Experiment: TIA Z3 ZL

Filter 1

Invalid filter
$Z(s)$: $(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ R_L)$

Filter 2

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

Filter 3

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

Filter 4

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

Filter 5

Filter Type: BS
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$
$H(s)$: $\frac{R_3\left(C_L L_L s^2+1\right)}{C_L L_L R_3 s^2+C_L R_3 s+1}$
Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}}{R_3}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_3}{L_L}$

Filter 6

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$
$H(s)$: $\frac{L_L R_3 s}{C_L L_L R_3 s^2+L_L s+R_3}$
Q: $C_L R_3\sqrt{\frac{1}{C_L L_L}}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{1}{C_L R_3}$

Filter 7

Filter Type: GE
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$
$H(s)$: $\frac{R_3\left(C_L L_L s^2+C_L R_L s+1\right)}{C_L L_L R_3 s^2+C_L R_3 s+C_L R_L s+1}$
Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}}{R_3+R_L}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_3+R_L}{L_L}$
Qz: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}}{R_L}$

Filter 8

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$
$H(s)$: $\frac{L_L R_3 R_L s}{C_L L_L R_3 R_L s^2+L_L R_3 s+L_L R_L s+R_3 R_L}$
Q: $\frac{C_L R_3 R_L\sqrt{\frac{1}{C_L L_L}}}{R_3+R_L}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_3+R_L}{C_L R_3 R_L}$

Filter 9

Filter Type: GE
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$
$H(s)$: $\frac{R_3\left(C_L L_L R_L s^2+L_L s+R_L\right)}{C_L L_L R_3 s^2+C_L L_L R_L s^2+L_L s+R_3+R_L}$
Q: $C_L\sqrt{\frac{1}{C_L L_L}}\left(R_3+R_L\right)$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{1}{C_L\left(R_3+R_L\right)}$
Qz: $C_L R_L\sqrt{\frac{1}{C_L L_L}}$

Filter 10

Filter Type: BS
$Z(s)$: $\left(\infty,\ \infty,\ R_3,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$
$H(s)$: $\frac{R_3 R_L\left(C_L L_L s^2+1\right)}{C_L L_L R_3 s^2+C_L L_L R_L s^2+C_L R_3 R_L s+R_3+R_L}$
Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}\left(R_3+R_L\right)}{R_3 R_L}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_3 R_L}{L_L\left(R_3+R_L\right)}$

Filter 11

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

Filter 12

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

Filter 13

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

Filter 14

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

Filter 15

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

Filter 16

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

Filter 17

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

Filter 18

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$
$H(s)$: $\frac{L_L R_L s}{C_3 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$
Q: $R_L \sqrt{\frac{1}{L_L (C_3 + C_L)}}\ (C_3 + C_L)$
ω_0: $\sqrt{\frac{1}{L_L (C_3 + C_L)}}$
Bandwidth: $\frac{1}{R_L (C_3 + C_L)}$

Filter 19

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

Filter 20

Filter Type: BS
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$
$H(s)$: $\frac{R_L (C_L L_L s^2 + 1)}{C_3 C_L L_L R_L s^3 + C_3 R_L s + C_L L_L s^2 + C_L R_L s + 1}$
Q: $\frac{C_L L_L \sqrt{\frac{1}{C_L L_L}}}{R_L (C_3 + C_L)}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_L (C_3 + C_L)}{C_L L_L}$

Filter 21

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

Filter 22

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

Filter 23

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

Filter 24

Filter Type: Invalid011
$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$
$H(s)$: $\frac{R_3 (C_L R_L s + 1)}{C_3 C_L R_3 R_L s^2 + C_3 R_3 s + C_L R_3 s + C_L R_L s + 1}$
Q: $\frac{C_3 C_L R_3 R_L \sqrt{\frac{C_3 + C_L}{C_3 C_L R_3 R_L}}}{C_3 R_3 + C_L R_3 + C_L R_L}$
ω_0: $\sqrt{\frac{1}{C_3 C_L R_3 R_L}}$
Bandwidth: $\frac{C_3 R_3 + C_L R_3 + C_L R_L}{C_3 C_L R_3 R_L}$

