + g_m)}$

Filter 26

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$H(s)$: $\frac{L_L g_m s}{(C_1 s + g_m)(C_L L_L s^2 + 1)}$

Q: $\frac{C_L L_L g_m \sqrt{\frac{1}{C_L L_L}}}{C_1}$

ω_0: $\sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{C_1}{C_L L_L g_m}$

Filter 27

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m \left(C_L L_L s^2 + C_L R_L s + 1\right)}{C_L s (C_1 s + g_m)}$

Filter 28

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{C_L s}}}\right)$

$H(s)$: $\frac{L_L R_L g_m s}{(C_1 s + g_m)(C_L L_L R_L s^2 + L_L s + R_L)}$

Q: $\frac{L_L \sqrt{\frac{R_L g_m}{L_L (C_1 + C_L R_L g_m)}}(C_1 + C_L R_L g_m)}{C_1 R_L + L_L g_m}$

ω_0: $\sqrt{\frac{R_L g_m}{L_L (C_1 + C_L R_L g_m)}}$

Bandwidth: $\frac{C_1 R_L + L_L g_m}{L_L (C_1 + C_L R_L g_m)}$

Filter 29

Filter Type: GE

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

$H(s)$: $\frac{g_m\left(C_LL_LR_Ls^2+L_Ls+R_L\right)}{(C_1s+g_m)(C_LL_Ls^2+1)}$

Q: $\frac{C_LL_Lg_m\sqrt{\frac{1}{C_LL_L}}}{C_1}$

ω_0: $\sqrt{\frac{1}{C_LL_L}}$

Bandwidth: $\frac{C_1}{C_LL_Lg_m}$

Qz: $C_LR_L\sqrt{\frac{1}{C_LL_L}}$

Filter 30

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{R_Lg_m(C_LL_Ls^2+1)}{(C_1s+g_m)(C_LL_Ls^2+C_LR_Ls+1)}$

Filter 31

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_1R_Lg_m}{C_1R_1s+R_1g_m+1}$

Filter 32

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m}{C_Ls(C_1R_1s+R_1g_m+1)}$

Filter 33

Filter Type: LP

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{R_L}{C_LR_Ls+1}\right)$

$H(s)$: $\frac{R_1R_Lg_m}{(C_LR_Ls+1)(C_1R_1s+R_1g_m+1)}$

Q: $\frac{C_1C_LR_1R_L\sqrt{\frac{R_1g_m+1}{C_1C_LR_1R_L}}}{C_1R_1+C_LR_1R_Lg_m+C_LR_L}$

ω_0: $\sqrt{\frac{R_1g_m+1}{C_1C_LR_1R_L}}$

Bandwidth: $\frac{C_1R_1+C_LR_1R_Lg_m+C_LR_L}{C_1C_LR_1R_L}$

Filter 34

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ R_L+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m(C_LR_Ls+1)}{C_Ls(C_1R_1s+R_1g_m+1)}$

Filter 35

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ L_Ls+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m(C_LL_Ls^2+1)}{C_Ls(C_1R_1s+R_1g_m+1)}$

Filter 36

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}\right)$

$H(s)$: $\frac{L_LR_1g_ms}{(C_LL_Ls^2+1)(C_1R_1s+R_1g_m+1)}$

Q: $\frac{C_LL_L\sqrt{\frac{1}{C_LL_L}}(R_1g_m+1)}{C_1R_1}$

ω_0: $\sqrt{\frac{1}{C_LL_L}}$

Bandwidth: $\frac{C_1R_1}{C_LL_L(R_1g_m+1)}$

Filter 37

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ L_Ls+R_L+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m(C_LL_Ls^2+C_LR_Ls+1)}{C_Ls(C_1R_1s+R_1g_m+1)}$

Filter 38

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

$H(s)$: $\frac{L_LR_1R_Lg_ms}{(C_1R_1s+R_1g_m+1)(C_LL_LR_Ls^2+L_Ls+R_L)}$

Q: $\frac{L_L\sqrt{\frac{R_L(R_1g_m+1)}{L_L(C_1R_1+C_LR_1R_Lg_m+C_LR_L)}}(C_1R_1+C_LR_1R_Lg_m+C_LR_L)}{C_1R_1R_L+L_LR_1g_m+L_L}$

