

Experiment: TIA Z2 Z5 ZL

Filter 1

Invalid filter

$Z(s): (\infty, R_2, \infty, \infty, R_4, R_L)$

Filter 2

Invalid filter

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{1}{C_L s}\right)$

Filter 3

Invalid filter

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{R_L}{C_L R_L s + 1}\right)$

Filter 4

Invalid filter

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, R_L + \frac{1}{C_L s}\right)$

Filter 5

Filter Type: BS

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, L_L s + \frac{1}{C_L s}\right)$

$H(s): \frac{(C_L L_L s^2 + 1)(R_2 R_4 g_m - R_2 + R_4)}{2C_L L_L R_2 g_m s^3 + 4C_L L_L s^2 + C_L R_2 R_4 g_m s + C_L R_2 s + C_L R_4 s + 2R_2 g_m + 1}$

$Q: \frac{2L_L \sqrt{\frac{1}{C_L L_L}}(R_2 g_m + 2)}{R_2 R_4 g_m + R_2 + R_4}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{R_2 R_4 g_m + R_2 + R_4}{2L_L (R_2 g_m + 2)}$

Filter 6

Filter Type: BP

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$H(s): \frac{L_L s(R_2 R_4 g_m - R_2 + R_4)}{C_L L_L R_2 R_4 g_m s^3 + C_L L_L R_2 s^2 + C_L L_L R_4 s^2 + 2L_L R_2 g_m s + 4L_L s + R_2 R_4 g_m + R_2 + R_4}$

$Q: \frac{C_L \sqrt{\frac{1}{C_L L_L}}(R_2 R_4 g_m + R_2 + R_4)}{R_2 R_4 g_m + 2}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{2(R_2 g_m + 2)}{C_L (R_2 R_4 g_m + R_2 + R_4)}$

Filter 7

Filter Type: GE

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, L_L s + R_L + \frac{1}{C_L s}\right)$

$H(s): \frac{(C_L L_L s^2 + C_L R_L s + 1)(R_2 R_4 g_m - R_2 + R_4)}{2C_L L_L R_2 g_m s^3 + 4C_L L_L s^2 + C_L R_2 R_4 g_m s + 2C_L R_2 R_4 g_m s + C_L R_2 s + C_L R_4 s + 4C_L L_L s + 2R_2 g_m + 4}$

$Q: \frac{2L_L \sqrt{\frac{1}{C_L L_L}}(R_2 g_m + 2)}{R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}{2L_L (R_2 g_m + 2)}$

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

Filter 8

Filter Type: BP

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$H(s): \frac{L_L R_L s(R_2 R_4 g_m - R_2 + R_4)}{C_L L_L R_2 R_4 R_L R_L g_m s^3 + C_L L_L R_2 R_L s^2 + C_L L_L R_4 R_L s^2 + L_L R_2 R_4 g_m s + L_L R_2 s + L_L R_4 s + 4L_L R_L s + R_2 R_4 R_L g_m + R_2 + R_4 + R_L}$

$Q: \frac{C_L R_L \sqrt{\frac{1}{C_L L_L}}(R_2 R_4 g_m + R_2 + R_4)}{R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}{C_L R_L (R_2 R_4 g_m + R_2 + R_4)}$

Filter 9

Filter Type: GE

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$H(s): \frac{(R_2 R_4 g_m - R_2 + R_4)(C_L L_L R_L s^2 + L_L s + R_L)}{C_L L_L R_2 R_4 g_m s^3 + 2C_L L_L R_2 R_L g_m s^2 + C_L L_L R_2 s^2 + C_L L_L R_4 s^2 + 4C_L L_L R_L s^2 + 2L_L R_2 g_m s + 4L_L s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}$

$Q: \frac{C_L \sqrt{\frac{1}{C_L L_L}}(R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L)}{2(R_2 g_m + 2)}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{2(R_2 g_m + 2)}{C_L (R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L)}$

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

Filter 10

Filter Type: BS

$Z(s): \left(\infty, R_2, \infty, \infty, R_4, \frac{R_L \left(L_L s + \frac{1}{C_L L_L}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$H(s): \frac{R_L (C_L L_L s^2 + 1)(R_2 R_4 g_m - R_2 + R_4)}{C_L L_L R_2 R_4 g_m s^3 + 2C_L L_L R_2 R_L g_m s^2 + C_L L_L R_2 s^2 + C_L L_L R_4 s^2 + 4C_L L_L R_L s^2 + 2L_L R_2 g_m s + 4L_L s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L}$

$Q: \frac{L_L \sqrt{\frac{1}{C_L L_L}}(R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L)}{R_L (R_2 R_4 g_m + R_2 + R_4)}$

$\omega_0: \sqrt{\frac{1}{C_L L_L}}$

Bandwidth: $\frac{R_L (R_2 R_4 g_m + R_2 + R_4)}{L_L (R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4 + 4R_L)}$

Filter 11

Invalid filter

$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, R_L\right)$

Filter 12

Invalid filter

$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s}\right)$

Filter 13

Filter Type: Invalid011

$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1}\right)$

$H(s): \frac{R_L (1 - C_L R_2 s + R_2 g_m + 1)}{C_4 C_L R_2 R_L s^3 + 2C_4 R_2 R_L g_m s^2 + C_4 R_2 s^2 + 4C_4 R_L s + C_L R_2 R_L g_m s + C_L R_L s + R_2 g_m + 1}$

$Q: \frac{C_L C_L R_2 R_L \sqrt{\frac{1}{C_L R_L}}}{2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L}$

$\omega_0: \sqrt{\frac{R_2 g_m + 1}{C_L C_L R_2 R_L}}$

Bandwidth: $\frac{2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L}{C_4 C_L R_2 R_L}$

Filter 14

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 15

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 16**Filter Type:** Invalid110

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{-L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s): \frac{L_L s(-C_4 R_2 s + R_2 g_m + 1)}{C_4 C_L L_L R_2 R_L s^3 + 2C_4 L_L R_2 R_L g_m s^2 + 4C_4 L_L s^2 + C_4 R_2 s + C_L L_L R_2 g_m s^2 + C_L L_L s^2 + R_2 g_m + 1}$$

$$H(s): \frac{L_L \sqrt{\frac{R_2 g_m + 1}{L_L (2C_4 R_2 g_m + 4C_4 + C_L R_2 g_m + C_L)}}}{C_4 R_2} (2C_4 R_2 g_m + 4C_4 + C_L R_2 g_m + C_L)$$

$$\mathbf{Q}: \frac{C_4 R_2}{L_L (2C_4 R_2 g_m + 4C_4 + C_L R_2 g_m + C_L)}$$

$$\omega_0: \sqrt{\frac{R_2 g_m + 1}{L_L (2C_4 R_2 g_m + 4C_4 + C_L R_2 g_m + C_L)}}$$

$$\mathbf{Bandwidth}: \frac{C_4 R_2}{L_L (2C_4 R_2 g_m + 4C_4 + C_L R_2 g_m + C_L)}$$

Filter 17

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 18**Filter Type:** Invalid110

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{L_L} + \frac{1}{L_L'}} \right)$$

$$H(s): \frac{L_L R_L s(-C_4 R_2 s + R_2 g_m + 1)}{C_4 C_L L_L R_2 R_L s^3 + 2C_4 L_L R_2 R_L g_m s^2 + C_4 L_L R_2 s^2 + 4C_4 L_L R_L s^2 + C_4 R_2 R_L g_m s^2 + C_L L_L R_L s^2 + L_L R_2 g_m s + L_L s + R_2 R_L g_m + R_L}$$

$$H(s): \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + 1)}{L_L (2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}}}{C_4 R_2 R_L + L_L R_2 g_m + L_L} (2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L)$$

$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + 1)}{L_L (2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}}}{C_4 R_2 R_L + L_L R_2 g_m + L_L}$$

$$\omega_0: \sqrt{\frac{R_2 (R_2 g_m + 1)}{L_L (2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}}$$

$$\mathbf{Bandwidth}: \frac{C_4 R_2 R_L + L_L R_2 g_m + L_L}{L_L (2C_4 R_2 R_L g_m + C_4 R_2 + 4C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}$$

Filter 19

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 20

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 21

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, R_L \right)$$

Filter 22**Filter Type:** Invalid011

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{1}{C_L s} \right)$$

$$H(s): \frac{-C_4 R_2 R_4 s + R_2 R_4 g_m - R_4 + R_4}{C_4 C_L R_2 R_4 s^2 + 2C_4 R_2 R_4 g_m s + 4C_4 R_4 s + C_L R_2 R_4 R_L g_m s + C_L R_2 R_4 R_L s + C_L R_4 s + 2R_2 g_m + 4}$$

$$\mathbf{Q}: \frac{\sqrt{2C_4 C_L R_4 R_4} \sqrt{\frac{R_2 g_m + 2}{C_4 R_4 s + 1}}}{2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4}$$

$$\omega_0: \sqrt{2} \sqrt{\frac{R_2 g_m + 2}{C_4 C_L R_4 R_4}}$$

$$\mathbf{Bandwidth}: \frac{2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 g_m + C_L R_4 + C_L R_4}{C_4 C_L R_2 R_4}$$

Filter 23**Filter Type:** Invalid011

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s): \frac{R_L (-C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{C_4 C_L R_2 R_4 R_L s^2 + 2C_4 R_2 R_2 R_L g_m s + C_4 R_2 R_4 s + 4C_4 R_4 R_L s + C_L R_2 R_4 R_L g_m s + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_4 + R_4 + 4R_L}$$

$$\mathbf{Q}: \frac{C_4 C_L R_2 R_4 R_L \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{2C_4 R_2 R_4 s + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_4 + R_4 + 4R_L}}}{2C_4 R_2 R_4 R_L g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_4 + R_4 + 4R_L}$$

$$\omega_0: \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{2C_4 R_2 R_4 R_L}}$$

$$\mathbf{Bandwidth}: \frac{2C_4 R_2 R_4 R_L g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_4 + R_4 + 4R_L}{C_4 C_L R_2 R_4 R_L}$$

Filter 24

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, R_L + \frac{1}{C_L s} \right)$$

Filter 25

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, L_L s + \frac{1}{C_L s} \right)$$

Filter 26**Filter Type:** Invalid110

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s): \frac{L_L s(-C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{C_4 C_L L_L R_2 R_4 R_L s^3 + 2C_4 L_L R_2 R_4 R_L g_m s^2 + 4C_4 L_L R_4 s^2 + C_4 R_2 R_4 R_L s + C_L L_L R_2 R_4 R_L s^2 + C_L L_L R_4 s^2 + 2L_L R_2 g_m s + 4L_L s + R_2 R_4 g_m + R_2 + R_4}$$

$$H(s): \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4)}}}{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}$$

$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4)}}}{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 R_4 R_L + 2L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}$$

$$\omega_0: \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4)}}$$

$$\mathbf{Bandwidth}: \frac{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 s + R_2 R_4 g_m + 2R_2 R_L g_m + R_2 + R_4)}$$

Filter 27

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 28**Filter Type:** Invalid110

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{1}{R_L + \frac{1}{L_L s}} \right)$$

$$H(s): \frac{L_L R_L s(-C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{C_4 C_L L_L R_2 R_4 R_L s^3 + 2C_4 L_L R_2 R_4 R_L g_m s^2 + 4C_4 L_L R_4 R_L s^2 + C_4 R_2 R_4 R_L s + C_L L_L R_2 R_4 R_L s^2 + C_L L_L R_4 R_L s^2 + L_L R_2 R_4 g_m s + 2L_L R_2 g_m s + L_L R_4 s + 4L_L R_L s + R_2 R_4 R_L g_m + R_2 R_L + R_4 R_L}$$

$$H(s): \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 R_L)}}}{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 R_4 R_L + 2L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}$$

$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 R_L)}}}{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 R_4 R_L + 2L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}$$

$$\omega_0: \sqrt{\frac{R_2 (R_2 g_m + R_2 + R_4)}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 R_L)}}$$

$$\mathbf{Bandwidth}: \frac{C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + L_L R_2 R_4 R_L + 2L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4L_L R_L}{L_L (2C_4 R_2 R_4 g_m + 4C_4 R_4 + C_L R_2 R_4 R_L g_m + C_L R_2 R_4 R_L s + C_L R_4 R_L)}$$