Filter 25

Filter Type: BS
$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$
$H(s)$: $\frac{R_3 (C_L L_L s^2 + 1)}{C_3 C_L L_L R_3 s^3 + C_3 R_3 s + C_L L_L s^2 + C_L R_3 s + 1}$
Q: $\frac{C_L L_L \sqrt{\frac{1}{C_L L_L}}}{R_3 (C_3 + C_L)}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{R_3 (C_3 + C_L)}{C_L L_L}$

Filter 26

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$
$H(s)$: $\frac{L_L R_3 s}{C_3 L_L R_3 s^2 + C_L L_L R_3 s^2 + L_L s + R_3}$
Q: $R_3 \sqrt{\frac{1}{L_L (C_3 + C_L)}}\ (C_3 + C_L)$
ω_0: $\sqrt{\frac{1}{L_L (C_3 + C_L)}}$
Bandwidth: $\frac{1}{R_3 (C_3 + C_L)}$

Filter 27

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

Filter 28

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$
$H(s)$: $\frac{L_L R_3 R_L s}{C_3 L_L R_3 R_L s^2 + C_L L_L R_3 R_L s^2 + L_L R_3 s + L_L R_L s + R_3 R_L}$
Q: $\frac{R_3 R_L \sqrt{\frac{1}{L_L (C_3 + C_L)}} (C_3 + C_L)}{R_3 + R_L}$
ω_0: $\sqrt{\frac{1}{L_L (C_3 + C_L)}}$
Bandwidth: $\frac{R_3 + R_L}{R_3 R_L (C_3 + C_L)}$

Filter 29

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

Filter 30

Filter Type: BS

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

$H(s)$: $\frac{R_3R_L(C_LL_Ls^2+1)}{C_3C_LL_LR_3R_Ls^3+C_3R_3R_Ls+C_LL_LR_3s^2+C_LL_LR_Ls^2+C_LR_3R_Ls+R_3+R_L}$

Q: $\frac{C_LL_L\sqrt{\frac{1}{C_LL_L}}(R_3+R_L)}{R_3R_L(C_3+C_L)}$

ω_0: $\sqrt{\frac{1}{C_LL_L}}$

Bandwidth: $\frac{R_3R_L(C_3+C_L)}{C_LL_L(R_3+R_L)}$

Filter 31

Invalid filter

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

Filter 32

Invalid filter

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

Filter 33

Filter Type: Invalid011

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

$H(s)$: $\frac{R_L(C_3R_3s+1)}{C_3C_LR_3R_Ls^2+C_3R_3s+C_3R_Ls+C_LR_Ls+1}$

Q: $\frac{C_3C_LR_3R_L\sqrt{\frac{1}{C_3C_LR_3R_L}}}{C_3R_3+C_3R_L+C_LR_L}$

ω_0: $\sqrt{\frac{1}{C_3C_LR_3R_L}}$

Bandwidth: $\frac{C_3R_3+C_3R_L+C_LR_L}{C_3C_LR_3R_L}$

Filter 34

Invalid filter

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

Filter 35

Invalid filter

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

Filter 36

Filter Type: Invalid110

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

$H(s)$: $\frac{L_Ls(C_3R_3s+1)}{C_3C_LL_LR_3s^3+C_3L_Ls^2+C_3R_3s+C_LL_Ls+1}$

Q: $\frac{L_L\sqrt{\frac{1}{L_L(C_3+C_L)}}(C_3+C_L)}{C_3R_3}$

ω_0: $\sqrt{\frac{1}{L_L(C_3+C_L)}}$

Bandwidth: $\frac{C_3R_3}{L_L(C_3+C_L)}$

Filter 37

Invalid filter

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

Filter 38

Filter Type: Invalid110

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

$H(s)$: $\frac{L_LR_Ls(C_3R_3s+1)}{C_3C_LL_LR_3s^3+C_3L_Ls^2+C_3R_3s+C_LL_LR_Ls^2+C_3R_3R_Ls+C_LL_LR_Ls^2+L_Ls+R_L}$

