Experiment: TIA Z1 ZL

Filter 1

Invalid filter
$Z(s)$: $(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L)$

Filter 2

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

Filter 3

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

Filter 4

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

Filter 5

Invalid filter
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 6

Invalid filter
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

Filter 7

Invalid filter
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 8

Filter Type: BP
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{r_{L^s}}}\right)$
$H(s)$: $\frac{L_L R_1 R_L g_m s}{(R_1 g_m+1)(C_L L_L R_L s^2+L_L s+R_L)}$
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
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 10

Filter Type: BS
$Z(s)$: $\left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$
$H(s)$: $\frac{R_1 R_L g_m (C_L L_L s^2+1)}{(R_1 g_m+1)(C_L L_L s^2+C_L R_L s+1)}$
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
$Z(s)$: $(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L)$

Filter 12

Invalid filter
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 13

Filter Type: BP
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$
$H(s)$: $\frac{L_1 R_L g_m s}{(C_L R_L s+1)(L_1 g_m s+1)}$
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
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

Filter 15

Invalid filter
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 16

Filter Type: HP
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$
$H(s)$: $\frac{L_1 L_L g_m s^2}{(C_L L_L s^2+1)(L_1 g_m s+1)}$
Q: $\frac{C_L L_L \sqrt{\frac{1}{C_L L_L}}}{L_1 g_m}$
ω_0: $\sqrt{\frac{1}{C_L L_L}}$
Bandwidth: $\frac{L_1 g_m}{C_L L_L}$

Filter 17

Invalid filter
$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 18

Filter Type: HP

$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

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

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

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

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

Filter 19

Invalid filter

$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 20

Invalid filter

$Z(s)$: $\left(L_1 s,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 21

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

Filter 22

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 23

Filter Type: LP

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

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

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

ω_0: $\sqrt{\frac{R_L}{C_1 C_L R_L}}$

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

Filter 24

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

Filter 25

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 26

Filter Type: BP

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

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

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

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 28

Filter Type: BP

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

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

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

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

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

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

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

Filter 30

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 31

Invalid filter

$Z(s)$: $\left(\frac{R_1}{C_1 R_1 s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

Filter 32

Invalid filter

$Z(s)$: $\left(\frac{R_1}{C_1 R_1 s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 33

Filter Type: LP
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_LR_Ls+1}\right)$
$H(s)$: $\frac{R_1R_Lg_m}{(C_LR_Ls+1)(C_1R_1s+R_1g_m+1)}$
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
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_Ls}\right)$

Filter 35

Invalid filter
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ L_Ls+\frac{1}{C_Ls}\right)$

Filter 36

Filter Type: BP
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}\right)$
$H(s)$: $\frac{L_LR_1g_ms}{(C_LL_Ls^2+1)(C_1R_1s+R_1g_m+1)}$
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
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 38

Filter Type: BP
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$
$H(s)$: $\frac{L_LR_1R_1g_ms}{(C_1R_1s+R_1g_m+1)(C_LL_LR_Ls^2+L_Ls+R_L)}$
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
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$
$H(s)$: $\frac{R_1g_m\left(C_LL_LR_Ls^2+L_Ls+R_L\right)}{(C_LL_Ls^2+1)(C_1R_1s+R_1g_m+1)}$
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
$Z(s)$: $\left(\frac{R_1}{C_1R_1s+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 41

Invalid filter
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

Filter 42

Invalid filter
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_Ls}\right)$

Filter 43

Filter Type: Invalid011
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_LR_Ls+1}\right)$
$H(s)$: $\frac{R_Lg_m(C_1R_1s+1)}{(C_LR_Ls+1)(C_1R_1g_ms+C_1s+g_m)}$
Q: $\frac{C_1C_LR_L\sqrt{\frac{g_m}{C_1C_LR_L(R_1g_m+1)}}(R_1g_m+1)}{C_1R_1g_m+C_1+C_LR_Lg_m}$
ω_0: $\sqrt{\frac{g_m}{C_1C_LR_L(R_1g_m+1)}}$
Bandwidth: $\frac{C_1R_1g_m+C_1+C_LR_Lg_m}{C_1C_LR_L(R_1g_m+1)}$

Filter 44

Invalid filter
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_Ls}\right)$

Filter 45

Invalid filter
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_Ls+\frac{1}{C_Ls}\right)$