ω_0: $\sqrt{\frac{R_L(R_1g_m+1)}{L_L(C_1R_1+C_LR_1R_Lg_m+C_LR_L)}}$

Bandwidth: $\frac{C_1R_1R_L+L_LR_1g_m+L_L}{L_L(C_1R_1+C_LR_1R_Lg_m+C_LR_L)}$

Filter 39

Filter Type: GE

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

$H(s)$: $\frac{R_1g_m(C_LL_LR_Ls^2+L_Ls+R_L)}{(C_LL_Ls^2+1)(C_1R_1s+R_1g_m+1)}$

Q: $\frac{C_LL_L\sqrt{\frac{1}{C_LL_L}}(R_1g_m+1)}{C_1R_1}$

ω_0: $\sqrt{\frac{1}{C_LL_L}}$

Bandwidth: $\frac{C_1R_1}{C_LL_L(R_1g_m+1)}$

Qz: $C_LR_L\sqrt{\frac{1}{C_LL_L}}$

Filter 40

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \infty,\ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{R_1R_Lg_m(C_LL_Ls^2+1)}{(C_1R_1s+R_1g_m+1)(C_LL_Ls^2+C_LR_Ls+1)}$

Filter 41

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3s+\frac{1}{C_3s},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_Lg_m(C_1R_1s+1)}{C_1R_1g_m s+C_1s+g_m}$

Filter 42

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 R_1 s + 1)}{C_L s(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 43

Filter Type: Invalid011

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1} \right)$

$H(s)$: $\frac{R_L g_m(C_1 R_1 s + 1)}{(C_L R_L s + 1)(C_1 R_1 g_m s + C_1 s + g_m)}$

$\mathbf{Q}$: $\frac{C_1 C_L R_L \sqrt{\frac{g_m}{C_1 C_L R_L(R_1 g_m + 1)}}(R_1 g_m + 1)}{C_1 R_1 g_m + C_1 + C_L R_L g_m}$

ω_0: $\sqrt{\frac{g_m}{C_1 C_L R_L(R_1 g_m + 1)}}$

Bandwidth: $\frac{C_1 R_1 g_m + C_1 + C_L R_L g_m}{C_1 C_L R_L(R_1 g_m + 1)}$

Filter 44

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 R_1 s + 1)(C_L R_L s + 1)}{C_L s(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 45

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 R_1 s + 1)(C_L L_L s^2 + 1)}{C_L s(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 46

Filter Type: Invalid110

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} \right)$

$H(s)$: $\frac{L_L g_m s(C_1 R_1 s + 1)}{(C_L L_L s^2 + 1)(C_1 R_1 g_m s + C_1 s + g_m)}$

$\mathbf{Q}$: $\frac{C_L L_L g_m \sqrt{\frac{1}{C_L L_L}}}{C_1(R_1 g_m + 1)}$

ω_0: $\sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{C_1(R_1 g_m + 1)}{C_L L_L g_m}$

Filter 47

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ L_L s + R_L + \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 R_1 s + 1)(C_L L_L s^2 + C_L R_L s + 1)}{C_L s(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 48

Filter Type: Invalid110

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L + L_L s}} \right)$

$H(s)$: $\frac{L_L R_L g_m s(C_1 R_1 s + 1)}{(C_1 R_1 g_m s + C_1 s + g_m)(C_L L_L R_L s^2 + L_L s + R_L)}$

$\mathbf{Q}$: $\frac{L_L \sqrt{\frac{R_L g_m}{L_L(C_1(C_1 R_1 g_m + C_1 + C_L R_L g_m)}}(C_1 R_1 g_m + C_1 + C_L R_L g_m)}{C_1 R_1 R_L g_m + C_L R_L + L_L g_m}$

ω_0: $\sqrt{\frac{R_L g_m}{L_L(C_1 R_1 g_m + C_1 + C_L R_L g_m)}}$

Bandwidth: $\frac{C_1 R_1 R_L g_m + C_1 R_L + L_L g_m}{L_L(C_1 R_1 g_m + C_1 + C_L R_L g_m)}$

