Filter Summary Report: CG,TIA,simple,Z3,Z4

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9 INVALID-WZ

10 INVALID-ORDER
10.1 INVALID-ORDER-1 $Z(s) = (\infty, \infty, R_3, R_4, \infty, \infty)$
10.2 INVALID-ORDER-2 $Z(s) = \left(\infty, \infty, R_3, \frac{1}{C_4 s}, \infty, \infty\right)$
10.3 INVALID-ORDER-3 $Z(s) = \left(\infty, \infty, R_3, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty\right)$
10.4 INVALID-ORDER-4 $Z(s) = \left(\infty, \infty, R_3, R_4 + \frac{1}{C_4 s}, \infty, \infty\right)$
10.5 INVALID-ORDER-5 $Z(s) = \left(\infty, \infty, \frac{1}{C_{3s}}, R_4, \infty, \infty\right)$
10.6 INVALID-ORDER-6 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty, \infty\right)$
10.7 INVALID-ORDER-7 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty\right)$
10.8 INVALID-ORDER-8 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, R_4 + \frac{1}{C_4 s}, \infty, \infty\right)$
10.9 INVALID-ORDER-9 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, L_4 s + \frac{1}{C_4 s}, \infty, \infty\right)$
$10.10 \text{INVALID-ORDER-10 } Z(s) = \left(\infty, \ \infty, \ \frac{1}{C_3 s}, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty, \ \infty\right) \qquad \dots $
10.11INVALID-ORDER-11 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right)$
$10.12 \text{INVALID-ORDER-12 } Z(s) = \left(\infty, \ \infty, \ \frac{1}{C_3 s}, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty, \ \infty \right) \dots $
10.13INVALID-ORDER-13 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty\right)$
10.14INVALID-ORDER-14 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, R_4, \infty, \infty\right)$
$10.15 \text{INVALID-ORDER-15 } Z(s) = \left(\infty, \ \infty, \ \frac{R_3}{C_3 R_3 s+1}, \ \frac{1}{C_4 s}, \ \infty, \ \infty\right) \dots $
$10.16 \text{INVALID-ORDER-} 16 \ Z(s) = \left(\infty, \ \infty, \ \frac{R_3}{C_3 R_3 s+1}, \ \frac{R_4}{C_4 R_4 s+1}, \ \infty, \ \infty\right) \dots $
10.17INVALID-ORDER-17 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s+1}, L_4 s + \frac{1}{C_4 s}, \infty, \infty\right)$
10.18INVALID-ORDER-18 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s+1}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right)$
10.19INVALID-ORDER-19 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty, \infty\right)$
10.20INVALID-ORDER-20 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty\right)$
$10.21 \text{INVALID-ORDER-21 } Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ R_4, \ \infty, \ \infty\right) \dots $
$10.22 \text{INVALID-ORDER-} 22 \ Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ \frac{1}{C_4 s}, \ \infty, \ \infty\right) \dots $
$10.23 \text{INVALID-ORDER-23 } Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ R_4 + \frac{1}{C_4 s}, \ \infty, \ \infty\right) $
$10.24 \text{INVALID-ORDER-} 24 \ Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ L_4 s + \frac{1}{C_4 s}, \ \infty, \ \infty\right) \ \dots $
$10.25 \text{INVALID-ORDER-} 25 \ Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty, \ \infty\right) $
$10.26 \text{INVALID-ORDER-} 26 \ Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty, \ \infty\right) \qquad \dots $
10.27INVALID-ORDER-27 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty\right)$
10.28INVALID-ORDER-28 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty, \infty\right)$
10.29INVALID-ORDER-29 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty\right)$
10.30INVALID-ORDER-30 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty, \infty\right)$
10.31INVALID-ORDER-31 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty\right)$
$10.32 \text{INVALID-ORDER-32 } Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, R_4 + \frac{1}{C_4 s}, \infty, \infty\right) \dots \dots$
$10.33 \text{INVALID-ORDER-} 33 \ Z(s) = \left(\infty, \ \infty, \ L_3 s + \frac{1}{C_3 s}, \ L_4 s + \frac{1}{C_4 s}, \ \infty, \ \infty\right) \dots $
$10.34 \text{INVALID-ORDER-34 } Z(s) = \left(\infty, \ \infty, \ L_3 s + \frac{1}{C_3 s}, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty, \ \infty\right)$
$10.35 \text{INVALID-ORDER-35 } Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right) \dots \dots$
10.36INVALID-ORDER-36 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty\right)$
10.37INVALID-ORDER-37 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty, \infty\right)$
10.38INVALID-ORDER-38 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty\right)$