Filter 46

Filter Type: Invalid110
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1}\right)$
$H(s)$: $\frac{L_Lg_ms(C_1R_1s+1)}{(C_LL_Ls^2+1)(C_1R_1g_ms+C_1s+g_m)}$
Q: $\frac{C_LL_Lg_m\sqrt{\frac{1}{C_LL_L}}}{C_1(R_1g_m+1)}$
ω_0: $\sqrt{\frac{1}{C_LL_L}}$
Bandwidth: $\frac{C_1(R_1g_m+1)}{C_LL_Lg_m}$

Filter 47

Invalid filter
$Z(s)$: $\left(R_1+\frac{1}{C_1s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 48

Filter Type: Invalid110

$Z(s)$: $\left(R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

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

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

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

$Z(s)$: $\left(R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 50

Invalid filter

$Z(s)$: $\left(R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 51

Filter Type: BS

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

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

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

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 53

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

Filter 54

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

Filter 55

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

Filter 56

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

Filter 57

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 58

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

Filter 59

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 60

Invalid filter

$Z(s)$: $\left(L_1 s + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 61

Filter Type: BP

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2 + 1},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

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

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

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2 + 1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

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

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

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2 + 1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$

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

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

Filter 66

Filter Type: HP
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$
$H(s)$: $\frac{L_1 L_L g_m s^2}{(C_L L_L s^2+1)(C_1 L_1 s^2+L_1 g_m s+1)}$
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
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 68

Filter Type: HP
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L+\frac{1}{L_L s}}}\right)$
$H(s)$: $\frac{L_1 L_L R_L g_m s^2}{(C_1 L_1 s^2+L_1 g_m s+1)(C_L L_L R_L s^2+L_L s+R_L)}$
Q: $\frac{R_L}{\sqrt{\frac{}{C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m}}(C_1 L_1 R_L+C_L L_L R_L+L_1 L_L g_m)}$
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
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 70

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 71

Filter Type: GE
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$
$H(s)$: $\frac{R_1 g_m (C_1 L_1 s^2+C_1 R_1 s+1)}{C_1 L_1 g_m s^2+C_1 R_1 g_m s+C_1 s+g_m}$
Q: $\frac{L_1 g_m\sqrt{\frac{}{C_1 L_1}}}{R_1 g_m+1}$
ω_0: $\sqrt{\frac{}{C_1 L_1}}$
Bandwidth: $\frac{R_1 g_m+1}{L_1 g_m}$
Qz: $\frac{L_1\sqrt{\frac{}{C_1 L_1}}}{R_1}$

Filter 72

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 73

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

Filter 74

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

Filter 75

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 76

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

Filter 77

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 78

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L+\frac{1}{L_L s}}}\right)$

Filter 79

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 80

Invalid filter
$Z(s)$: $\left(L_1 s+R_1+\frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 81

Filter Type: BP

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

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

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 82

Filter Type: LP

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

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

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 83

Filter Type: BP

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

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

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

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

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

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

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

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

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 86

Filter Type: HP

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

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

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

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

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 88

Filter Type: HP

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

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

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

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

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

Filter 89

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 90

Invalid filter

$Z(s)$: $\left(\frac{1}{C_1 s+\frac{1}{R_1}+\frac{1}{L_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 91

Filter Type: GE

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

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

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

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 93

Invalid filter

$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

Filter 94

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

Filter 95

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 96

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

Filter 97

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 98

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L+L_L s}}\right)$

Filter 99

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 100

Invalid filter
$Z(s)$: $\left(\frac{L_1 s}{C_1 L_1 s^2+1}+R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

Filter 101

Filter Type: BS
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$
$H(s)$: $\frac{R_1 R_L g_m\left(C_1 L_1 s^2+1\right)}{C_1 L_1 R_L g_m s^2+C_1 L_1 s^2+C_1 R_L s+R_L g_m+1}$
Q: $\frac{L_1\sqrt{\frac{1}{C_1 L_1}}\left(R_L g_m+1\right)}{R_L}$
ω_0: $\sqrt{\frac{1}{C_1 L_1}}$
Bandwidth: $\frac{R_L}{L_1\left(R_L g_m+1\right)}$

Filter 102

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s}\right)$

Filter 103

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

Filter 104

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L+\frac{1}{C_L s}\right)$

Filter 105

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$

Filter 106

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

Filter 107

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

Filter 108

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L+\frac{1}{L_L s}}}\right)$

Filter 109

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

Filter 110

Invalid filter
$Z(s)$: $\left(\frac{R_1\left(L_1 s+\frac{1}{C_1 s}\right)}{L_1 s+R_1+\frac{1}{C_1 s}},\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$