Filter 49

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$H(s)$: $\frac{g_m(C_1 R_1 s + 1)(C_L L_L R_L s^2 + L_L s + R_L)}{(C_L L_L s^2 + 1)(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 50

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$H(s)$: $\frac{R_L g_m(C_1 R_1 s + 1)(C_L L_L s^2 + 1)}{(C_L L_L s^2 + C_L R_L s + 1)(C_1 R_1 g_m s + C_1 s + g_m)}$

Filter 51

Filter Type: BS

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ \infty,\ R_L \right)$

$H(s)$: $\frac{R_L g_m(C_1 L_1 s^2 + 1)}{C_1 L_1 g_m s^2 + C_1 s + g_m}$

$\mathbf{Q}$: $L_1 g_m \sqrt{\frac{1}{C_1 L_1}}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{1}{L_1 g_m}$

Filter 52

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ \infty,\ \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 L_1 s^2 + 1)}{C_L s(C_1 L_1 g_m s^2 + C_1 s + g_m)}$

Filter 53

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1} \right)$

$H(s)$: $\frac{R_L g_m(C_1 L_1 s^2 + 1)}{(C_L R_L s + 1)(C_1 L_1 g_m s^2 + C_1 s + g_m)}$

Filter 54

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 L_1 s^2 + 1)(C_L R_L s + 1)}{C_L s(C_1 L_1 g_m s^2 + C_1 s + g_m)}$

Filter 55

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s} \right)$

$H(s)$: $\frac{g_m(C_1 L_1 s^2 + 1)(C_L L_L s^2 + 1)}{C_L s(C_1 L_1 g_m s^2 + C_1 s + g_m)}$

Filter 56

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

$H(s)$: $\frac{L_L g_m s(C_1 L_1 s^2+1)}{(C_L L_L s^2+1)(C_1 L_1 g_m s^2+C_1 s+g_m)}$

Filter 57

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m(C_1 L_1 s^2+1)(C_L L_L s^2+C_L R_L s+1)}{C_L s(C_1 L_1 g_m s^2+C_1 s+g_m)}$

Filter 58

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$H(s)$: $\frac{L_L R_L g_m s(C_1 L_1 s^2+1)}{(C_1 L_1 g_m s^2+C_1 s+g_m)(C_L L_L R_L s^2+L_L s+R_L)}$

Filter 59

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

$H(s)$: $\frac{g_m(C_1 L_1 s^2+1)(C_L L_L R_L s^2+L_L s+R_L)}{(C_L L_L s^2+1)(C_1 L_1 g_m s^2+C_1 s+g_m)}$

Filter 60

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

$H(s)$: $\frac{R_L g_m(C_1 L_1 s^2+1)(C_L L_L s^2+1)}{(C_L L_L s^2+C_L R_L s+1)(C_1 L_1 g_m s^2+C_1 s+g_m)}$

Filter 61

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{L_1 R_L g_m s}{C_1 L_1 s^2+L_1 g_m s+1}$

Q: $\frac{C_1\sqrt{\frac{1}{C_1 L_1}}}{g_m}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{g_m}{C_1}$

Filter 62

Filter Type: LP

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m}{C_L(C_1 L_1 s^2+L_1 g_m s+1)}$

Q: $\frac{C_1\sqrt{\frac{1}{C_1 L_1}}}{g_m}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{g_m}{C_1}$

Filter 63

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

$H(s)$: $\frac{L_1 R_L g_m s}{(C_L R_L s+1)(C_1 L_1 s^2+L_1 g_m s+1)}$

Q: $\frac{L_1\sqrt{\frac{1}{L_1(C_1+C_L R_L g_m)}}(C_1+C_L R_L g_m)}{C_L R_L+L_1 g_m}$

ω_0: $\sqrt{\frac{1}{L_1(C_1+C_L R_L g_m)}}$

Bandwidth: $\frac{C_L R_L+L_1 g_m}{L_1(C_1+C_L R_L g_m)}$

Filter 64

Filter Type: Invalid011

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m(C_L R_L s+1)}{C_L(C_1 L_1 s^2+L_1 g_m s+1)}$