Filter 29

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 30

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{R_L \left(L_L s + \frac{1}{C_L^2} \right)}{L_L s + R_L + \frac{1}{C_L^2}} \right)$$

Filter 31

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, R_L \right)$$

Filter 32

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 33

Filter Type: Invalid011
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$
$$H(s): \frac{R_2 (C_4 R_2 R_4 g_m s - C_4 R_2 s + C_4 R_4 + R_2 g_m + 1)}{C_L C_L R_2 R_4 R_L g_m s^2 + C_L C_L R_2 R_4 R_L s^2 + C_4 C_L R_L R_4 R_L s^2 + C_4 R_2 R_4 g_m s + 2 C_4 R_2 R_2 g_m s + C_4 R_2 s + C_L R_4 s + 4 C_4 R_L s + C_L R_2 R_L g_m s + C_L R_L s + R_2 g_m + 1}$$
$$Q: \frac{C_4 C_L R_L R_4 R_2 R_L g_m + 2 C_4 R_2 R_2 g_m + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L}{C_4 C_L R_L R_4 R_2 R_L g_m + 2 C_4 R_2 R_2 g_m + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L}$$
$$\omega_0: \sqrt{\frac{R_2 g_m + 1}{C_L C_L R_L R_4 R_2 R_L g_m + R_2 + R_4}}$$

Bandwidth: $\frac{C_4 R_2 R_4 g_m + 2 C_4 R_2 R_2 g_m + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_4 g_m + C_L R_L}{C_4 C_L R_L (R_2 R_4 g_m + R_2 + R_4)}$

Filter 34

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 35

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 36

Filter Type: Invalid110
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$
$$H(s): \frac{L_L s (C_4 R_2 R_4 g_m s - C_4 R_2 s + C_4 R_4 + R_2 g_m + 1)}{C_4 C_L L_L R_4 R_4 R_L g_m s^2 + C_4 C_L L_L R_4 R_4 s^2 + C_4 C_L L_L R_4 R_4 s^2 + 2 C_4 L_L R_2 R_4 g_m s + 4 C_4 L_L s^2 + C_4 R_2 R_4 g_m s + C_4 R_2 s + C_L L_L R_2 g_m s^2 + C_L L_L s^2 + R_2 g_m + 1}$$
$$Q: \frac{L_L \sqrt{\frac{R_2 g_m + 1}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}} (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}{C_4 (R_2 R_4 g_m + R_2 + R_4)}$$
$$\omega_0: \sqrt{\frac{R_2 g_m + 1}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}}$$

Bandwidth: $\frac{C_4 (R_2 R_4 g_m + R_2 + R_4)}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}$

Filter 37

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 38

Filter Type: Invalid110
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$$
$$H(s): \frac{L_L R_L s (C_4 R_2 R_4 g_m s - C_4 R_2 s + C_4 R_4 + R_2 g_m + 1)}{C_4 C_L L_L R_4 R_4 R_L g_m s^2 + C_4 C_L L_L R_4 R_4 s^2 + C_4 C_L L_L R_4 R_4 s^2 + 2 C_4 L_L R_2 R_4 g_m s + C_4 L_L R_4 s^2 + C_4 L_L R_4 s^2 + 4 C_4 L_L R_4 s^2 + C_4 R_2 R_4 R_L g_m s + C_4 R_2 R_4 s + C_4 R_L s + C_L L_L R_2 R_4 g_m s^2 + C_L L_L R_4 s^2 + L_L s + R_2 R_L g_m + R_L}$$
$$Q: \frac{L_L \sqrt{\frac{R_2 (R_2 g_m + 1)}{L_L (C_4 R_2 R_4 g_m + 2 C_4 R_2 R_4 s + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}} (C_4 R_2 R_4 g_m + 2 C_4 R_2 R_4 s + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}{C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 s + C_4 R_4 R_L + L_L R_2 g_m + L_L}$$
$$\omega_0: \sqrt{\frac{R_2 (R_2 g_m + 1)}{L_L (C_4 R_2 R_4 g_m + 2 C_4 R_2 R_4 s + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}}$$

Bandwidth: $\frac{C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 s + C_4 R_4 R_L + L_L R_2 g_m + L_L}{L_L (C_4 R_2 R_4 g_m + 2 C_4 R_2 R_4 s + C_4 R_2 + C_4 R_4 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}$

Filter 39

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 40

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L^2} \right)}{L_L s + R_L + \frac{1}{C_L^2}} \right)$$

Filter 41

Filter Type: GE
$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, R_L \right)$$
$$H(s): \frac{R_L (C_4 L_4 R_2 g_m s^2 + C_4 L_4 s^2 - C_4 R_2 s + R_2 g_m + 1)}{C_4 L_L L_L R_2 g_m s^2 + C_4 L_4 s^2 + 2 C_4 R_2 R_L g_m s + C_4 R_2 s + 4 C_4 R_L s + R_2 g_m + 1}$$
$$Q: \frac{L_4 \sqrt{\frac{1}{C_4 L_L}} (R_2 g_m + 1)}{2 R_2 R_L g_m + R_2 + 4 R_L}$$
$$\omega_0: \sqrt{\frac{1}{C_4 L_L}}$$

Bandwidth: $\frac{2 R_2 R_L g_m + R_2 + 4 R_L}{L_L (R_2 g_m + 1)}$

Qz: $\frac{L_4 \sqrt{\frac{1}{C_4 L_L}} (-R_2 g_m - 1)}{R_2}$

Filter 42

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 43

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 44

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 45

Invalid filter
$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 46

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_L s^2 + 1} \right)$$

Filter 47

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 48

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{C_L s}}} \right)$$

Filter 49

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 50

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 51

Filter Type: GE

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, R_L \right)$$

$$H(s): \frac{R_L \left(-C_4 L_4 R_2 s^2 + L_4 R_2 g_m s + L_4 s - R_2 \right)}{2 C_4 L_L R_2 R_L g_m s^2 + C_4 L_4 R_2 s^2 + 4 C_4 L_4 R_L s^2 + L_4 R_2 g_m s + L_4 s + 2 R_2 R_L g_m + R_2 + 4 R_L}$$

$$\mathbf{Q}: \frac{C_4 \sqrt{\frac{1}{C_L^2 L_L^2}} (2 R_2 R_L g_m + R_2 + 4 R_L)}{R_2 g_m + 1}$$

$$\omega_0: \sqrt{\frac{1}{C_4^2 L_L^4}}$$

$$\mathbf{Bandwidth}: \frac{R_2 g_m + 1}{C_4 (2 R_2 R_L g_m + R_2 + 4 R_L)}$$

$$\mathbf{Qz}: -\frac{C_4 R_2 \sqrt{\frac{1}{C_L^2 L_L^2}}}{R_2 g_m + 1}$$

Filter 52

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{1}{C_L s} \right)$$

Filter 53

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 54

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, R_L + \frac{1}{C_L s} \right)$$

Filter 55

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, L_L s + \frac{1}{C_L s} \right)$$

Filter 56

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{L_4 s}{C_L L_L s^2 + 1} \right)$$

Filter 57

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 58

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{C_L s}}} \right)$$

Filter 59

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 60

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_4 s}{C_4 L_L s^2 + 1}, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 61

Filter Type: GE

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, R_L \right)$$

$$H(s): \frac{R_L \left(C_4 L_4 R_2 g_m s^2 + C_4 L_4 s^2 + C_4 R_2 R_L g_m s - C_4 R_2 s + C_4 R_4 s + R_2 g_m + 1 \right)}{C_4 L_L R_2 g_m s^2 + C_4 L_4 s^2 + C_4 R_2 R_L g_m s + 2 C_4 R_2 R_L g_m s + C_4 R_2 s + C_4 R_4 s + 4 C_4 R_L s + R_2 g_m + 1}$$

$$\mathbf{Q}: \frac{L_4 \sqrt{\frac{1}{C_L^2 L_L^2}} (R_2 g_m + 1)}{R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L}$$

$$\omega_0: \sqrt{\frac{1}{C_4^2 L_L^4}}$$

$$\mathbf{Bandwidth}: \frac{R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L}{C_4 (R_2 g_m + 1)}$$

$$\mathbf{Qz}: \frac{L_4 \sqrt{\frac{1}{C_L^2 L_L^2}} (R_2 g_m + 1)}{R_2 R_4 g_m - R_2 + R_4}$$

Filter 62

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 63

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 64

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 65

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s}\right)$

Filter 66

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

Filter 67

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 68

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L_L s}}}\right)$

Filter 69

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 70

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 71

Filter Type: GE

$Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, R_L\right)$
 $H(s)$: $\frac{R_L \left(-C_4 L_4 R_2 R_L s^2 + L_4 R_2 R_L g_m s - L_4 R_L s + L_4 R_L s - R_2 R_L\right)}{2 C_4 L_4 R_2 R_L R_L g_m s^2 + C_4 L_4 R_2 R_L s^2 + 4 C_4 L_4 R_L R_L s^2 + L_4 R_L R_L g_m s + 2 L_4 R_2 R_L g_m s + L_4 R_2 s + L_4 R_L s + 4 L_4 R_L s + 2 R_2 R_L R_L g_m + R_2 R_L + 4 R_L R_L}$
Q: $\frac{C_4 R_L \sqrt{\frac{C_4 L_4}{C_4 L_4}} (2 R_2 R_L g_m + R_2 + 4 R_L)}{R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L}$
 ω_0 : $\sqrt{\frac{1}{C_4 L_4}}$
Bandwidth: $\frac{R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L}{C_4 R_L (2 R_2 R_L g_m + R_2 + 4 R_L)}$
Qz: $-\frac{C_4 R_2 R_L \sqrt{\frac{C_4 L_4}{C_4 L_4}}}{R_2 R_L g_m - R_2 + R_L}$

Filter 72

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{1}{C_L s}\right)$

Filter 73

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{R_L}{C_L R_L + 1}\right)$

Filter 74

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, R_L + \frac{1}{C_L s}\right)$

Filter 75

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, L_L s + \frac{1}{C_L s}\right)$

Filter 76

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

Filter 77

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 78

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L_L s}}}\right)$

Filter 79

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 80

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 81

Filter Type: GE

$Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_L s^2 + 1} + R_L, R_L\right)$
 $H(s)$: $\frac{R_L \left(C_4 L_4 R_2 R_L g_m s^2 - C_4 L_4 R_2 s^2 + C_4 L_4 R_L s^2 + L_4 R_2 g_m s + L_4 s + R_2 R_L g_m - R_2 + R_L\right)}{C_4 L_4 R_2 R_L g_m s^2 + 2 C_4 L_4 R_L R_L g_m s^2 + C_4 L_4 R_2 s^2 + C_4 L_4 R_L s^2 + 4 C_4 L_4 R_L s^2 + L_4 R_2 g_m s + L_4 s + R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L}$
Q: $\frac{C_4 \sqrt{\frac{C_4 L_4}{C_4 L_4}} (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L)}{R_2 g_m + 1}$
 ω_0 : $\sqrt{\frac{1}{C_4 L_4}}$
Bandwidth: $\frac{R_2 g_m + 1}{C_4 (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L)}$
Qz: $\frac{C_4 \sqrt{\frac{C_4 L_4}{C_4 L_4}} (R_2 R_L g_m - R_2 + R_L)}{R_2 g_m + 1}$

Filter 82

Invalid filter
 $Z(s)$: $\left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_L s^2 + 1} + R_L, \frac{1}{C_L s}\right)$

Filter 83

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 84

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, R_L + \frac{1}{C_L s} \right)$$

Filter 85

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, L_L s + \frac{1}{C_L s} \right)$$

Filter 86

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 87

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 88

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$$

Filter 89

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 90

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{L_L s}{C_4 L_4 s^2 + 1} + R_4, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 91**Filter Type:** GE