Q: $\frac{L_L\sqrt{\frac{R_L}{L_L(C_3R_3+C_3R_L+C_LR_L)}}(C_3R_3+C_3R_L+C_LR_L)}{C_3R_3R_L+L_L}$

ω_0: $\sqrt{\frac{R_L}{L_L(C_3R_3+C_3R_L+C_LR_L)}}$

Bandwidth: $\frac{C_3R_3R_L+L_L}{L_L(C_3R_3+C_3R_L+C_LR_L)}$

Filter 39

Invalid filter

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

Filter 40

Invalid filter

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

Filter 41

Filter Type: BS

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

$H(s)$: $\frac{R_L(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_Ls+1}$

Q: $\frac{L_3\sqrt{\frac{1}{C_3L_3}}}{R_L}$

ω_0: $\sqrt{\frac{1}{C_3L_3}}$

Bandwidth: $\frac{R_L}{L_3}$

Filter 42

Invalid filter

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

Filter 43

Filter Type: BS

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

$H(s)$: $\frac{R_L(C_3L_3s^2+1)}{C_3C_LL_LR_Ls^3+C_3L_3s^2+C_3R_Ls+C_LR_Ls+1}$

Q: $\frac{C_3L_3\sqrt{\frac{1}{C_3L_3}}}{R_L(C_3+C_L)}$

ω_0: $\sqrt{\frac{1}{C_3L_3}}$

Bandwidth: $\frac{R_L(C_3+C_L)}{C_3L_3}$

Filter 44

Invalid filter

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

Filter 45

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

Filter 46

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

Filter 47

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

Filter 48

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

Filter 49

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

Filter 50

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

Filter 51

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{L_3 R_L s}{C_3 L_3 R_L s^2+L_3 s+R_L}$
Q: $C_3 R_L \sqrt{\frac{1}{C_3 L_3}}$
ω_0: $\sqrt{\frac{1}{C_3 L_3}}$
Bandwidth: $\frac{1}{C_3 R_L}$

Filter 52

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

Filter 53

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$
$H(s)$: $\frac{L_3 R_L s}{C_3 L_3 R_L s^2+C_L L_3 R_L s^2+L_3 s+R_L}$
Q: $R_L \sqrt{\frac{1}{L_3(C_3+C_L)}}\,(C_3+C_L)$
ω_0: $\sqrt{\frac{1}{L_3(C_3+C_L)}}$
Bandwidth: $\frac{1}{R_L(C_3+C_L)}$

Filter 54

Filter Type: Invalid110
$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$
$H(s)$: $\frac{L_3 s(C_L R_L s+1)}{C_3 C_L L_3 R_L s^3+C_3 L_3 s^2+C_L L_3 s^2+C_L R_L s+1}$
Q: $\frac{L_3 \sqrt{\frac{1}{L_3(C_3+C_L)}}\,(C_3+C_L)}{C_L R_L}$
ω_0: $\sqrt{\frac{1}{L_3(C_3+C_L)}}$
Bandwidth: $\frac{C_L R_L}{L_3(C_3+C_L)}$

Filter 55

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

Filter 56

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

Filter 57

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

Filter 58

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L+\frac{1}{L_L s}}}\right)$
$H(s)$: $\frac{L_3 L_L R_L s^2}{C_3 L_3 L_L R_L s^2+C_L L_3 L_L R_L s^2+L_3 L_L s+L_3 R_L+L_L R_L}$
Q: $R_L \sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}\,(C_3+C_L)$
ω_0: $\sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}$
Bandwidth: $\frac{1}{R_L(C_3+C_L)}$