Q: $\frac{C_1\sqrt{\frac{1}{C_1 L_1}}}{g_m}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{g_m}{C_1}$

Filter 65

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m(C_L L_L s^2+1)}{C_L(C_1 L_1 s^2+L_1 g_m s+1)}$

Filter 66

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

$H(s)$: $\frac{L_1 L_L g_m s^2}{(C_L L_L s^2+1)(C_1 L_1 s^2+L_1 g_m s+1)}$

Q: $\frac{(C_1 L_1+C_L L_L)\sqrt{\frac{1}{C_1 L_1+C_L L_L}}}{L_1 g_m}$

ω_0: $\sqrt{\frac{1}{C_1 L_1+C_L L_L}}$

Bandwidth: $\frac{L_1 g_m}{C_1 L_1+C_L L_L}$

Filter 67

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 g_m(C_L L_L s^2+C_L R_L s+1)}{C_L(C_1 L_1 s^2+L_1 g_m s+1)}$

Filter 68

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ L_3 s+R_3+\frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$H(s)$: $\frac{L_1 L_L R_L g_m s^2}{(C_1 L_1 s^2+L_1 g_m s+1)(C_L L_L R_L s^2+L_L s+R_L)}$

Q: $\frac{\sqrt{\frac{R_L}{C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m}}(C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m)}{L_1 R_L g_m+L_L}$

ω_0: $\sqrt{\frac{R_L}{C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m}}$

Bandwidth: $\frac{L_1 R_L g_m+L_L}{C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m}$

Filter 69

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3s + R_3 + \frac{1}{C_3s},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

$H(s)$: $\frac{L_1g_m s\left(C_LL_Ls^2+L_Ls+R_L\right)}{(C_LL_Ls^2+1)(C_1L_1s^2+L_1g_m s+1)}$

Filter 70

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ L_3s + R_3 + \frac{1}{C_3s},\ \infty,\ \infty,\ \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{L_1R_Lg_m s\left(C_LL_Ls^2+1\right)}{(C_1L_1s^2+L_1g_m s+1)(C_LL_Ls^2+C_LR_Ls+1)}$

Filter 71

Filter Type: GE

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_Lg_m\left(C_1L_1s^2+C_1R_1s+1\right)}{C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m}$

Q: $\frac{L_1g_m\sqrt{\frac{1}{C_1L_1}}}{R_1g_m+1}$

ω_0: $\sqrt{\frac{1}{C_1L_1}}$

Bandwidth: $\frac{R_1g_m+1}{L_1g_m}$

Qz: $\frac{L_1\sqrt{\frac{1}{C_1L_1}}}{R_1}$

Filter 72

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{g_m\left(C_1L_1s^2+C_1R_1s+1\right)}{C_Ls(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 73

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{R_L}{C_LR_Ls+1}\right)$

$H(s)$: $\frac{R_Lg_m\left(C_1L_1s^2+C_1R_1s+1\right)}{(C_LR_Ls+1)(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 74

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ R_L + \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{g_m\left(C_LR_Ls+1\right)\left(C_1L_1s^2+C_1R_1s+1\right)}{C_Ls(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 75

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ L_Ls + \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{g_m\left(C_LL_Ls^2+1\right)\left(C_1L_1s^2+C_1R_1s+1\right)}{C_Ls(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 76

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}\right)$

$H(s)$: $\frac{L_Lg_m s\left(C_1L_1s^2+C_1R_1s+1\right)}{(C_LL_Ls^2+1)(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 77

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ L_Ls + R_L + \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{g_m\left(C_1L_1s^2+C_1R_1s+1\right)\left(C_LL_Ls^2+C_LR_Ls+1\right)}{C_Ls(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 78

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{1}{C_Ls + \frac{1}{R_L} + \frac{1}{L_Ls}}\right)$

$H(s)$: $\frac{L_LR_Lg_m s\left(C_1L_1s^2+C_1R_1s+1\right)}{(C_LL_LR_Ls^2+L_Ls+R_L)(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 79