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10.39INVALID-ORDER-39 Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_3s^2+1}, \frac{1}{C_4s}, \infty, \infty\right)
10.40INVALID-ORDER-40 Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_2L_3s^2+1}, R_4 + \frac{1}{C_4s}, \infty, \infty\right)
10.41INVALID-ORDER-41 Z(s) = \left(\infty, \infty, \frac{L_3 s}{C_3 L_2 s^2 + 1}, L_4 s + \frac{1}{C_4 s}, \infty, \infty\right)
10.42INVALID-ORDER-42 Z(s) = \left(\infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty\right)
10.43INVALID-ORDER-43 Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3 L_{3s}^2 + 1}, L_4 s + R_4 + \frac{1}{C_{4s}}, \infty, \infty\right)
10.44INVALID-ORDER-44 Z(s) = \left(\infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty, \infty\right)
10.45INVALID-ORDER-45 Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_3s^2+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)
10.46INVALID-ORDER-46 Z(s) = \left(\infty, \ \infty, \ L_3 s + R_3 + \frac{1}{C_3 s}, \ \frac{1}{C_4 s}, \ \infty, \ \infty\right) \ . \ .
10.47INVALID-ORDER-47 Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_2 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty\right)
10.48INVALID-ORDER-48 Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_2 s}, R_4 + \frac{1}{C_4 s}, \infty, \infty\right)
10.49INVALID-ORDER-49 Z(s) = \left(\infty, \ \infty, \ L_3 s + R_3 + \frac{1}{C_{3s}}, \ L_4 s + \frac{1}{C_{4s}}, \ \infty, \ \infty\right)
10.50INVALID-ORDER-50 Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_2 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty\right)
10.51INVALID-ORDER-51 Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right)
10.52INVALID-ORDER-52 Z(s) = \left(\infty, \ \infty, \ L_3s + R_3 + \frac{1}{C_3s}, \ \frac{L_4R_4s}{C_4L_4R_4s^2 + L_4s + R_4}, \ \infty, \ \infty\right)
10.53INVALID-ORDER-53 Z(s) = (\infty, \infty, L_3s + R_3 + \frac{1}{C_3s}, \frac{C_4L_4R_4s^2 + L_4s + R_4}{C_4L_4s^2 + 1}, \infty, \infty)
10.54INVALID-ORDER-54 Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty\right)
10.55 \text{INVALID-ORDER-55} \ Z(s) = \left(\infty, \ \infty, \ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \ R_4 + \frac{1}{C_4 s}, \ \infty, \ \infty\right)
10.56INVALID-ORDER-56 Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_2 L_3 R_3 s^2 + L_2 s + R_3}, L_4 s + \frac{1}{C_4 s}, \infty, \infty\right) . . .
10.57INVALID-ORDER-57 Z(s) = \left(\infty, \infty, \frac{L_3 R_{3s}}{C_3 L_3 R_{3s}^2 + L_3 s + R_3}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right)
10.58INVALID-ORDER-58 Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty, \infty\right)
10.59INVALID-ORDER-59 Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \right)
10.60INVALID-ORDER-60 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_2 L_3 s^2 + 1}, \frac{1}{C_4 s}, \infty, \infty\right).
10.61INVALID-ORDER-61 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty\right)
10.62INVALID-ORDER-62 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, R_4 + \frac{1}{C_4 s}, \infty, \infty\right)
10.63INVALID-ORDER-63 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, L_4 s + \frac{1}{C_4 s}, \infty, \infty\right)
10.64INVALID-ORDER-64 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty\right)
10.65INVALID-ORDER-65 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty\right)
10.66INVALID-ORDER-66 Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty\right)
10.67INVALID-ORDER-67 Z(s) = (\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{C_4L_4R_4s^2 + L_4s + R_4}{C_4L_4s^2 + 1}, \infty, \infty)
                                                              (\infty, \infty, \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty)
10.68INVALID-ORDER-68 Z(s) = (
                                                              \infty, \ \infty, \ \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \ \frac{1}{C_4s}, \ \infty, \ \infty
10.69INVALID-ORDER-69 Z(s) =
                                                              (\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{R_4}{C_4R_4s+1}, \infty, \infty)
10.70INVALID-ORDER-70 Z(s) =
                                                              \left(\infty, \, \infty, \, \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, \, R_4 + \frac{1}{C_4s}, \, \infty, \, \infty\right)
10.71INVALID-ORDER-71 Z(s) =
                                                              (\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, L_4s + \frac{1}{C_4s}, \infty, \infty)
10.72INVALID-ORDER-72 Z(s) =
                                                              (\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4s}{C_4L_4s^2+1}, \infty, \infty)
10.73INVALID-ORDER-73 Z(s) =
                                                              \left(\infty, \ \infty, \ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, \ L_4s+R_4+\frac{1}{C_4s}, \ \infty, \ \infty\right)
                                                                                                                                                        10.74INVALID-ORDER-74 Z(s) = 10.74
10.75INVALID-ORDER-75 Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \infty\right)
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10.76INVALID-ORDER-76 $Z(s) = \left(\infty, \ \infty, \ \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \ \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1}, \ \infty, \ \infty\right)$	 •
10.77INVALID-ORDER-77 $Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)$	