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, R_L \right)$$

$$H(s): \frac{C_4 L_4 R_2 R_L g_m s^2 + 2 C_4 L_4 R_2 R_L g_m s^2 + C_4 L_4 R_2 s^2 + C_4 L_4 R_4 s^2 - C_4 L_4 R_2 s^2 - C_4 R_2 R_4 s + R_2 R_L g_m - R_2 + R_4}{C_4 L_4 R_2 R_L g_m s^2 + 2 C_4 L_4 R_2 R_L g_m s^2 + C_4 L_4 R_2 s^2 + 3 C_4 L_4 R_L s^2 + 2 C_4 R_2 R_L R_L g_m s + C_4 R_2 R_L s + 4 C_4 R_L R_L s + R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L}$$

$$\mathbf{Q}: \frac{L_4 \sqrt{\frac{1}{C_4 L_4}} (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L)}{R_4 (2 R_2 R_L g_m + R_2 + 4 R_L)}$$

$$\omega_0: \sqrt{\frac{1}{C_4 L_4}}$$

$$\text{Bandwidth: } \frac{R_4 (2 R_2 R_L g_m + R_2 + 4 R_L)}{L_4 (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L)}$$

$$\mathbf{Qz}: \frac{L_4 \sqrt{\frac{1}{C_4 L_4}} (-R_2 R_L g_m + R_2 - R_4)}{R_2 R_4}$$

Filter 92

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{1}{C_L s} \right)$$

Filter 93

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 94

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, R_L + \frac{1}{C_L s} \right)$$

Filter 95

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, L_L s + \frac{1}{C_L s} \right)$$

Filter 96

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 97

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 98

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$$

Filter 99

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 100

Invalid filter

$$Z(s): \left(\infty, R_2, \infty, \infty, \frac{R_4 (L_L s + \frac{1}{C_L s})}{L_L s + R_4 + \frac{1}{C_L s}}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 101

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_L s}, \infty, \infty, R_4, R_L \right)$$

Filter 102

Filter Type: Invalid011

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{1}{C_L s} \right)$$

$$H(s): \frac{C_2 C_L R_4 R_L s^2 + C_2 R_4 s + C_L R_4 g_m - 1}{C_2 C_L R_4 R_L s^2 + 4 C_2 s + C_L R_4 g_m s + C_L s + 2 g_m}$$

$$\mathbf{Q}: \frac{\sqrt{2} C_2 C_L R_4 \sqrt{C_2^2 R_L R_4}}{4 C_2 + C_L R_4 g_m + C_L}$$

$$\omega_0: \sqrt{2} \sqrt{\frac{R_4}{C_2 C_L R_4}}$$

$$\text{Bandwidth: } \frac{4 C_2 + C_L R_4 g_m + C_L}{C_2 C_L R_4}$$

Filter 103

Filter Type: Invalid011

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s): \frac{R_L (C_2 R_4 s + R_4 g_m - 1)}{C_2 C_L R_L R_L s^2 + C_2 R_L s + 4 C_2 L_L R_L s + C_L R_L R_L g_m s + C_L R_L s + R_4 g_m + 2 R_L g_m + 1}$$

$$\mathbf{Q}: \frac{C_2 C_L R_L R_L \sqrt{\frac{R_4 g_m + 1}{C_2^2 L_L R_L}}}{C_2 R_L + 4 C_2 R_L + C_L R_L R_L g_m + C_L R_L}$$

$$\omega_0: \sqrt{\frac{R_4 g_m + 2 R_L g_m + 1}{C_2 C_L R_L R_L}}$$

$$\text{Bandwidth: } \frac{C_2 R_L + C_2 R_L + C_L R_L R_L g_m + C_L R_L}{C_2 C_L R_L R_L}$$

Filter 104

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, R_L + \frac{1}{C_L s} \right)$$

Filter 105

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, L_L s + \frac{1}{C_L s} \right)$$

Filter 106

Filter Type: Invalid110

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s): \frac{L_L s (C_2 R_4 s + R_4 g_m - 1)}{C_2 C_L L_L R_L R_L s^3 + 4 C_2 L_L s^2 + C_2 R_4 s + C_L L_L R_L R_L g_m s^2 + C_L L_L R_L s^2 + 2 L_L g_m s + R_4 g_m + 1}$$

$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_4 g_m + 1}{L_L (4 C_2 + C_L R_4 g_m + C_L)}}}{C_2 R_L + 2 L_L g_m}$$

$$\omega_0: \sqrt{\frac{R_4 g_m + 1}{L_L (4 C_2 + C_L R_4 g_m + C_L)}}$$

$$\text{Bandwidth: } \frac{C_2 R_L + 2 L_L g_m}{L_L (4 C_2 + C_L R_4 g_m + C_L)}$$

Filter 107

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 108

Filter Type: Invalid110

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{1}{C_L s + \frac{1}{\frac{1}{L_L s} + \frac{1}{L_L s}}} \right)$$

$$H(s): \frac{L_L R_L s (C_2 R_4 s + R_4 g_m - 1)}{C_2 C_L L_L R_L R_L s^3 + C_2 L_L R_4 s^2 + 4 C_2 L_L R_L s^2 + C_2 R_4 R_L s + C_L L_L R_L R_L g_m s^2 + C_L L_L R_L s^2 + L_L R_4 g_m s + L_L s + R_4 R_L g_m + R_L}$$

$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_L (R_4 g_m + 1)}{L_L (C_2 R_4 + 4 C_2 R_L + C_L R_L R_L g_m + C_L R_L)}}}{C_2 R_L R_L + L_L R_4 g_m + 2 L_L R_L g_m + L_L}$$

$$\omega_0: \sqrt{\frac{R_L (R_4 g_m + 1)}{L_L (C_2 R_4 + 4 C_2 R_L + C_L R_L R_L g_m + C_L R_L)}}$$

$$\text{Bandwidth: } \frac{C_2 R_L R_L + L_L R_4 g_m + 2 L_L R_L g_m + L_L}{L_L (C_2 R_4 + 4 C_2 R_L + C_L R_L R_L g_m + C_L R_L)}$$

Filter 109

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 110

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 111

Filter Type: Invalid011

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_L s}, R_L \right)$$

$$H(s): \frac{R_L (C_2 s - C_4 s + g_m)}{4 C_2 C_L R_L R_L s^2 + C_2 C_L R_L s^2 + C_2 s + 2 C_4 R_L R_L g_m s + C_4 s + g_m}$$

$$\mathbf{Q}: \frac{2 C_2 C_L R_L \sqrt{\frac{R_L}{C_2^2 R_L R_L}}}{C_2 + 2 C_4 R_L g_m + C_4}$$

$$\omega_0: \sqrt{\frac{R_L}{C_2^2 R_L R_L}}$$

$$\text{Bandwidth: } \frac{C_2 + 2 C_4 R_L g_m + C_4}{4 C_2 C_L R_L}$$

Filter 112

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_L s}, \frac{1}{C_L s} \right)$$

Filter 113

Filter Type: Invalid011

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_L s}, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s): \frac{R_L (C_2 s - C_4 s + g_m)}{4 C_2 C_L R_L R_L s^2 + C_2 C_L R_L s^2 + C_2 s + C_4 C_L R_L s^2 + 2 C_4 R_L R_L g_m s + C_4 s + C_L R_L R_L g_m s + g_m}$$

$$\mathbf{Q}: \frac{R_L \sqrt{\frac{R_L (4 C_2 C_L + C_2 C_L + C_4 C_L)}{C_2 + 2 C_4 R_L g_m + C_4 + C_L}}}{C_2 + 2 C_4 R_L g_m + C_4 + C_L R_L g_m}$$

$$\omega_0: \sqrt{\frac{g_m}{R_L (4 C_2 C_L + C_2 C_L + C_4 C_L)}}$$

$$\text{Bandwidth: } \frac{C_2 + 2 C_4 R_L g_m + C_4 + C_L R_L g_m}{R_L (4 C_2 C_L + C_2 C_L + C_4 C_L)}$$

Filter 114

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_L s}, R_L + \frac{1}{C_L s} \right)$$

Filter 115

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_L s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 116

Filter Type: Invalid110

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} \right) \\ H(s): & \frac{L_Ls}{4C_2C_4L_Ls^3+C_2C_LL_Ls^3+C_2s^3+C_2C_4L_Ls^3+2C_4L_Lg_ms^2+C_4s+C_LL_Lg_ms^2+g_m} \\ Q: & \frac{L_Lg_m\sqrt{\frac{L_L(4C_4+C_L)}{C_2+C_4}}}{C_2+C_4} \\ \omega_0: & \sqrt{\frac{1}{L_L(2C_4+C_L)}} \\ \text{Bandwidth:} & \frac{C_2+C_4}{L_Lg_m(2C_4+C_L)} \end{aligned}$$

Filter 117

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

Filter 118

Filter Type: Invalid110

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}} \right) \\ H(s): & \frac{L_LR_Ls(C_2s-C_4s+g_m)}{4C_2C_4L_LR_Ls^3+C_2C_4L_LL_RLs^3+C_2L_Ls^3+C_2R_Ls+C_4C_LL_RLs^3+2C_4L_LR_Lg_ms^3+C_4L_Ls^3+C_4R_Ls+C_LL_RLg_ms^2+L_Lg_ms^3+R_Lg_m} \\ Q: & \frac{L_LL_L\sqrt{\frac{R_Lg_m}{L_L(C_2+2C_4R_Lg_m+C_4+C_LL_RLg_m)}}(C_2+2C_4R_Lg_m+C_4+C_LL_RLg_m)}{C_2R_Ls+C_4R_Ls+L_Lg_m} \\ \omega_0: & \sqrt{\frac{R_Lg_m}{L_LL_L(C_2+2C_4R_Lg_m+C_4+C_LL_RLg_m)}} \\ \text{Bandwidth:} & \frac{C_4R_L+C_4R_L+L_Lg_m}{L_LL_L(C_2+2C_4R_Lg_m+C_4+C_LL_RLg_m)} \end{aligned}$$

Filter 119

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$$

Filter 120

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}} \right)$$

Filter 121

Filter Type: Invalid011

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, R_L \right) \\ H(s): & \frac{R_L(C_2R_4s-C_4R_4+R_Lg_m-1)}{4C_2C_4R_LR_Ls^3+C_2R_LR_Ls^3+C_2R_Ls+4C_2R_Ls+2C_4R_4R_Lg_ms+C_4R_4s+R_4g_m+2R_Lg_m+1} \\ Q: & \frac{C_2R_4+4C_2R_L\sqrt{\frac{R_Lg_m+2R_Lg_m+1}{C_2C_4R_4g_m+1}}}{\sqrt{\frac{R_Lg_m+2R_Lg_m+1}{\infty C_2R_LR_L}}} \\ \omega_0: & \frac{2}{\sqrt{\frac{R_Lg_m+2R_Lg_m+1}{\infty C_2R_LR_L}}} \\ \text{Bandwidth:} & \frac{C_2R_4+4C_2R_L+2C_4R_LR_Lg_m+C_4R_4}{4C_2C_4R_LR_L} \end{aligned}$$

Filter 122

Filter Type: Invalid011

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, \frac{1}{C_Ls} \right) \\ H(s): & \frac{C_4R_Ls-C_4R_4s+R_Lg_m-1}{4C_2C_4R_LR_Ls^3+C_2C_LR_LR_Ls^3+C_2R_Ls+4C_2s+C_4C_LR_LR_Ls^3+2C_4R_LR_Lg_ms+C_LR_Ls+R_4g_m+2R_Lg_m+1} \\ Q: & \frac{\sqrt{2}R_L\sqrt{\frac{R_Lg_m}{R_L(4C_2C_4+C_2C_L+C_4C_L)}}}{4C_2+2C_4R_Lg_m+C_LR_Lg_m+C_L} \\ \omega_0: & \sqrt{2}\sqrt{\frac{g_m}{R_L(4C_2C_4+C_2C_L+C_4C_L)}} \\ \text{Bandwidth:} & \frac{4C_2+2C_4R_Lg_m+C_LR_Lg_m+C_L}{R_L(4C_2C_4+C_2C_L+C_4C_L)} \end{aligned}$$