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

$H(s)$: $\frac{g_m\left(C_1L_1s^2+C_1R_1s+1\right)\left(C_LL_LR_Ls^2+L_Ls+R_L\right)}{(C_LL_Ls^2+1)(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 80

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3s + \frac{1}{R_3} + \frac{1}{L_3s}},\ \infty,\ \infty,\ \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{R_Lg_m\left(C_LL_Ls^2+1\right)\left(C_1L_1s^2+C_1R_1s+1\right)}{(C_LL_Ls^2+C_LR_Ls+1)(C_1L_1g_m s^2+C_1R_1g_m s+C_1s+g_m)}$

Filter 81

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3s}{C_3L_3s^2+1} + R_3,\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{L_1R_LR_1g_m s}{C_1L_1R_1s^2+L_1R_1g_m s+L_1s+R_1}$

Q: $\frac{C_1R_1\sqrt{\frac{1}{C_1L_1}}}{R_1g_m+1}$

ω_0: $\sqrt{\frac{1}{C_1L_1}}$

Bandwidth: $\frac{R_1g_m+1}{C_1R_1}$

Filter 82

Filter Type: LP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3s}{C_3L_3s^2+1} + R_3,\ \infty,\ \infty,\ \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{L_1R_1g_m}{C_L(C_1L_1R_1s^2+L_1R_1g_m s+L_1s+R_1)}$

Q: $\frac{C_1R_1\sqrt{\frac{1}{C_1L_1}}}{R_1g_m+1}$

ω_0: $\sqrt{\frac{1}{C_1L_1}}$

Bandwidth: $\frac{R_1g_m+1}{C_1R_1}$

Filter 83

Filter Type: BP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_L s}{C_3 s^2 s + 1} + R_3,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

$H(s)$: $\frac{L_1 R_1 R_L g_m s}{(C_L R_L s + 1)(C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Q: $\frac{L_1 \sqrt{\frac{R_1}{L_1(C_1 R_1 + C_L R_1 g_m + C_L R_L)}(C_1 R_1 + C_L R_1 R_L g_m + C_L R_L)}}{C_L R_1 R_L + L_1 R_1 g_m + L_1}$

ω_0: $\sqrt{\frac{R_1}{L_1(C_1 R_1 + C_L R_1 R_L g_m + C_L R_L)}}$

Bandwidth: $\frac{C_L R_1 R_L + L_1 R_1 g_m + L_1}{L_1(C_1 R_1 + C_L R_1 R_L g_m + C_L R_L)}$

Filter 84

Filter Type: Invalid011

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 R_1 g_m (C_L R_L s + 1)}{C_L (C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Q: $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{R_1 g_m + 1}{C_1 R_1}$

Filter 85

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 R_1 g_m (C_L L_L s^2 + 1)}{C_L (C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Filter 86

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$H(s)$: $\frac{L_1 L_L R_1 g_m s^2}{(C_L L_L s^2 + 1)(C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Q: $\frac{R_1 (C_1 L_1 + C_L L_L) \sqrt{\frac{1}{C_1 L_1 + C_L L_L}}}{L_1(R_1 g_m + 1)}$

ω_0: $\sqrt{\frac{1}{C_1 L_1 + C_L L_L}}$

Bandwidth: $\frac{L_1(R_1 g_m + 1)}{R_1(C_1 L_1 + C_L L_L)}$

Filter 87

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{L_1 R_1 g_m (C_L L_L s^2 + C_L R_L s + 1)}{C_L (C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Filter 88

Filter Type: HP

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$H(s)$: $\frac{L_1 L_L R_1 R_L g_m s^2}{(C_L L_L R_L s^2 + L_L s + R_L)(C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Q: $\frac{\sqrt{\frac{R_1 R_L}{C_1 L_1 R_1 R_L + C_L L_L R_1 R_L + C_L L_L R_L R_1}(C_1 L_1 R_1 R_L + C_L L_L R_1 R_L + L_1 L_L R_1 g_m s + L_1 L_L)}}{L_1 R_1 R_L g_m + L_1 R_L + L_L R_1}}{C_1 L_1 R_1 R_L + C_L L_L R_1 R_L + L_1 L_L R_1 R_L + L_1 L_L R_1}$