1 Examined
$$H(z)$$
 for CG TIA simple Z3 Z4: $\frac{Z_3Z_4Z_Lg_m}{Z_3Z_4g_m+2Z_3Z_Lg_m+Z_4Z_Lg_m}$

$$H(z) = \frac{Z_3 Z_4 Z_L g_m}{Z_3 Z_4 g_m + 2 Z_3 Z_L g_m + Z_4 Z_L g_m}$$

- 2 HP
- 3 BP
- **3.1** BP-1 $Z(s) = \left(\infty, \infty, R_3, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$

$H(s) = \frac{L_4 R_3 Z_L s}{2C_4 L_4 R_3 Z_L s^2 + 2R_3 Z_L + s\left(L_4 R_3 + L_4 Z_L\right)}$

Parameters:

Q:
$$\frac{2C_4R_3Z_L\sqrt{\frac{1}{C_4L_4}}}{R_3+Z_L}$$
 wo: $\sqrt{\frac{1}{C_4L_4}}$ bandwidth: $\frac{R_3+Z_L}{2C_4R_3Z_L}$ K-LP: 0 K-HP: 0 K-BP: $\frac{R_3Z_L}{R_3+Z_L}$ Qz: None Wz: None

3.2 BP-2 $Z(s) = \left(\infty, \infty, R_3, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$

$H(s) = \frac{L_4 R_3 R_4 Z_L s}{2 C_4 L_4 R_3 R_4 Z_L s^2 + 2 R_3 R_4 Z_L + s \left(L_4 R_3 R_4 + 2 L_4 R_3 Z_L + L_4 R_4 Z_L\right)}$

Parameters:

$$\begin{array}{l} \text{Q:} \ \frac{2C_4R_3R_4Z_L\sqrt{\frac{1}{C_4L_4}}}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_4L_4}} \\ \text{bandwidth:} \ \frac{R_3R_4+2R_3Z_L+R_4Z_L}{2C_4R_3R_4Z_L} \\ \text{K-LP:} \ 0 \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \text{None} \end{array}$$

3.3 BP-3 $Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$

$$\begin{array}{l} \text{Q: } \sqrt{2}C_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}} + 2\sqrt{2}C_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}\\ \text{wo: } \sqrt{2}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}\\ \text{bandwidth: } \frac{\sqrt{2}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{\sqrt{2}C_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}} + 2\sqrt{2}C_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}\\ \text{K-LP: 0}\\ \text{K-HP: 0}\\ \text{K-BP: } Z_{L} \end{array}$$

$$H(s) = \frac{L_4 Z_L s}{L_4 s + 2 Z_L + s^2 \left(C_3 L_4 Z_L + 2 C_4 L_4 Z_L \right)}$$