Filter 59

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

Filter 60

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

Filter 61

Filter Type: GE
$Z(s)$: $\left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{R_L\left(C_3 L_3 s^2 + C_3 R_3 s + 1\right)}{C_3 L_3 s^2 + C_3 R_3 s + C_3 R_L s + 1}$
Q: $\frac{L_3\sqrt{\frac{1}{C_3 L_3}}}{R_3 + R_L}$
ω_0: $\sqrt{\frac{1}{C_3 L_3}}$
Bandwidth: $\frac{R_3 + R_L}{L_3}$
Qz: $\frac{L_3\sqrt{\frac{1}{C_3 L_3}}}{R_3}$

Filter 62

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

Filter 63

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

Filter 64

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

Filter 65

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

Filter 66

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

Filter 67

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

Filter 68

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

Filter 69

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

Filter 70

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

Filter 71

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s + \frac{1}{R_3} + \frac{1}{L_3 s}},\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{L_3 R_3 R_L s}{C_3 L_3 R_3 R_L s^2 + L_3 R_3 s + L_3 R_L s + R_3 R_L}$
Q: $\frac{C_3 R_3 R_L\sqrt{\frac{1}{C_3 L_3}}}{R_3 + R_L}$
ω_0: $\sqrt{\frac{1}{C_3 L_3}}$
Bandwidth: $\frac{R_3 + R_L}{C_3 R_3 R_L}$

Filter 72

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s + \frac{1}{R_3} + \frac{1}{L_3 s}},\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$
$H(s)$: $\frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + C_L L_3 R_3 s^2 + L_3 s + R_3}$
Q: $R_3\sqrt{\frac{1}{L_3(C_3 + C_L)}}\,(C_3 + C_L)$
ω_0: $\sqrt{\frac{1}{L_3(C_3 + C_L)}}$
Bandwidth: $\frac{1}{R_3(C_3 + C_L)}$

Filter 73

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s + \frac{1}{R_3} + \frac{1}{L_3 s}},\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$
$H(s)$: $\frac{L_3 R_3 R_L s}{C_3 L_3 R_3 R_L s^2 + C_L L_3 R_3 R_L s^2 + L_3 R_3 s + L_3 R_L s + R_3 R_L}$
Q: $\frac{R_3 R_L\sqrt{\frac{1}{L_3(C_3 + C_L)}}\,(C_3 + C_L)}{R_3 + R_L}$
ω_0: $\sqrt{\frac{1}{L_3(C_3 + C_L)}}$
Bandwidth: $\frac{R_3 + R_L}{R_3 R_L(C_3 + C_L)}$

Filter 74

Filter Type: Invalid110
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s + \frac{1}{R_3} + \frac{1}{L_3 s}},\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$
$H(s)$: $\frac{L_3 R_3 s(C_L R_L s + 1)}{C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_L L_3 R_3 s^2 + C_L L_3 R_L s^2 + C_L R_3 R_L s + L_3 s + R_3}$
Q: $\frac{L_3\sqrt{\frac{R_3}{L_3(C_3 R_3 + C_L R_3 + C_L R_L)}}\,(C_3 R_3 + C_L R_3 + C_L R_L)}{C_L R_3 R_L + L_3}$
ω_0: $\sqrt{\frac{R_3}{L_3(C_3 R_3 + C_L R_3 + C_L R_L)}}$
Bandwidth: $\frac{C_L R_3 R_L + L_3}{L_3(C_3 R_3 + C_L R_3 + C_L R_L)}$

Filter 75

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

Filter 76

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s+\frac{1}{R_3}+\frac{1}{L_3 s}},\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$
$H(s)$: $\frac{L_3 L_L R_3 s}{C_3 L_3 L_L R_3 s^2+C_L L_3 L_L R_3 s^2+L_3 L_L s+L_3 L_3 s+L_3 R_3+L_L R_3}$
Q: $R_3\sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}\,(C_3+C_L)$
ω_0: $\sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}$
Bandwidth: $\frac{1}{R_3(C_3+C_L)}$