ω_0: $\sqrt{\frac{R_1 R_L}{C_1 L_1 R_1 R_L + C_L L_L R_1 R_L + L_1 L_L R_1 R_L + L_1 L_L R_1}}$

Bandwidth: $\frac{L_1 R_1 R_L g_m + L_1 R_L + L_L R_1}{C_1 L_1 R_1 R_L + C_L L_L R_1 R_L + L_1 L_L R_1 R_L + L_1 L_L R_1}$

Filter 89

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$H(s)$: $\frac{L_1 R_1 g_m (C_L L_L R_L s^2 + L_L s + R_L)}{(C_L L_L s^2 + 1)(C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Filter 90

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$H(s)$: $\frac{L_1 R_1 R_L g_m s (C_L L_L s^2 + 1)}{(C_L L_L s^2 + C_L R_L s + 1)(C_1 L_1 R_1 s^2 + L_1 R_1 g_m s + L_1 s + R_1)}$

Filter 91

Filter Type: GE

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s + \frac{1}{C_3 s}\right)}{L_3 s + R_3 + \frac{1}{C_3 s}},\ \infty,\ \infty,\ R_L\right)$

$H(s)$: $\frac{R_L g_m (C_1 L_1 R_1 s^2 + L_1 s + R_1)}{C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + L_1 g_m s + R_1 g_m + 1}$

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}(R_1 g_m + 1)}{g_m}$

ω_0: $\sqrt{\frac{1}{C_1 L_1}}$

Bandwidth: $\frac{g_m}{C_1(R_1 g_m + 1)}$

Qz: $C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}$

Filter 92

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s + \frac{1}{C_3 s}\right)}{L_3 s + R_3 + \frac{1}{C_3 s}},\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m (C_1 L_1 R_1 s^2 + L_1 s + R_1)}{C_L s (C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + L_1 g_m s + R_1 g_m + 1)}$

Filter 93

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s + \frac{1}{C_3 s}\right)}{L_3 s + R_3 + \frac{1}{C_3 s}},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

$H(s)$: $\frac{R_L g_m (C_1 L_1 R_1 s^2 + L_1 s + R_1)}{(C_L R_L s + 1)(C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + L_1 g_m s + R_1 g_m + 1)}$

Filter 94

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s + \frac{1}{C_3 s}\right)}{L_3 s + R_3 + \frac{1}{C_3 s}},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m (C_L R_L s + 1)(C_1 L_1 R_1 s^2 + L_1 s + R_1)}{C_L s (C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + L_1 g_m s + R_1 g_m + 1)}$

Filter 95

Invalid filter

$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s + \frac{1}{C_3 s}\right)}{L_3 s + R_3 + \frac{1}{C_3 s}},\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$H(s)$: $\frac{g_m (C_L L_L s^2 + 1)(C_1 L_1 R_1 s^2 + L_1 s + R_1)}{C_L s (C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + L_1 g_m s + R_1 g_m + 1)}$

Filter 96

Invalid filter

$Z(s)$: $\left(\infty, \ \infty, \ \frac{R_1\left(L_3s+\frac{1}{C_3s}\right)}{L_3s+R_3+\frac{1}{C_3s}}, \ \infty, \ \infty, \ \frac{L_Ls}{C_LL_Ls^2+1}\right)$

$H(s)$: $\frac{L_Lg_ms\left(C_1L_1R_1s^2+L_1s+R_1\right)}{(C_LL_Ls^2+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+L_1g_ms+R_1g_m+1)}$

Filter 97

Invalid filter

$Z(s)$: $\left(\infty, \ \infty, \ \frac{R_1\left(L_3s+\frac{1}{C_3s}\right)}{L_3s+R_3+\frac{1}{C_3s}}, \ \infty, \ \infty, \ L_Ls+R_L+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{g_m\left(C_LL_Ls^2+C_LR_Ls+1\right)\left(C_1L_1R_1s^2+L_1s+R_1\right)}{C_Ls(C_1L_1R_1g_ms^2+C_1L_1s^2+L_1g_ms+R_1g_m+1)}$