3.4 BP-4
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$\begin{array}{l} \text{Q:} & \frac{\sqrt{2}C_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}+2\sqrt{2}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{R_{4}+2Z_{L}} \\ \text{wo:} & \sqrt{2}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}} \\ \text{bandwidth:} & \frac{\sqrt{2}(R_{4}+2Z_{L})\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{\sqrt{2}C_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}+2\sqrt{2}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}} \\ \text{K-LP:} & 0 \\ \text{K-HP:} & 0 \\ \text{K-BP:} & \frac{R_{4}Z_{L}}{R_{4}+2Z_{L}} \\ \text{Qz:} & \text{None} \\ \text{Wz:} & \text{None} \end{array}$$

3.5 BP-5
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$$

Parameters:

Q:
$$\frac{\sqrt{2}C_{3}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}+2\sqrt{2}C_{4}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{R_{3}+Z_{L}}$$
 wo:
$$\sqrt{2}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}$$
 bandwidth:
$$\frac{\sqrt{2}(R_{3}+Z_{L})\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{\sqrt{2}C_{3}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}+2\sqrt{2}C_{4}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}$$
 K-LP: 0 K-HP: 0 K-BP:
$$\frac{R_{3}Z_{L}}{R_{3}+Z_{L}}$$
 Qz: None Wz: None

3.6 BP-6
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$\begin{array}{l} \text{Q:} \ \frac{\sqrt{2}C_{3}R_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}+2\sqrt{2}C_{4}R_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}} \\ \text{wo:} \ \sqrt{2}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}} \\ \text{bandwidth:} \ \frac{\sqrt{2}(R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L})\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}}{\sqrt{2}C_{3}R_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}}+2\sqrt{2}C_{4}R_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{4}+2C_{4}L_{4}}}} \\ \text{K-LP:} \ 0 \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{R_{3}R_{4}Z_{L}}{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}}}{Q_{Z:} \ \text{None}} \\ \text{Wz:} \ \text{None} \end{array}$$

$$H(s) = \frac{L_4 R_4 Z_L s}{2 R_4 Z_L + s^2 \left(C_3 L_4 R_4 Z_L + 2 C_4 L_4 R_4 Z_L \right) + s \left(L_4 R_4 + 2 L_4 Z_L \right)}$$

$$H(s) = \frac{L_4 R_3 Z_L s}{2 R_3 Z_L + s^2 \left(C_3 L_4 R_3 Z_L + 2 C_4 L_4 R_3 Z_L \right) + s \left(L_4 R_3 + L_4 Z_L \right)}$$

$$H(s) = \frac{L_4 R_3 R_4 Z_L s}{2R_3 R_4 Z_L + s^2 \left(C_3 L_4 R_3 R_4 Z_L + 2C_4 L_4 R_3 R_4 Z_L\right) + s \left(L_4 R_3 R_4 + 2L_4 R_3 Z_L + L_4 R_4 Z_L\right)}$$

3.7 BP-7
$$Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3 L_{3s}^2 + 1}, R_4, \infty\right)$$

Q:
$$\frac{C_3R_4Z_L\sqrt{\frac{1}{C_3L_3}}}{R_4+2Z_L}$$

wo: $\sqrt{\frac{1}{C_3L_3}}$
bandwidth: $\frac{R_4+2Z_L}{C_3R_4Z_L}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4Z_L}{R_4+2Z_L}$
Qz: None

3.8 BP-8
$$Z(s) = \left(\infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{1}{C_4 s}, \infty\right)$$

Parameters:

Q:
$$C_3Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}$$
 wo: $\sqrt{\frac{1}{C_3L_3+2C_4L_3}}$ bandwidth: $\sqrt{\frac{1}{C_3L_3+2C_4L_3}}$ $\frac{\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}{C_3Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}$ K-LP: 0 K-HP: 0 K-BP: Z_L Qz: None Wz: None