Filter 123

Filter Type: Invalid011

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, \frac{R_L}{C_LR_Ls+1} \right) \\ H(s): & \frac{R_L(C_2R_4s-C_4R_4s+R_Lg_m-1)}{4C_2C_4R_LR_Ls^3+C_2C_LR_LR_Ls^3+C_2R_Ls+4C_2R_Ls+C_4C_LR_LR_Ls^3+2C_4R_LR_Lg_ms+C_LR_Ls+R_4g_m+2R_Lg_m+1} \\ Q: & \frac{R_LR_L\sqrt{\frac{R_Lg_m+2R_Lg_m+1}{R_LR_L(4C_2C_4+C_2C_L+C_4C_L)}}}{C_2R_Ls+4C_2R_L+2C_4R_LR_Lg_m+C_LR_LR_Lg_m+C_LR_L} \\ \omega_0: & \sqrt{\frac{R_LR_L(4C_2C_4+C_2C_L+C_4C_L)}{R_LR_L(R_LC_4s+C_2C_L+C_4C_L)}} \\ \text{Bandwidth:} & \frac{C_2R_L+4C_2R_L+2C_4R_LR_Lg_m+C_4R_L+C_LR_LR_Lg_m+C_LR_L}{R_LR_L(R_LC_4s+C_2C_L+C_4C_L)} \end{aligned}$$

Filter 124

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, R_L + \frac{1}{C_Ls} \right)$$

Filter 125

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, L_Ls + \frac{1}{C_Ls} \right)$$

Filter 126

Filter Type: Invalid110

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1} \right) \\ H(s): & \frac{L_Ls(C_2R_4s-C_4R_4s+R_Lg_m-1)}{4C_2C_4L_LR_Ls^3+C_2C_4L_LL_RLs^3+4C_2L_Ls^2+C_2R_4s+C_4C_LL_RLs^3+2C_4L_LR_Lg_ms^2+C_4R_4s+C_LL_RLg_ms^2+C_LL_Ls^2+2L_Lg_ms+R_Lg_m+1} \\ Q: & \frac{L_LL_L\sqrt{\frac{R_Lg_m+1}{L_LL_L(4C_2+2C_4R_Lg_m+C_LR_Lg_m+C_L)}}}{C_2R_4s+C_4R_4s+2L_Lg_m} \\ \omega_0: & \sqrt{\frac{R_Lg_m+1}{L_LL_L(4C_2+2C_4R_Lg_m+C_LR_Lg_m+C_L)}} \\ \text{Bandwidth:} & \frac{C_2R_4+C_4R_4+2L_Lg_m}{L_LL_L(4C_2+2C_4R_Lg_m+C_LR_Lg_m+C_L)} \end{aligned}$$

Filter 127

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

Filter 128

Filter Type: Invalid110

$$\begin{aligned} Z(s): & \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, C_Ls+\frac{1}{R_L+\frac{1}{L_Ls}} \right) \\ H(s): & \frac{L_LR_Ls(C_2R_4s-C_4R_4s+R_Lg_m-1)}{4C_2C_4L_LR_LR_Ls^3+C_2C_4L_LL_RLs^3+4C_2L_LR_Ls^2+C_2R_4R_Ls+C_4C_LL_RLs^3+2C_4L_LR_Lg_ms^2+C_4R_4R_Ls+C_LL_RLg_ms^2+L_LR_Ls^2+2L_Lg_ms+R_LR_Lg_m+1} \\ Q: & \frac{L_LL_L\sqrt{\frac{R_L(R_Lg_m+1)}{L_LL_L(C_2R_4+4C_2R_L+2C_4R_LR_Lg_m+C_LR_LR_Lg_m+C_LR_L)}}(C_2R_4+4C_2R_L+2C_4R_LR_Lg_m+C_4R_4+C_LR_LR_Lg_m+C_LR_L)}{C_2R_LR_L+C_4R_LR_L+L_LR_Lg_m+2L_LR_Lg_m+L_L} \\ \omega_0: & \sqrt{\frac{R_L(R_Lg_m+1)}{L_LL_L(C_2R_4+4C_2R_L+2C_4R_LR_Lg_m+C_LR_LR_Lg_m+C_LR_L)}} \\ \text{Bandwidth:} & \frac{C_2R_LR_L+C_4R_LR_L+L_LR_Lg_m+2L_LR_Lg_m+L_L}{L_LL_L(C_2R_4+4C_2R_L+2C_4R_LR_Lg_m+C_4R_4+C_LR_LR_Lg_m+C_LR_L)} \end{aligned}$$

Filter 129

Invalid filter

$$Z(s): \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$$

Filter 130

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 131

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, R_L\right)$$

Filter 132

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$$

Filter 133

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L}{C_LR_4s+1}\right)$$

Filter 134

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$$

Filter 135

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 136

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_LL_s}{C_LL_s^2+1}\right)$$

Filter 137

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 138

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_Ls}}}\right)$$

Filter 139

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_s^2+1}+R_L\right)$$

Filter 140

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 141

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L\right)$$

Filter 142

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$$

Filter 143

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{R_L}{C_LR_4s+1}\right)$$

Filter 144

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$$

Filter 145

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 146

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{L_4s}{C_LL_s^2+1}\right)$$

Filter 147

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 148

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_Ls}}}\right)$$

Filter 149

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_s^2+1}+R_L\right)$$

Filter 150

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 151

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L\right)$$

Filter 152

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{1}{C_L s} \right)$

Filter 153

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{R_L}{C_L R_L s + 1} \right)$

Filter 154

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, R_L + \frac{1}{C_L s} \right)$

Filter 155

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, L_L s + \frac{1}{C_L s} \right)$

Filter 156

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$

Filter 157

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, L_L s + R_L + \frac{1}{C_L s} \right)$

Filter 158

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

Filter 159

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

Filter 160

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

Filter 161

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, R_L \right)$

Filter 162

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$

Filter 163

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$

Filter 164

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$

Filter 165

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$

Filter 166

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_4 s^2 + 1} \right)$

Filter 167

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$

Filter 168

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

Filter 169

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_4 s^2 + 1} + R_L \right)$

Filter 170

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

Filter 171

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, R_L \right)$

Filter 172

Invalid filter
 $Z(s)$: $\left(\infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{1}{C_L s} \right)$

Filter 173

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 174

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, R_L+\frac{1}{C_Ls}\right)$$

Filter 175

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 176

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 177

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 178

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$$

Filter 179

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$$

Filter 180

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s+\frac{1}{R_4}+\frac{1}{L_4s}}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{R_L}{C_Ls}}\right)$$

Filter 181

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, R_L\right)$$

Filter 182

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{1}{C_Ls}\right)$$

Filter 183

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 184

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, R_L+\frac{1}{C_Ls}\right)$$

Filter 185

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 186

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 187

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 188

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$$

Filter 189

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$$

Filter 190

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}+R_4, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{R_L}{C_Ls}}\right)$$

Filter 191

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{R_L}{C_Ls}}, R_L\right)$$

Filter 192

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{R_L}{C_Ls}}, \frac{1}{C_Ls}\right)$$

Filter 193

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{R_L}{C_Ls}}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 194

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, R_L+\frac{1}{C_Ls}\right)$$

Filter 195

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 196

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{L_Ls}{C_L L_Ls^2+1}\right)$$

Filter 197

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 198

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{1}{C_Ls^2+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$$

Filter 199

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{L_Ls}{C_L L_Ls^2+1}+R_L\right)$$

Filter 200

Invalid filter

$$Z(s)\colon \left(\infty, \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 201

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, R_L\right)$$

Filter 202

Filter Type: Invalid011

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{1}{C_Ls}\right)$$
$$H(s)\colon \frac{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$Q\colon \frac{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$\omega_0\colon \sqrt{2}\sqrt{\frac{R_2g_m+2}{C_2C_LR_2R_4}}$$

Bandwidth: $\frac{4C_2R_2+C_LR_2R_4g_m+C_LR_2+C_LR_4}{C_2C_LR_2R_4}$

Filter 203

Filter Type: Invalid011

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{R_L}{C_LR_Ls+1}\right)$$
$$H(s)\colon \frac{R_L(C_2R_2R_4s+R_2R_4g_m-R_2+R_4)}{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$Q\colon \frac{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}{C_2C_LR_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$\omega_0\colon \sqrt{\frac{R_2R_4g_m+2R_2R_4g_m+R_2+R_4+4R_4}{C_2C_LR_2R_4R_L}}$$

Bandwidth: $\frac{C_2R_2R_4+4C_2R_2R_4s+C_LR_2R_4R_Lg_m+C_LR_2R_4+C_LR_4R_L}{C_2C_LR_2R_4R_L}$

Filter 204

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, R_L+\frac{1}{C_Ls}\right)$$

Filter 205

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 206

Filter Type: Invalid110

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{L_Ls}{C_L L_Ls^2+1}\right)$$
$$H(s)\colon \frac{L_Ls(C_2R_2R_4s+R_2R_4g_m-R_2+R_4)}{C_2C_LR_2R_4R_Ls^2+4C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$Q\colon \frac{R_2R_4g_m+R_2+R_4}{L_L(4C_2R_2+C_LR_2R_4g_m+C_LR_2+C_LR_4)}(4C_2R_2+C_LR_2R_4g_m+C_LR_2+C_LR_4)$$
$$\omega_0\colon \sqrt{\frac{R_2R_4g_m+R_2+R_4}{L_L(4C_2R_2+C_LR_2R_4g_m+C_LR_2+C_LR_4)}}$$

Bandwidth: $\frac{C_2R_2R_4+2L_LR_2R_4g_m+4L_LR_4}{L_L(4C_2R_2+C_LR_2R_4g_m+C_LR_2+C_LR_4)}$

Filter 207

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 208

Filter Type: Invalid110

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{1}{R_L+\frac{1}{L_Ls}}\right)$$
$$H(s)\colon \frac{L_LR_Ls(C_2R_2R_4s+R_2R_4g_m-R_2+R_4)}{C_2C_LR_2R_4R_Ls^2+C_2L_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LL_LR_2R_4R_Ls^2+C_LL_LR_2R_4R_Ls^2+R_2+R_4}$$
$$Q\colon \frac{L_L\sqrt{\frac{R_L(R_2R_4g_m+R_2+R_4)}{C_2R_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}}}{C_2R_2R_4R_Ls^2+C_2R_2R_4s+C_LR_2R_4R_Ls^2+4C_2R_2R_4R_Ls+C_LR_2R_4R_Ls^2+R_2+R_4}$$
$$\omega_0\colon \sqrt{\frac{R_L(R_2R_4g_m+R_2+R_4)}{L_L(C_2R_2R_4s+C_2R_2R_4s+C_LR_2R_4R_Ls^2+C_LR_2R_4R_Ls^2+R_2+R_4)}}$$

Bandwidth: $\frac{C_2R_2R_4+2L_LR_2R_4g_m+4L_LR_4}{L_L(C_2R_2R_4s+C_2R_2R_4s+C_LR_2R_4R_Ls^2+C_LR_2R_4R_Ls^2+R_2+R_4)}$

Filter 209

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{L_Ls}{C_L L_Ls^2+1}+R_L\right)$$

Filter 210

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, R_4, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 211

Filter Type: Invalid011

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, R_L \right) \\ H(s) &: \frac{R_L (C_2 B_2 s - C_1 B_2 s + B_2 g_m + 1)}{4 C_2 C_4 R_2 R_L s^2 + C_2 R_2 s + 2 C_4 R_2 R_L g_m s + C_4 R_2 s + 4 C_4 R_L s + R_2 g_m + 1} \\ \mathbf{Q} &: \frac{2 C_2 C_4 R_2 R_L}{C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L} \sqrt{\frac{R_2 g_m + 1}{C_2^2 R_2 R_L}} \\ \omega_0 &: \sqrt{\frac{R_2 g_m + 1}{C_2^2 C_4 R_2 R_L}} \\ \text{Bandwidth: } &\frac{C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L}{4 C_2^2 C_4 R_2 R_L} \end{aligned}$$