Filter 77

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

Filter 78

Filter Type: BP
$Z(s)$: $\left(\infty,\ \infty,\ \frac{1}{C_3 s+\frac{1}{R_3}+\frac{1}{L_3 s}},\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$
$H(s)$: $\frac{L_3 L_L R_3 R_L s^2}{C_3 L_3 L_L R_3 R_L s^2+C_L L_3 L_L R_3 R_L s^2+L_3 L_L R_3 s+L_3 L_L R_L s+L_3 R_3 R_L+L_L R_3 R_L}$
Q: $\frac{R_3 R_L\sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}\,(C_3+C_L)}{R_3+R_L}$
ω_0: $\sqrt{\frac{L_3+L_L}{L_3 L_L(C_3+C_L)}}$
Bandwidth: $\frac{R_3+R_L}{R_3 R_L(C_3+C_L)}$

Filter 79

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

Filter 80

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

Filter 81

Filter Type: GE
$Z(s)$: $\left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1}+R_3,\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{R_L(C_3 L_3 R_3 s^2+L_3 s+R_3)}{C_3 L_3 R_3 s^2+C_3 L_3 R_L s^2+L_3 s+R_3+R_L}$
Q: $C_3\sqrt{\frac{1}{C_3 L_3}}\,(R_3+R_L)$
ω_0: $\sqrt{\frac{1}{C_3 L_3}}$
Bandwidth: $\frac{1}{C_3(R_3+R_L)}$
Qz: $C_3 R_3\sqrt{\frac{1}{C_3 L_3}}$

Filter 82

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

Filter 83

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

Filter 84

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

Filter 85

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

Filter 86

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

Filter 87

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

Filter 88

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

Filter 89

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

Filter 90

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

Filter 91

Filter Type: BS
$Z(s)$: $\left(\infty,\ \infty,\ \frac{R_3\left(L_3 s+\frac{1}{C_3 s}\right)}{L_3 s+R_3+\frac{1}{C_3 s}},\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{R_3 R_L(C_3 L_3 s^2+1)}{C_3 L_3 R_3 s^2+C_3 L_3 R_L s^2+C_3 R_3 R_L s+R_3+R_L}$
Q: $\frac{L_3\sqrt{\frac{1}{C_3 L_3}}\,(R_3+R_L)}{R_3 R_L}$
ω_0: $\sqrt{\frac{1}{C_3 L_3}}$
Bandwidth: $\frac{R_3 R_L}{L_3(R_3+R_L)}$

Filter 92

Filter Type: BS

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

$H(s)$: $\frac{R_3\left(C_3 L_3 s^2+1\right)}{C_3 C_L L_3 R_3 s^3+C_3 L_3 s^2+C_3 R_3 s+C_L R_3 s+1}$

Q: $\frac{C_3 L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3\left(C_3+C_L\right)}$

ω_0: $\sqrt{\frac{1}{C_3 L_3}}$

Bandwidth: $\frac{R_3\left(C_3+C_L\right)}{C_3 L_3}$

Filter 93

Filter Type: BS

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

$H(s)$: $\frac{R_3 R_L\left(C_3 L_3 s^2+1\right)}{C_3 C_L L_3 R_3 R_L s^3+C_3 L_3 R_3 s^2+C_3 L_3 R_L s^2+C_3 R_3 R_L s+C_L R_3 R_L s+R_3+R_L}$

Q: $\frac{C_3 L_3 \sqrt{\frac{1}{C_3 L_3}}\left(R_3+R_L\right)}{R_3 R_L\left(C_3+C_L\right)}$

ω_0: $\sqrt{\frac{1}{C_3 L_3}}$

Bandwidth: $\frac{R_3 R_L\left(C_3+C_L\right)}{C_3 L_3\left(R_3+R_L\right)}$

Filter 94

Invalid filter

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

Filter 95

Invalid filter

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

Filter 96

Invalid filter

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

Filter 97

Invalid filter

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

Filter 98

Invalid filter

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

Filter 99

Invalid filter

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

Filter 100

Invalid filter

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