3.9 BP-9
$$Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_3s^2+1}, \frac{R_4}{C_4R_4s+1}, \infty\right)$$

Parameters:

$$\begin{array}{l} \text{Q:} \ \frac{C_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}{R_4+2Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_3L_3+2C_4L_3}} \\ \text{bandwidth:} \ \frac{(R_4+2Z_L)\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}{C_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}} \\ \text{K-LP:} \ 0 \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{R_4Z_L}{R_4+2Z_L} \\ \text{Qz:} \ \text{None} \\ \\ \text{Wz:} \ \text{None} \end{array}$$

3.10 BP-10
$$Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_3s^2+1}, \frac{L_{4s}}{C_4L_4s^2+1}, \infty\right)$$

$$H(s) = \frac{L_3 R_4 Z_L s}{C_3 L_3 R_4 Z_L s^2 + R_4 Z_L + s \left(L_3 R_4 + 2L_3 Z_L\right)}$$

$$H(s) = \frac{L_3 Z_L s}{L_3 s + Z_L + s^2 \left(C_3 L_3 Z_L + 2 C_4 L_3 Z_L \right)}$$

$$H(s) = \frac{L_3 R_4 Z_L s}{R_4 Z_L + s^2 \left(C_3 L_3 R_4 Z_L + 2 C_4 L_3 R_4 Z_L \right) + s \left(L_3 R_4 + 2 L_3 Z_L \right)}$$

$$H(s) = \frac{L_3 L_4 Z_L s}{L_3 L_4 s + 2 L_3 Z_L + L_4 Z_L + s^2 \left(C_3 L_3 L_4 Z_L + 2 C_4 L_3 L_4 Z_L \right)}$$

Q:
$$C_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + 2C_4Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}$$
 wo: $\sqrt{\frac{2L_3+L_4}{C_3L_3L_4+2C_4L_3L_4}}$ bandwidth:
$$\frac{\sqrt{\frac{2L_3+L_4}{C_3L_3L_4+2C_4L_3L_4}}}{C_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{K-LP: 0}$$
 K-HP: 0 K-HP: 0 K-BP:
$$\frac{Z_L\sqrt{\frac{2L_3}{C_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}}$$
 Qz: None

Wz: None

3.11 BP-11 $Z(s) = \left(\infty, \infty, \frac{L_3s}{C_3L_3s^2+1}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty\right)$

$$H(s) = \frac{L_3L_4R_4Z_Ls}{2L_3R_4Z_L + L_4R_4Z_L + s^2\left(C_3L_3L_4R_4Z_L + 2C_4L_3L_4R_4Z_L\right) + s\left(L_3L_4R_4 + 2L_3L_4Z_L\right)}$$

Parameters:

$$\begin{array}{c} Q \colon \frac{C_3R_4Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{R_4+2Z_L} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} \\ wo \colon \sqrt{\frac{2L_3+L_4}{C_3L_3L_4+2C_4L_3L_4}} \\ & & & & & & & & & & & & & \\ bandwidth \colon \frac{2L_3+L_4}{C_3R_4Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{R_4+2Z_L} \\ & & & & & & & & & & & & \\ bandwidth \colon \frac{2L_3+L_4}{C_3R_4Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{R_4+2C_4L_3L_4} + 2C_4R_4Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}} \\ & & & & & & & & & \\ K - LP \colon 0 \\ & & & & & & & & \\ K - HP \colon 0 \\ & & & & & & & & \\ K - BP \colon \frac{R_4Z_L\sqrt{\frac{2}{C_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{R_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}}{R_4+2C_4L_3L_4} \\ & & & & & & & \\ Qz \colon \text{None} \\ & & & & & & & \\ Wz \colon \text{None} \end{array}$$

3.12 BP-12 $Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, R_4, \infty\right)$

$$H(s) = \frac{L_3 R_3 R_4 Z_L s}{C_3 L_3 R_3 R_4 Z_L s^2 + R_3 R_4 Z_L + s \left(L_3 R_3 R_4 + 2 L_3 R_3 Z_L + L_3 R_4 Z_L\right)}$$

Parameters:

$$\begin{array}{l} \text{Q: } \frac{C_3R_3R_4Z_L\sqrt{\frac{1}{C_3L_3}}}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{wo: } \sqrt{\frac{1}{C_3L_3}} \\ \text{bandwidth: } \frac{R_3R_4+2R_3Z_L+R_4Z_L}{C_3R_3R_4Z_L} \\ \text{K-LP: 0} \\ \text{K-HP: 0} \\ \text{K-BP: } \frac{R_3R_4Z_L}{R_3Z_L+R_4Z_L} \\ \text{Qz: None} \end{array}$$