Filter 212

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 213

Filter Type: Invalid011

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right) \\ H(s) &: \frac{R_L (C_2 R_2 s - C_1 B_2 s + B_2 g_m + 1)}{4 C_2^2 C_4 R_2 R_L s^2 + C_2 C_L R_2 R_L s^2 + C_2 R_2 s + C_4 C_L R_2 R_L s^2 + 2 C_4 R_2 R_L g_m s + C_4 R_2 s + 4 C_4 R_L s + C_L R_2 R_L g_m s + C_L R_L s + R_2 g_m + 1} \\ \mathbf{Q} &: \frac{R_2 R_L \sqrt{\frac{R_2 g_m + 1}{R_2 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}}}{C_2 R_2 + 2 C_1 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L} (4 C_2 C_4 + C_2 C_L + C_4 C_L) \\ \omega_0 &: \sqrt{\frac{R_2 g_m + 1}{R_2 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}} \\ \text{Bandwidth: } &\frac{C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L}{R_2 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)} \end{aligned}$$

Filter 214

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2^2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 215

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 216

Filter Type: Invalid110

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2^2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} \right) \\ H(s) &: \frac{L_L s (C_2 R_2 s - C_4 R_2 s + B_2 g_m + 1)}{4 C_2^2 C_4 L_L R_2 s^2 + C_2 C_L L_L R_2 s^2 + C_2 R_2 s + C_4 C_L L_L R_2 s^2 + 2 C_4 L_L R_2 R_2 g_m s^2 + 4 C_4 L_L s^2 + C_4 R_2 s + C_L L_L R_2 g_m s^2 + C_L L_L s^2 + R_2 g_m + 1} \\ \mathbf{Q} &: \frac{L_L \sqrt{\frac{B_2 g_m + 1}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}}}{R_2 (C_2 + C_4)} (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L) \\ \omega_0 &: \sqrt{\frac{R_2 g_m + 1}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)}} \\ \text{Bandwidth: } &\frac{R_2 (C_2 + C_4)}{L_L (2 C_4 R_2 g_m + 4 C_4 + C_L R_2 g_m + C_L)} \end{aligned}$$

Filter 217

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2^2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 218

Filter Type: Invalid110

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s} + \frac{1}{L_L s} \right) \\ H(s) &: \frac{L_L R_L s (C_2 R_2 s - C_1 R_2 s + B_2 g_m + 1)}{4 C_2 C_4 L_L R_2 R_L s^2 + C_2 C_L L_L R_2 R_L s^2 + C_2 L_L R_2 s^2 + C_2 R_2 R_L s + C_1 C_L L_L R_2 R_L s^2 + 2 C_4 L_L R_2 R_L g_m s^2 + 4 C_4 L_L R_L s^2 + C_4 R_2 R_L s + C_L L_L R_2 R_L g_m s^2 + C_L L_L R_L s^2 + L_L s + R_2 R_L g_m + R_L} \\ \mathbf{Q} &: \frac{L_L \sqrt{\frac{R_2 (B_2 g_m + 1)}{L_L (C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + C_L R_L + C_L R_2 R_L g_m + C_L R_L)}}}{C_2 R_2 R_L + C_4 R_2 R_L + L_L R_2 g_m + L_L} (C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L) \\ \omega_0 &: \sqrt{\frac{R_2 (B_2 g_m + 1)}{L_L (C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)}} \\ \text{Bandwidth: } &\frac{C_2 R_2 R_L + C_4 R_2 R_L + L_L R_2 g_m + L_L}{L_L (C_2 R_2 + 2 C_4 R_2 R_L g_m + C_4 R_2 + 4 C_4 R_L + C_L R_2 R_L g_m + C_L R_L)} \end{aligned}$$

Filter 219

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 220

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 221

Filter Type: Invalid011

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, R_L \right) \\ H(s) &: \frac{R_L (C_2 R_2 R_4 s - C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{4 C_2^2 C_4 R_4 R_L R_L s^2 + C_2 C_L R_2 R_4 s^2 + C_2 R_2 R_4 s + 2 C_4 R_2 R_4 R_L s + 2 C_4 R_2 R_4 g_m s + C_4 R_2 R_4 s + 4 C_4 R_L s + R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L} \\ \mathbf{Q} &: \frac{2 C_2 C_4 R_2 R_L}{C_2 R_2 R_4 + 4 C_2^2 R_2 R_L + 2 C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 + 4 C_4 R_L} \sqrt{\frac{R_2 R_4 g_m + 1}{R_2 R_4 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}} \\ \omega_0 &: \sqrt{\frac{R_2 R_4 g_m + 1}{R_2 R_4 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}} \\ \text{Bandwidth: } &\frac{C_2 B_2 R_4 + C_2 R_2 R_4 + 2 C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 + 4 C_4 R_L}{4 C_2^2 C_4 R_2 R_4 R_L} \end{aligned}$$

Filter 222

Filter Type: Invalid011

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{1}{C_L s} \right) \\ H(s) &: \frac{C_2 R_2 R_4 s - C_1 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4}{4 C_2^2 C_4 R_4 R_L R_L s^2 + C_2 C_L R_2 R_4 s^2 + 4 C_2 R_2 R_4 s + 2 C_4 R_2 R_4 R_L s + 2 C_4 R_2 R_4 g_m s + C_4 R_2 R_4 s + 4 C_4 R_L s + R_2 R_4 g_m s + C_L R_2 R_4 s + C_L R_4 s + 2 R_2 g_m + 4} \\ \mathbf{Q} &: \frac{\sqrt{2} R_2 R_4 \sqrt{\frac{R_2 g_m + 2}{R_2 R_4 (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}}}{4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_L + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4} (4 C_2 C_4 + C_2 C_L + C_4 C_L) \\ \omega_0 &: \sqrt{2} \sqrt{\frac{R_2 g_m + 2}{R_2 R_4 (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}} \\ \text{Bandwidth: } &\frac{4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_L + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4}{R_2 R_4 (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)} \end{aligned}$$

Filter 223

Filter Type: Invalid011

$$\begin{aligned} Z(s) &: \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{R_L}{C_L R_L s + 1} \right) \\ H(s) &: \frac{R_L (C_2 R_2 R_4 s - C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{4 C_2^2 C_4 R_2 R_L R_L s^2 + C_2 C_L R_2 R_L s^2 + C_2 R_2 R_L s + 4 C_2 R_2 R_L s + 2 C_4 R_2 R_L R_L s + 2 C_4 R_2 R_L g_m s + C_4 R_2 R_L s + 4 C_4 R_L s + C_L R_2 R_L s + C_L R_L s + R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L} \\ \mathbf{Q} &: \frac{R_2 R_4 R_L \sqrt{\frac{R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L}{R_2 R_4 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}}}{C_2 R_2 R_4 + 4 C_2 R_2 R_L + 2 C_4 R_2 R_L R_L g_m + C_4 R_2 R_4 + 4 C_4 R_L R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_L R_L} (4 C_2 C_4 + C_2 C_L + C_4 C_L) \\ \omega_0 &: \sqrt{\frac{R_2 R_4 g_m + 2 R_2 R_L g_m + R_2 + R_4 + 4 R_L}{R_2 R_4 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)}} \\ \text{Bandwidth: } &\frac{C_2 R_2 R_4 + 4 C_2 R_2 R_L + 2 C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 + 4 C_4 R_L R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_L R_L}{R_2 R_4 R_L (4 C_2^2 C_4 + C_2 C_L + C_4 C_L)} \end{aligned}$$

Filter 224

Invalid filter

$$Z(s) : \left(\infty, \frac{R_2}{C_2 R_{2s+1}}, \infty, \infty, \frac{R_4}{C_L R_4 s + 1}, R_L + \frac{1}{C_L s} \right)$$

Filter 225

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, L_L s + \frac{1}{C_L s} \right)$$

Filter 226

Filter Type: Invalid110

$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$
$$H(s): \frac{L_L s (C_2 R_2 R_4 s - C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{4 C_2^2 C_4 L_L R_2 R_4 s^3 + C_2^2 C_L L_L R_2 R_4 s^3 + 4 C_2 L_L R_2 R_4 s^2 + C_2 R_2 R_4 + C_2^2 R_2 R_4 s + C_2 C_L L_L R_2 R_4 s^3 + 2 C_4 L_L R_2 R_4 g_m s^2 + C_2 L_L R_2 R_4 s^2 + C_L L_L R_4 s^3 + 2 L_L R_2 g_m s + 4 L_L s + R_2 R_4 g_m + R_2 + R_4}$$
$$Q: \frac{L_L \sqrt{\frac{R_2 R_4 g_m + R_2 + R_4}{L_L (4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_4 + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4)} (4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_4 + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4)}}{C_2 R_2 R_4 + C_4 R_2 R_4 + 2 L_L R_2 g_m + 4 L_L}$$
$$\omega_0: \sqrt{\frac{R_2 R_4 g_m + R_2 + R_4}{L_L (4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_4 + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4)}}$$
Bandwidth: $\frac{C_2 R_2 R_4 + C_4 R_2 R_4 + 2 L_L R_2 g_m + 4 L_L}{L_L (4 C_2 R_2 + 2 C_4 R_2 R_4 g_m + 4 C_4 R_4 + C_L R_2 R_4 g_m + C_L R_2 + C_L R_4)}$

Filter 227

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 228

Filter Type: Invalid110

$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L_L s}}} \right)$$
$$H(s): \frac{L_L R_L s (C_2 R_2 R_4 s - C_4 R_2 R_4 s + R_2 R_4 g_m - R_2 + R_4)}{4 C_2^2 C_4 L_L R_2 R_4 R_L s^3 + C_2^2 C_L L_L R_2 R_4 R_L s^3 + C_2 L_L R_2 R_4 R_L s^2 + 4 C_2 L_L R_2 R_4 R_L s^2 + C_2 R_2 R_4 R_L s + C_2 C_L L_L R_2 R_4 R_L s^3 + 2 C_4 L_L R_2 R_4 R_L g_m s^2 + C_L L_L R_2 R_4 R_L s^2 + C_L L_L R_4 R_L s^2 + L_L R_2 R_4 g_m s + 2 L_L R_2 R_4 g_m s + L_L R_2 s + L_L R_4 s + 4 L_L R_L s + R_2 R_4 R_L g_m + R_2 R_L + R_4 R_L}$$
$$Q: \frac{L_L \sqrt{\frac{R_2 R_4 R_L g_m + R_2 + R_4}{L_L (C_2 R_2 R_4 + 4 C_2 R_2 R_4 R_L + 2 C_4 R_2 R_4 R_L g_m + 4 C_4 R_4 R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_4 R_L)} (C_2 R_2 R_4 + 4 C_2 R_2 R_4 R_L + 2 C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 + 4 C_4 R_4 R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_4 R_L)}}{C_2 R_2 R_4 R_L + C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + 2 L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4 L_L R_L}$$
$$\omega_0: \sqrt{\frac{R_L (R_2 R_4 g_m + R_2 + R_4)}{L_L (C_2 R_2 R_4 + 4 C_2 R_2 R_4 R_L + 2 C_4 R_2 R_4 R_L g_m + 4 C_4 R_4 R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_4 R_L)}}$$
Bandwidth: $\frac{C_2 R_2 R_4 R_L + C_4 R_2 R_4 R_L + L_L R_2 R_4 g_m + 2 L_L R_2 R_4 g_m + L_L R_2 + L_L R_4 + 4 L_L R_L}{L_L (C_2 R_2 R_4 + 4 C_2 R_2 R_4 R_L + 2 C_4 R_2 R_4 R_L g_m + C_4 R_2 R_4 + 4 C_4 R_4 R_L + C_L R_2 R_4 R_L g_m + C_L R_2 R_L + C_L R_4 R_L)}$

Filter 229

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 230

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 231

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, R_L \right)$$

Filter 232

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 233

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 234

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 235

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 236

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 237

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 238

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$$

Filter 239

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 240

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_4 + \frac{1}{C_4 s}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 241

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, L_4 s + \frac{1}{C_4 s}, R_L \right)$$