Filter 98

Invalid filter

$Z(s)$: $\left(\infty, \ \infty, \ \frac{R_1\left(L_3s+\frac{1}{C_3s}\right)}{L_3s+R_3+\frac{1}{C_3s}}, \ \infty, \ \infty, \ \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

$H(s)$: $\frac{L_LR_Lg_ms\left(C_1L_1R_1s^2+L_1s+R_1\right)}{(C_LL_LR_Ls^2+L_Ls+R_L)(C_1L_1R_1g_ms^2+C_1L_1s^2+L_1g_ms+R_1g_m+1)}$

Filter 99

Invalid filter

$Z(s)$: $\left(\infty, \ \infty, \ \frac{R_1\left(L_3s+\frac{1}{C_3s}\right)}{L_3s+R_3+\frac{1}{C_3s}}, \ \infty, \ \infty, \ \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

$H(s)$: $\frac{g_m\left(C_1L_1R_1s^2+L_1s+R_1\right)\left(C_LL_LR_Ls^2+L_Ls+R_L\right)}{(C_LL_Ls^2+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+L_1g_ms+R_1g_m+1)}$

Filter 100

Invalid filter

$Z(s)$: $\left(\infty, \ \infty, \ \frac{R_1\left(L_3s+\frac{1}{C_3s}\right)}{L_3s+R_3+\frac{1}{C_3s}}, \ \infty, \ \infty, \ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{R_Lg_m\left(C_LL_Ls^2+1\right)\left(C_1L_1R_1s^2+L_1s+R_1\right)}{(C_LL_Ls^2+C_LR_Ls+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+L_1g_ms+R_1g_m+1)}$

Filter 101

Filter Type: BS

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ R_L\right)$

$H(s)$: $\frac{R_LR_Lg_m\left(C_1L_1s^2+1\right)}{C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1}$

Q: $\frac{L_1\sqrt{\frac{1}{C_1L_1}}(R_1g_m+1)}{R_1}$

ω_0: $\sqrt{\frac{1}{C_1L_1}}$

Bandwidth: $\frac{R_1}{L_1(R_1g_m+1)}$

Filter 102

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m\left(C_1L_1s^2+1\right)}{C_Ls(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 103

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_LR_Ls+1}\right)$

$H(s)$: $\frac{R_1R_Lg_m\left(C_1L_1s^2+1\right)}{(C_LR_Ls+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 104

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ R_L+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m\left(C_1L_1s^2+1\right)\left(C_LR_Ls+1\right)}{C_Ls(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 105

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ L_Ls+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m\left(C_1L_1s^2+1\right)\left(C_LL_Ls^2+1\right)}{C_Ls(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 106

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{L_Ls}{C_LL_Ls^2+1}\right)$

$H(s)$: $\frac{L_LR_1g_ms\left(C_1L_1s^2+1\right)}{(C_LL_Ls^2+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 107

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ L_Ls+R_L+\frac{1}{C_Ls}\right)$

$H(s)$: $\frac{R_1g_m\left(C_1L_1s^2+1\right)\left(C_LL_Ls^2+C_LR_Ls+1\right)}{C_Ls(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 108

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

$H(s)$: $\frac{L_LR_1R_Lg_ms\left(C_1L_1s^2+1\right)}{(C_LL_LR_Ls^2+L_Ls+R_L)(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 109

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

$H(s)$: $\frac{R_1g_m\left(C_1L_1s^2+1\right)\left(C_LL_LR_Ls^2+L_Ls+R_L\right)}{(C_LL_Ls^2+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$

Filter 110

Invalid filter

$Z(s)$: $\left(R_1, \ \infty, \ \infty, \ \infty, \ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

$H(s)$: $\frac{R_1R_Lg_m\left(C_1L_1s^2+1\right)\left(C_LL_Ls^2+1\right)}{(C_LL_Ls^2+C_LR_Ls+1)(C_1L_1R_1g_ms^2+C_1L_1s^2+C_1R_1s+R_1g_m+1)}$