3.13 BP-13 $Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{L_3 R_3 Z_L s}{R_3 Z_L + s^2 \left(C_3 L_3 R_3 Z_L + 2 C_4 L_3 R_3 Z_L \right) + s \left(L_3 R_3 + L_3 Z_L \right)}$$

Parameters:

Wz: None

$$\begin{aligned} &\text{Q:} \ \frac{C_3 R_3 Z_L \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}} + 2C_4 R_3 Z_L \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}}}{R_3 + Z_L} \\ &\text{wo:} \ \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}} \\ &\text{bandwidth:} \ \frac{(R_3 + Z_L) \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}}}{C_3 R_3 Z_L \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}} + 2C_4 R_3 Z_L \sqrt{\frac{1}{C_3 L_3 + 2C_4 L_3}}} \end{aligned}$$

K-LP: 0
K-HP: 0
K-BP:
$$\frac{R_3Z_L}{R_3+Z_L}$$

Qz: None
Wz: None

3.14 BP-14
$$Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{L_3 R_3 R_4 Z_L s}{R_3 R_4 Z_L + s^2 \left(C_3 L_3 R_3 R_4 Z_L + 2 C_4 L_3 R_3 R_4 Z_L \right) + s \left(L_3 R_3 R_4 + 2 L_3 R_3 Z_L + L_3 R_4 Z_L \right)}$$

$$\begin{array}{l} \text{Q:} \ \frac{C_3R_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4R_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_3L_3+2C_4L_3}} \\ \text{bandwidth:} \ \frac{(R_3R_4+2R_3Z_L+R_4Z_L)\sqrt{\frac{1}{C_3L_3+2C_4L_3}}}{C_3R_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}+2C_4R_3R_4Z_L\sqrt{\frac{1}{C_3L_3+2C_4L_3}}} \\ \text{K-LP:} \ 0 \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \text{None} \end{array}$$

3.15 BP-15 $Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$

$$H(s) = \frac{L_3L_4R_3Z_Ls}{2L_3R_3Z_L + L_4R_3Z_L + s^2\left(C_3L_3L_4R_3Z_L + 2C_4L_3L_4R_3Z_L\right) + s\left(L_3L_4R_3 + L_3L_4Z_L\right)}$$

Parameters:

$$\begin{array}{c} \text{Q:} \ \frac{C_3R_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + 2C_4R_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}} \\ \text{wo:} \ \sqrt{\frac{2L_3+L_4}{C_3L_3L_4+2C_4L_3L_4}} \\ \text{bandwidth:} \ \frac{\sqrt{\frac{2L_3+L_4}{C_3L_3L_4+2C_4L_3L_4}} (R_3+Z_L)}{C_3R_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}} + 2C_4R_3Z_L\sqrt{\frac{2L_3}{C_3L_3L_4+2C_4L_3L_4}} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} \\ \text{K-LP: 0} \\ \text{K-HP: 0} \\ \text{K-BP:} \ \frac{R_3Z_L\sqrt{\frac{2}{C_3L_3L_4+2C_4L_4}} + \frac{1}{C_3L_3L_4+2C_4L_4}} {R_3+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4} + \frac{L_4}{C_3L_3L_4+2C_4L_3L_4}} \\ \text{Qz: None} \\ \text{Wz: None} \end{array}$$

3.16 BP-16
$$Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$H(s) = \frac{L_3L_4R_3R_4Z_Ls}{2L_3R_3R_4Z_L + L_4R_3R_4Z_L + s^2\left(C_3L_3L_4R_3R_4Z_L + 2C_4L_3L_4R_3R_4Z_L\right) + s\left(L_3L_4R_3R_4 + 2L_3L_4R_3Z_L + L_3L_4R_4Z_L\right)}$$