Filter 242

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 243

Invalid filter
$$Z(s): \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 244

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 245

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 246

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_L L_4s^2+1}\right)$

Filter 247

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 248

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

Filter 249

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_L L_4s^2+1} + R_L\right)$

Filter 250

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_L}\right)}{L_Ls+R_L+\frac{1}{C_L}}\right)$

Filter 251

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L\right)$

Filter 252

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{1}{C_Ls}\right)$

Filter 253

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L}{C_LR_2s+1}\right)$

Filter 254

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L + \frac{1}{C_Ls}\right)$

Filter 255

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 256

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_4s^2+1}\right)$

Filter 257

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 258

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

Filter 259

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_4s^2+1} + R_L\right)$

Filter 260

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L\left(L_Ls+\frac{1}{C_L}\right)}{L_Ls+R_L+\frac{1}{C_L}}\right)$

Filter 261

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L\right)$

Filter 262

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 263

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LR_4s+1}\right)$

Filter 264

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 265

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 266

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_L s^2 + 1} \right)$

Filter 267

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$

Filter 268

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

Filter 269

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_L s^2 + 1} + R_L \right)$

Filter 270

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$

Filter 271

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, R_L \right)$

Filter 272

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{1}{C_L s} \right)$

Filter 273

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{R_L}{C_L R_L s + 1} \right)$

Filter 274

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, R_L + \frac{1}{C_L s} \right)$

Filter 275

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, L_L s + \frac{1}{C_L s} \right)$

Filter 276

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{L_4 s}{C_L L_L s^2 + 1} \right)$

Filter 277

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, L_L s + R_L + \frac{1}{C_L s} \right)$

Filter 278

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

Filter 279

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{L_4 s}{C_L L_L s^2 + 1} + R_L \right)$

Filter 280

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$

Filter 281

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, R_L \right)$

Filter 282

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, \frac{1}{C_L s} \right)$

Filter 283

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, \frac{R_L}{C_L R_L s + 1} \right)$

Filter 284

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, R_L + \frac{1}{C_L s} \right)$

Filter 285

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, L_L s + \frac{1}{C_L s} \right)$

Filter 286

Invalid filter
 $Z(s)$: $\left(\infty, \frac{R_2}{C_2 R_3 s + 1}, \infty, \infty, \frac{L_4 s}{C_L L_L s^2 + 1} + R_4, \frac{L_4 s}{C_L L_L s^2 + 1} \right)$

Filter 287

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 288

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_Ls}}}\right)$

Filter 289

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{L_4s}{C_4L_4s^2+1}+R_L\right)$

Filter 290

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 291

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, R_L\right)$

Filter 292

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{1}{C_Ls}\right)$

Filter 293

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{R_2}{C_LR_Ls+1}\right)$

Filter 294

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, R_L+\frac{1}{C_Ls}\right)$

Filter 295

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 296

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 297

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 298

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_Ls}}}\right)$

Filter 299

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{L_Ls}{C_4L_4s^2+1}+R_L\right)$

Filter 300

Invalid filter
 $Z(s)\colon \left(\infty, \frac{R_2}{C_2R_2s+1}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 301

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4, R_L\right)$

Filter 302

Filter Type: Invalid011
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{1}{C_Ls}\right)$
 $H(s)\colon \frac{C_2C_LR_2R_4R_4g_ms^2+C_2C_LR_2R_2s^2+C_2C_LR_4R_4s^2+C_2R_2s+C_2R_4s+R_4g_m-1}{C_2C_LR_2R_4g_ms^2+C_2C_LR_2s^2+C_2C_LR_4s^2+2C_2R_2g_ms+4C_2s+C_LR_4g_ms+C_L+2g_m}$
Q: $\frac{\sqrt{2}C_2C_L\sqrt{C_2C_LR_2R_4g_m+R_2+R_4}\left(R_2R_4g_m+R_2+R_4\right)}{2C_2R_2g_m+4C_2+C_LR_4g_m+C_L}$
 $\omega_0\colon \sqrt{2}\sqrt{\frac{g_m}{C_2C_LR_2R_4g_m+R_2+R_4}}$
Bandwidth: $\frac{2C_2R_2g_m+C_2+C_LR_4g_m+C_L}{C_2C_LR_2R_4g_m+R_2+R_4}$

Filter 303

Filter Type: Invalid011
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{R_L}{C_LR_Ls+1}\right)$
 $H(s)\colon \frac{R_L\left(C_2R_2R_4g_ms-C_2R_4s+C_2R_4s+R_4g_m-1\right)}{C_2C_LR_2R_4R_4g_ms^2+C_2C_LR_2R_4s^2+C_2C_LR_4R_4s^2+C_2R_2R_4g_ms+2C_2R_2R_4g_ms+C_2R_4s+4C_2R_4s+C_LR_4R_4g_ms+C_LR_4s+R_4g_m+2R_Lg_m+1}$
 $\frac{C_2C_LR_4\sqrt{C_2C_LR_2R_4g_m+R_2+R_4}}{C_2C_LR_2R_4g_ms+2C_2R_2R_4g_ms+C_2R_4s+4C_2R_4s+C_LR_4R_4g_ms+C_LR_4s}$
Q: $\frac{R_4g_m+2R_Lg_m+1}{C_2C_LR_2R_4\left(R_2R_4g_m+R_2+R_4\right)}$
 $\omega_0\colon \sqrt{\frac{R_4g_m+2R_Lg_m+1}{C_2C_LR_2\left(R_2R_4g_m+R_2+R_4\right)}}$
Bandwidth: $\frac{C_2R_4R_4g_m+2C_2R_2R_4g_m+C_2R_2+C_2R_4+C_2R_4+C_LR_4R_4g_m+C_LR_4}{C_2C_LR_2\left(R_2R_4g_m+R_2+R_4\right)}$

Filter 304

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4, R_L+\frac{1}{C_Ls}\right)$

Filter 305

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4, L_Ls+\frac{1}{C_Ls}\right)$

Filter 306

Filter Type: Invalid110

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$
$$H(s): \frac{L_L s (C_1 R_2 R_4 g_m s - C_2 R_2 s + C_2 R_4 s + R_4 g_m - 1)}{C_2 C_L L_L R_2 R_4 g_m s^3 + C_2 C_L L_L R_2 s^2 + C_2 C_L L_L R_4 s^2 + 2 C_2 L_L R_2 g_m s^2 + 4 C_2 L_L s^2 + C_2 R_2 R_4 g_m s + C_2 R_2 s + C_2 R_4 s + C_L L_L R_4 g_m s^2 + C_L L_L s^2 + 2 L_L g_m s + R_4 g_m + 1}$$
$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_4 g_m + 1}{L_L (2 C_2 R_2 g_m + 4 C_2 + C_L R_4 g_m + C_L)}} (2 C_2 R_2 g_m + 4 C_2 + C_L R_4 g_m + C_L)}{C_2 R_2 R_4 g_m + C_2 R_2 + C_2 R_4 + 2 L_L g_m}$$
$$\omega_0: \sqrt{\frac{R_4 g_m + 1}{L_L (2 C_2 R_2 g_m + 4 C_2 + C_L R_4 g_m + C_L)}}$$
$$\mathbf{Bandwidth}: \frac{C_2 R_4 R_4 g_m + C_2 R_2 + C_2 R_4 + 2 L_L g_m}{L_L (2 C_2 R_2 g_m + 4 C_2 + C_L R_4 g_m + C_L)}$$

Filter 307

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_4, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 308

Filter Type: Invalid110

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{C_L s}} \right)$$
$$H(s): \frac{L_L R_1 s (C_2 R_2 R_4 g_m s - C_2 R_2 s + C_2 R_4 s + R_4 g_m - 1)}{C_2 C_L L_L R_2 R_4 R_L g_m s^3 + C_2 C_L L_L R_2 R_4 s^2 + C_2 C_L L_L R_4 R_L s^2 + C_2 L_L R_2 R_4 g_m s^2 + 2 C_2 L_L R_2 R_4 g_m s^2 + C_2 L_L R_2 s^2 + C_2 L_L R_4 s^2 + 4 C_2 L_L R_4 s^2 + C_2 R_2 R_4 R_L g_m s + C_2 R_2 R_4 s + C_2 R_4 R_L s + C_L L_L R_4 R_L g_m s^2 + C_L L_L R_4 s^2 + L_L R_4 g_m s + 2 L_L R_L g_m s + L_L s + R_4 R_L g_m + R_L}$$
$$\mathbf{Q}: \frac{L_L \sqrt{\frac{R_4 (R_4 g_m + 1)}{L_L (C_2 R_2 R_4 g_m + 2 C_2 R_2 R_L g_m + C_2 R_2 + C_2 R_4 + 4 C_2 R_L + C_L R_4 R_L g_m + C_L R_L)}} (C_2 R_2 R_4 g_m + 2 C_2 R_2 R_L g_m + C_2 R_2 + C_2 R_4 + 4 C_2 R_L + C_L R_4 R_L g_m + C_L R_L)}{C_2 R_2 R_4 R_L g_m + C_2 R_2 R_L + C_2 R_4 R_L + L_L R_4 g_m + 2 L_L R_L g_m + L_L}$$
$$\omega_0: \sqrt{\frac{R_4 (R_4 g_m + 1)}{L_L (C_2 R_2 R_4 g_m + 2 C_2 R_2 R_L g_m + C_2 R_2 + C_2 R_4 + 4 C_2 R_L + C_L R_4 R_L g_m + C_L R_L)}}$$
$$\mathbf{Bandwidth}: \frac{C_2 R_2 R_4 R_L g_m + C_2 R_2 R_L + C_2 R_4 R_L + L_L R_4 g_m + 2 L_L R_L g_m + L_L}{L_L (C_2 R_2 R_4 g_m + 2 C_2 R_2 R_L g_m + C_2 R_2 + C_2 R_4 + 4 C_2 R_L + C_L R_4 R_L g_m + C_L R_L)}$$

Filter 309

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 310

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_4, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 311

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, R_L \right)$$

Filter 312

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L}{C_L s} \right)$$

Filter 313

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 314

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 315

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 316

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 317

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 318

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{C_L s}} \right)$$

Filter 319

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 320

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L (L_L s + \frac{1}{C_L s})}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 321

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, R_L \right)$$

Filter 322

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{1}{C_L s} \right)$$

Filter 323

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 324

Invalid filter

$$Z(s): \left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, R_L + \frac{1}{C_L s} \right)$$

Filter 325

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 326

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 327

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 328

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$

Filter 329

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

Filter 330

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 331

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, R_L\right)$

Filter 332

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 333

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 334

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$

Filter 335

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 336

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 337

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 338

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$

Filter 339

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

Filter 340

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 341

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L\right)$

Filter 342

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 343

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{R_4}{C_LR_Ls+1}\right)$

Filter 344

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$

Filter 345

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 346

Invalid filter
 $Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 347

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 348

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{C_Ls}}}\right)$

Filter 349

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 350

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 351

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, R_L\right)$

Filter 352

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{1}{C_Ls}\right)$

Filter 353

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{R_L}{C_LL_Ls+1}\right)$

Filter 354

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, R_L + \frac{1}{C_Ls}\right)$

Filter 355

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 356

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_4s^2+1}\right)$

Filter 357

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 358

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{C_Ls}}}\right)$

Filter 359

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 360

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_4L_4s^2+1}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 361

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L\right)$

Filter 362

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 363

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LL_Ls+1}\right)$

Filter 364

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 365

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 366

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 367

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 368

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{C_Ls}}}\right)$

Filter 369

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_4 s}{C_L L_4 s^2 + 1} + R_L\right)$

Filter 370

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{C_L^2}{C_L^2}\right)}{L_L s + R_L + \frac{1}{C_L^2 s}}\right)$

Filter 371

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, R_L\right)$

Filter 372

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{1}{C_L s}\right)$

Filter 373

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{R_L}{C_L R_L s + 1}\right)$

Filter 374

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, R_L + \frac{1}{C_L s}\right)$

Filter 375

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, L_L s + \frac{1}{C_L s}\right)$

Filter 376

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{L_4 s}{C_L L_4 s^2 + 1}\right)$

Filter 377

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 378

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

Filter 379

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{L_4 s}{C_L L_4 s^2 + 1} + R_L\right)$

Filter 380

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}}, \frac{R_L \left(L_L s + \frac{C_L^2}{C_L^2}\right)}{L_L s + R_L + \frac{1}{C_L^2 s}}\right)$

Filter 381

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, R_L\right)$

Filter 382

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \frac{1}{C_L s}\right)$

Filter 383

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \frac{R_L}{C_L R_L s + 1}\right)$

Filter 384

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, R_L + \frac{1}{C_L s}\right)$

Filter 385

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, L_L s + \frac{1}{C_L s}\right)$

Filter 386

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \frac{L_4 s}{C_L L_4 s^2 + 1}\right)$

Filter 387

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 388

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

Filter 389

Invalid filter
 $Z(s)$: $\left(\infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \frac{L_4 s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 390

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$$

Filter 391

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, R_L\right)$$

Filter 392

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{1}{C_Ls}\right)$$

Filter 393

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 394

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, R_L+\frac{1}{C_Ls}\right)$$

Filter 395

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 396

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{L_4s}{C_4L_4s^2+1}\right)$$

Filter 397

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 398

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$$

Filter 399

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{L_Ls}{C_4L_Ls^2+1}+R_L\right)$$

Filter 400

Invalid filter

$$Z(s)\colon \left(\infty, R_2+\frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_Ls}\right)}{L_4s+R_4+\frac{1}{C_Ls}}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$$

Filter 401

Filter Type: GE

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, R_L\right)$$

$$H(s)\colon \frac{R_L\left(C_2L_2R_4g_ms^2-C_2L_2s^2+C_2R_4s+R_4g_m-1\right)}{C_2L_2R_4g_ms^2+2C_2L_2R_Lg_ms^2+C_2L_2s^2+C_2R_4s+4C_2R_Ls+R_4g_m+2R_Lg_m+1}$$

$$\mathbf{Q}\colon \frac{L_2\sqrt{\frac{C_2L_2}{C_2^2L_2^2}\left(R_4g_m+2R_Lg_m+1\right)}}{R_4+4R_L}$$

$$\omega_0\colon \sqrt{\frac{1}{C_2L_2}}$$

$$\mathbf{Bandwidth}\colon \frac{R_4+4R_L}{L_2\left(R_4g_m+2R_Lg_m+1\right)}$$

$$\mathbf{Qz}\colon \frac{L_2\sqrt{\frac{1}{C_2^2L_2^2}\left(R_4g_m-1\right)}}{R_4}$$

Filter 402

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{1}{C_Ls}\right)$$

Filter 403

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 404

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, R_L+\frac{1}{C_Ls}\right)$$

Filter 405

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 406

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{L_Ls}{C_4L_Ls^2+1}\right)$$

Filter 407

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 408

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$$

Filter 409

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{L_Ls}{C_4L_Ls^2+1}+R_L\right)$$

Filter 410

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4, \frac{R_L\left(L_Ls + \frac{1}{C_L^2}\right)}{L_Ls + R_L + \frac{1}{C_L^2}}\right)$$

Filter 411

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, R_L\right)$$

Filter 412

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$$

Filter 413

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{R_4}{C_LR_Ls+1}\right)$$

Filter 414

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$$

Filter 415

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$$

Filter 416

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 417

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$$

Filter 418

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{1}{R_L + \frac{1}{L_L^2}}\right)$$

Filter 419

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$$

Filter 420

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_L^2}\right)}{L_Ls + R_L + \frac{1}{C_L^2}}\right)$$

Filter 421

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, R_L\right)$$

Filter 422

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{1}{C_Ls}\right)$$

Filter 423

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 424

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, R_L + \frac{1}{C_Ls}\right)$$

Filter 425

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls + \frac{1}{C_Ls}\right)$$

Filter 426

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 427

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$$

Filter 428

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{1}{C_Ls + \frac{1}{R_L} + \frac{1}{L_L^2}}\right)$$

Filter 429

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$$

Filter 430

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_L\left(L_Ls + \frac{1}{C_L^2}\right)}{L_Ls + R_L + \frac{1}{C_L^2}}\right)$$

Filter 431

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, R_L\right)$$

Filter 432

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 433

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 434

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 435

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 436

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 437

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 438

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$

Filter 439

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 440

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 441

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, R_L\right)$

Filter 442

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 443

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 444

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 445

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 446

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 447

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 448

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$

Filter 449

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 450

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 451

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, R_L\right)$

Filter 452

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{1}{C_Ls}\right)$

Filter 453

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 454

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L + \frac{1}{C_Ls}\right)$

Filter 455

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 456

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 457

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 458

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{1}{C_Ls + \frac{1}{R_L + L_Ls}}\right)$

Filter 459

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 460

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 461

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L\right)$

Filter 462

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 463

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 464

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 465

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 466

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 467

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 468

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$

Filter 469

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 470

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$

Filter 471

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + L_4s}}, R_L\right)$

Filter 472

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + L_4s}}, \frac{1}{C_Ls}\right)$

Filter 473

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + L_4s}}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 474

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{R_4 + \frac{1}{L_4s}}, R_L + \frac{1}{C_Ls}\right)$

Filter 475

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, L_Ls + \frac{1}{C_Ls}\right)$$

Filter 476

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 477

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, L_Ls + R_L + \frac{1}{C_Ls}\right)$$

Filter 478

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$$

Filter 479

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$$

Filter 480

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{L_4s}}}, \frac{R_L\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}\right)$$

Filter 481

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, R_L\right)$$

Filter 482

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{1}{C_Ls}\right)$$

Filter 483

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 484

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, R_L + \frac{1}{C_Ls}\right)$$

Filter 485

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, L_Ls + \frac{1}{C_Ls}\right)$$

Filter 486

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 487

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, L_Ls + R_L + \frac{1}{C_Ls}\right)$$

Filter 488

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$$

Filter 489

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$$

Filter 490

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_4, \frac{R_L\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}\right)$$

Filter 491

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}, R_L\right)$$

Filter 492

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}, \frac{1}{C_Ls}\right)$$

Filter 493

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 494

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}, R_L + \frac{1}{C_Ls}\right)$$

Filter 495

Invalid filter

$$Z(s)\colon \left(\infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_4\left(L_Ls + \frac{1}{C_LL}\right)}{L_Ls + R_L + \frac{1}{C_LLs}}, L_Ls + \frac{1}{C_Ls}\right)$$

Filter 496

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{L_Ls}{C_LLs^2+1}\right)$$

Filter 497

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 498

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{1}{C_LL_L+\frac{1}{L_Ls}}\right)$$

Filter 499

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$$

Filter 500

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+\frac{1}{C_2s}, \infty, \infty, \frac{R_L\left(L_4s+\frac{1}{C_4^2}\right)}{L_4s+R_4+\frac{1}{C_4^2}}, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 501

Filter Type: GE

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, R_L\right)$$

$$H(s)\colon \frac{R_L\left(C_2L_2R_4g_m s^2-C_2L_2s^2+C_2R_2R_4g_m s-C_2R_2s+C_2R_4s+R_4g_m-1\right)}{C_2L_2R_4g_m s^2+2C_2L_2R_Lg_m s^2+C_2L_2s^2+C_2R_2R_4g_m s+2C_2^2R_2R_Lg_m s+C_2^2R_2s+C_2^2R_4s+4C_2^2R_Ls+R_4g_m+2R_Lg_m+1}$$

$$\mathbf{Q}\colon \frac{L_2\sqrt{C_2^2C_2^2\left(R_4g_m+2R_Lg_m+1\right)}}{R_2R_4g_m-2R_2R_Lg_m+R_2+R_L+4R_L^2}$$

$$\omega_0\colon \sqrt{\frac{1}{C_2L_2}}$$
Bandwidth: $\frac{R_2R_4g_m+2R_2R_Lg_m+R_2+R_4+4R_L}{L_2\left(R_4g_m+2R_Lg_m+1\right)}$

$$\mathbf{Q}\mathbf{z}\colon \frac{L_2\sqrt{C_2^2C_2^2\left(R_4g_m-1\right)}}{R_2R_4g_m-R_2+R_4}$$

Filter 502

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{1}{C_Ls}\right)$$

Filter 503

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 504

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, R_L+\frac{1}{C_Ls}\right)$$

Filter 505

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 506

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{L_Ls}{C_LL_Ls+1}\right)$$

Filter 507

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 508

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{1}{C_LL_Ls+\frac{1}{L_Ls}}\right)$$

Filter 509

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{L_Ls}{C_LL_Ls+1}+R_L\right)$$

Filter 510

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, R_4, \frac{R_L\left(L_Ls+\frac{1}{C_L^2}\right)}{L_Ls+R_L+\frac{1}{C_L^2}}\right)$$

Filter 511

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, R_L\right)$$

Filter 512

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$$

Filter 513

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 514

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$$

Filter 515

Invalid filter

$$Z(s)\colon \left(\infty, L_2s+R_2+\frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 516

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_4s}{C_L L_L s^2 + 1}\right)$

Filter 517

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 518

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$

Filter 519

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{L_4s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 520

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_L^2}\right)}{L_Ls + R_L + \frac{1}{C_L^2}}\right)$

Filter 521

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, R_L\right)$

Filter 522

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{1}{C_Ls}\right)$

Filter 523

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{R_L}{C_LR_Ls + 1}\right)$

Filter 524

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, R_L + \frac{1}{C_Ls}\right)$

Filter 525

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 526

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{L_4s}{C_LL_Ls^2 + 1}\right)$

Filter 527

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 528

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{L_Ls}}}\right)$

Filter 529

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{L_4s}{C_LL_Ls^2 + 1} + R_L\right)$

Filter 530

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4}{C_4R_4s + 1}, \frac{R_L\left(L_Ls + \frac{1}{C_L^2}\right)}{L_Ls + R_L + \frac{1}{C_L^2}}\right)$

Filter 531

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, R_L\right)$

Filter 532

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 533

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls + 1}\right)$

Filter 534

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 535

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 536

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{L_4s}{C_LL_Ls^2 + 1}\right)$

Filter 537

Invalid filter
 $Z(s)$: $\left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 538

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls + R_L^* + \frac{1}{L_L^*s}}\right)$

Filter 539

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 540

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_4 + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_L^*s}\right)}{L_Ls + R_L + \frac{1}{C_L^*s}}\right)$

Filter 541

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, R_L\right)$

Filter 542

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 543

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 544

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls}\right)$

Filter 545

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 546

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 547

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 548

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L^* + \frac{1}{L_L^*s}}}\right)$

Filter 549

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 550

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + \frac{1}{C_4s}, \frac{R_L\left(L_Ls + \frac{1}{C_L^*s}\right)}{L_Ls + R_L + \frac{1}{C_L^*s}}\right)$

Filter 551

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, R_L\right)$

Filter 552

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{1}{C_Ls}\right)$

Filter 553

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 554

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, R_L + \frac{1}{C_Ls}\right)$

Filter 555

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, L_Ls + \frac{1}{C_Ls}\right)$

Filter 556

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 557

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, L_Ls + R_L + \frac{1}{C_Ls}\right)$

Filter 558

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{1}{C_Ls + \frac{1}{R_L^* + \frac{1}{L_L^*s}}}\right)$

Filter 559

Invalid filter
 $Z(s)\colon \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_Ls}{C_LL_Ls^2+1}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

Filter 560

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L \left(L_Ls + \frac{1}{C_L^2s} \right)}{L_Ls + R_L + \frac{1}{C_L^2s}} \right)$$

Filter 561

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L \right)$$

Filter 562

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls} \right)$$

Filter 563

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1} \right)$$

Filter 564

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, R_L + \frac{1}{C_Ls} \right)$$

Filter 565

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + \frac{1}{C_Ls} \right)$$

Filter 566

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{L_4s}{C_L L_Ls^2+1} \right)$$

Filter 567

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

Filter 568

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{C_L^2s}}} \right)$$

Filter 569

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{L_4s}{C_L L_Ls^2+1} + R_L \right)$$

Filter 570

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \frac{R_L \left(L_Ls + \frac{1}{C_L^2s} \right)}{L_Ls + R_L + \frac{1}{C_L^2s}} \right)$$

Filter 571

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, R_L \right)$$

Filter 572

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{1}{C_Ls} \right)$$

Filter 573

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{R_L}{C_LR_Ls+1} \right)$$

Filter 574

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, R_L + \frac{1}{C_Ls} \right)$$

Filter 575

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, L_Ls + \frac{1}{C_Ls} \right)$$

Filter 576

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{L_4s}{C_L L_Ls^2+1} \right)$$

Filter 577

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

Filter 578

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{1}{C_Ls + \frac{1}{R_L + \frac{1}{C_L^2s}}} \right)$$

Filter 579

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{L_4s}{C_L L_Ls^2+1} + R_L \right)$$

Filter 580

Invalid filter

$$Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_4s + \frac{1}{R_4 + \frac{1}{C_4^2s}}}, \frac{R_L \left(L_Ls + \frac{1}{C_L^2s} \right)}{L_Ls + R_L + \frac{1}{C_L^2s}} \right)$$

Filter 581

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, R_L \right)$

Filter 582

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{1}{C_Ls} \right)$

Filter 583

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{R_L}{C_LR_Ls+1} \right)$

Filter 584

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, R_L + \frac{1}{C_Ls} \right)$

Filter 585

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, L_Ls + \frac{1}{C_Ls} \right)$

Filter 586

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{L_Ls}{C_LL_Ls^2+1} \right)$

Filter 587

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, L_Ls + R_L + \frac{1}{C_Ls} \right)$

Filter 588

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{1}{C_Ls + R_L + \frac{1}{L_Ls}} \right)$

Filter 589

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$

Filter 590

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \frac{R_L \left(L_Ls + \frac{1}{C_Ls} \right)}{L_Ls + R_L + \frac{1}{C_Ls}} \right)$

Filter 591

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, R_L \right)$

Filter 592

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{1}{C_Ls} \right)$

Filter 593

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{R_L}{C_LR_Ls+1} \right)$

Filter 594

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, R_L + \frac{1}{C_Ls} \right)$

Filter 595

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, L_Ls + \frac{1}{C_Ls} \right)$

Filter 596

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{L_Ls}{C_LL_Ls^2+1} \right)$

Filter 597

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, L_Ls + R_L + \frac{1}{C_Ls} \right)$

Filter 598

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{1}{C_LR_L + R_L + \frac{1}{L_Ls}} \right)$

Filter 599

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$

Filter 600

Invalid filter
 $Z(s): \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_4 \left(L_4s + \frac{1}{C_4s} \right)}{L_4s + R_4 + \frac{1}{C_4s}}, \frac{R_L \left(L_Ls + \frac{1}{C_Ls} \right)}{L_Ls + R_L + \frac{1}{C_Ls}} \right)$

Filter 601

Filter Type: GE

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, R_L \right)$$
$$H(s) \text{: } \frac{R_L \left(C_2 L_2 R_4 R_L g_m s^2 - C_2 L_2 R_4 s^2 + C_2 L_2 R_4 s^2 + L_2 R_4 g_m s - L_2 s + R_4 R_L g_m - R_4 + R_L \right)}{C_2 L_2 R_4 R_L g_m s^2 + 2 C_2 L_2 R_4 R_L g_m s^2 + C_2 L_2 R_4 s^2 + C_2 L_2 R_4 s^2 + 3 C_2 L_2 R_4 s^2 + L_2 R_4 g_m s + 2 L_2 R_L g_m + L_2 s + R_4 R_L g_m + 2 R_4 R_L g_m + R_4 + R_L + 4 R_L}$$
$$\mathbf{Q} \text{: } \frac{C_2 \sqrt{\frac{1}{C_2^2 L_2^2}} (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L)}{R_L g_m + 2 R_L g_m + 1}$$
$$\omega_0 \text{: } \sqrt{\frac{1}{C_2^2 L_2^2}}$$
$$\mathbf{Bandwidth} \text{: } \frac{R_L g_m + 2 R_L g_m + 1}{C_2 (R_2 R_L g_m + 2 R_2 R_L g_m + R_2 + R_L + 4 R_L)}$$
$$\mathbf{Qz} \text{: } \frac{C_2 \sqrt{\frac{1}{C_2^2 L_2^2}} (R_2 R_L g_m - R_2 + R_L)}{R_L g_m - 1}$$

Filter 602

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{1}{C_L s} \right)$$

Filter 603

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 604

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, R_L + \frac{1}{C_L s} \right)$$

Filter 605

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, L_L s + \frac{1}{C_L s} \right)$$

Filter 606

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 607

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 608

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{C_L s}} \right)$$

Filter 609

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 610

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_4, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 611

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, R_L \right)$$

Filter 612

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s} \right)$$

Filter 613

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L}{C_L R_L s + 1} \right)$$

Filter 614

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, R_L + \frac{1}{C_L s} \right)$$

Filter 615

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s} \right)$$

Filter 616

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Filter 617

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s} \right)$$

Filter 618

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{C_L s}} \right)$$

Filter 619

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

Filter 620

Invalid filter

$$Z(s) \text{: } \left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$$

Filter 621

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, R_L\right)$

Filter 622

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{1}{C_Ls}\right)$

Filter 623

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_{L^*}}{C_LR_{L^*s+1}}\right)$

Filter 624

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, R_L+\frac{1}{C_Ls}\right)$

Filter 625

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 626

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_4s}{C_LL_4s^2+1}\right)$

Filter 627

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 628

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_L^*}}}\right)$

Filter 629

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{L_4s}{C_LL_4s^2+1}+R_L\right)$

Filter 630

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4}{C_4R_4s+1}, \frac{R_L\left(L_Ls+\frac{1}{C_L^*}\right)}{L_Ls+R_L+\frac{1}{C_L^*}}\right)$

Filter 631

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, R_L\right)$

Filter 632

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 633

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 634

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$

Filter 635

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 636

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_4s}{C_LR_Ls^2+1}\right)$

Filter 637

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 638

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{L_L^*}}}\right)$

Filter 639

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{L_4s}{C_LL_4s^2+1}+R_L\right)$

Filter 640

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, R_4+\frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_L^*}\right)}{L_Ls+R_L+\frac{1}{C_L^*}}\right)$

Filter 641

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L\right)$

Filter 642

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 643

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 644

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$

Filter 645

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 646

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 647

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 648

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$

Filter 649

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

Filter 650

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+\frac{1}{C_4s}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 651

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L\right)$

Filter 652

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{1}{C_Ls}\right)$

Filter 653

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 654

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, R_L+\frac{1}{C_Ls}\right)$

Filter 655

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls+\frac{1}{C_Ls}\right)$

Filter 656

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$

Filter 657

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, L_Ls+R_L+\frac{1}{C_Ls}\right)$

Filter 658

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$

Filter 659

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$

Filter 660

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

Filter 661

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+R_4+\frac{1}{C_4s}, R_L\right)$

Filter 662

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+R_4+\frac{1}{C_4s}, \frac{1}{C_Ls}\right)$

Filter 663

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+R_4+\frac{1}{C_4s}, \frac{R_L}{C_LR_Ls+1}\right)$

Filter 664

Invalid filter
 $Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, L_4s+R_4+\frac{1}{C_4s}, R_L+\frac{1}{C_Ls}\right)$

Filter 665

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + \frac{1}{C_L s}\right)$

Filter 666

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

Filter 667

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 668

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L_L s}}}\right)$

Filter 669

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 670

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 671

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, R_L\right)$

Filter 672

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{1}{C_L s}\right)$

Filter 673

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{R_L}{C_L R_L s + 1}\right)$

Filter 674

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, R_L + \frac{1}{C_L s}\right)$

Filter 675

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, L_L s + \frac{1}{C_L s}\right)$

Filter 676

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

Filter 677

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, L_L s + R_L + \frac{1}{C_L s}\right)$

Filter 678

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L_L s}}}\right)$

Filter 679

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

Filter 680

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{1}{C_4 s + \frac{1}{R_4 + \frac{1}{L_4 s}}}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

Filter 681

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_4, R_L\right)$

Filter 682

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_4, \frac{1}{C_L s}\right)$

Filter 683

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_4, \frac{R_L}{C_L R_L s + 1}\right)$

Filter 684

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_4, R_L + \frac{1}{C_L s}\right)$

Filter 685

Invalid filter
 $Z(s)$: $\left(\infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_4, L_L s + \frac{1}{C_L s}\right)$

Filter 686

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 687

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 688

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$$

Filter 689

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$$

Filter 690

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1}+R_4, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$$

Filter 691

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, R_L\right)$$

Filter 692

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{1}{C_Ls}\right)$$

Filter 693

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 694

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, R_L+\frac{1}{C_Ls}\right)$$

Filter 695

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, L_Ls+\frac{1}{C_Ls}\right)$$

Filter 696

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{L_Ls}{C_LL_Ls^2+1}\right)$$

Filter 697

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, L_Ls+R_L+\frac{1}{C_Ls}\right)$$

Filter 698

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{1}{C_Ls+\frac{1}{R_L+\frac{1}{C_Ls}}}\right)$$

Filter 699

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{L_Ls}{C_LL_Ls^2+1}+R_L\right)$$

Filter 700

Invalid filter

$$Z(s)\colon \left(\infty, \frac{L_2s}{C_2L_2s^2+1}+R_2, \infty, \infty, \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}}, \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$$

Filter 701

Filter Type: GE

$$Z(s)\colon \left(\infty, \frac{R_0\left(L_2s+\frac{1}{C_2s}\right)}{L_2s+R_2+\frac{1}{C_2s}}, \infty, \infty, R_4, R_L\right)$$

$$H(s)\colon \frac{R_L\left(C_2L_2R_2R_4g_ms^2-C_2L_2R_2s^2+C_2L_2R_4s^2+C_2R_2R_4s+R_2R_4g_m-R_2+R_4\right)}{C_2L_2R_2R_4g_ms^4+3C_2^2L_2^2R_2R_4L_gms^3+C_2^2L_2^2R_2s^2+C_2L_2R_2s^3+3C_2^2L_2R_2R_4s+C_2R_2R_4s+2R_2R_4g_m+2R_2R_4L_gm+R_2+R_4+4R_L}$$

$$\mathbf{Q}\colon \frac{L_2\sqrt{C_2^2L_2^2}\left(R_2R_4g_m+2R_2R_4L_gm+R_2+R_4+R_L\right)}{R_2\left(R_4+4R_L\right)}$$

$$\omega_0\colon \sqrt{\frac{1}{C_2L_2}}\frac{R_2\left(R_4+4R_L\right)}{L_2\left(R_2R_4g_m+2R_2R_4L_gm+R_2+R_4+4R_L\right)}$$

$$\mathbf{Bandwidth}\colon \frac{L_2\sqrt{C_2^2L_2^2}\left(R_2R_4g_m-R_2+R_4\right)}{R_2R_4}$$

$$\mathbf{QZ}\colon \frac{L_2\sqrt{C_2^2L_2^2}\left(R_2R_4g_m-R_2+R_4\right)}{R_2R_4}$$

Filter 702

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_0\left(L_2s+\frac{1}{C_2s}\right)}{L_2s+R_2+\frac{1}{C_2s}}, \infty, \infty, R_4, \frac{1}{C_Ls}\right)$$

Filter 703

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_0\left(L_2s+\frac{1}{C_2s}\right)}{L_2s+R_2+\frac{1}{C_2s}}, \infty, \infty, R_4, \frac{R_L}{C_LR_Ls+1}\right)$$

Filter 704

Invalid filter

$$Z(s)\colon \left(\infty, \frac{R_0\left(L_2s+\frac{1}{C_2s}\right)}{L_2s+R_2+\frac{1}{C_2s}}, \infty, \infty, R_4, R_L+\frac{1}{C_Ls}\right)$$