$$\begin{array}{c} Q \colon \frac{C_3 R_3 R_4 Z_L \sqrt{\frac{2L_3}{C_3 L_3 L_4 + 2C_4 L_3 L_4}} + \frac{L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}}{R_3 R_4 + 2R_3 Z_L + R_4 Z_L} \\ \text{wo: } \sqrt{\frac{2L_3 + L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}} \\ \text{bandwidth: } \frac{\sqrt{\frac{2L_3 + L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}}}{R_3 R_4 Z_L \sqrt{\frac{2L_3 + L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}}} \\ \text{K-LP: 0} \\ \text{K--HP: 0} \\ \text{K-BP: } \frac{R_3 R_4 Z_L \sqrt{\frac{2L_3}{C_3 L_3 L_4 + 2C_4 L_3 L_4}} + \frac{L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}} + 2R_3 Z_L \sqrt{\frac{2L_3}{C_3 L_4 + 2C_4 L_3 L_4}} + \frac{L_4}{C_3 L_3 L_4 + 2C_4 L_3 L_4}} \\ \text{Qz: None} \end{array}$$

- 4 LP
- 5 BS
- **5.1** BS-1 $Z(s) = \left(\infty, \infty, R_3, L_4 s + \frac{1}{C_4 s}, \infty\right)$

$$\begin{array}{l} \text{Q:} \ \frac{L_4 R_3 \sqrt{\frac{1}{C_4 L_4}} + L_4 Z_L \sqrt{\frac{1}{C_4 L_4}}}{2 R_3 Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_4 L_4}} \\ \text{bandwidth:} \ \frac{2 R_3 Z_L \sqrt{\frac{1}{C_4 L_4}}}{L_4 R_3 \sqrt{\frac{1}{C_4 L_4}} + L_4 Z_L \sqrt{\frac{1}{C_4 L_4}}} \\ \text{K-LP:} \ \frac{R_3 Z_L}{R_3 + Z_L} \\ \text{K-HP:} \ \frac{R_3 Z_L}{R_3 + Z_L} \\ \text{K-BP:} \ 0 \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \sqrt{\frac{1}{C_4 L_4}} \end{array}$$

5.2 BS-2
$$Z(s) = \left(\infty, \infty, R_3, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty\right)$$

Parameters:

$$\begin{array}{l} \text{Q:} \ \frac{L_4R_3R_4\sqrt{\frac{1}{C_4L_4}}+2L_4R_3Z_L\sqrt{\frac{1}{C_4L_4}}+L_4R_4Z_L\sqrt{\frac{1}{C_4L_4}}}{2R_3R_4Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_4L_4}} \\ \text{bandwidth:} \ \frac{2R_3R_4Z_L\sqrt{\frac{1}{C_4L_4}}}{L_4R_3R_4\sqrt{\frac{1}{C_4L_4}}+2L_4R_3Z_L\sqrt{\frac{1}{C_4L_4}}}+L_4R_4Z_L\sqrt{\frac{1}{C_4L_4}} \\ \text{K-LP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{K-HP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{K-BP:} \ 0 \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \sqrt{\frac{1}{C_4L_4}} \end{array}$$

5.3 BS-3 $Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, R_4, \infty\right)$

$$\begin{aligned} &\text{Q: } \frac{L_3 R_4 \sqrt{\frac{1}{C_3 L_3}} + 2 L_3 Z_L \sqrt{\frac{1}{C_3 L_3}}}{R_4 Z_L} \\ &\text{wo: } \sqrt{\frac{1}{C_3 L_3}} \\ &\text{bandwidth: } \frac{R_4 Z_L \sqrt{\frac{1}{C_3 L_3}}}{L_3 R_4 \sqrt{\frac{1}{C_3 L_3}} + 2 L_3 Z_L \sqrt{\frac{1}{C_3 L_3}}} \\ &\text{K-LP: } \frac{R_4 Z_L}{R_4 + 2 Z_L} \end{aligned}$$

$$H(s) = \frac{C_4 L_4 R_3 Z_L s^2 + R_3 Z_L}{2C_4 R_3 Z_L s + R_3 + Z_L + s^2 \left(C_4 L_4 R_3 + C_4 L_4 Z_L\right)}$$

$$H(s) = \frac{C_4 L_4 R_3 R_4 Z_L s^2 + R_3 R_4 Z_L}{2C_4 R_3 R_4 Z_L s + R_3 R_4 + 2R_3 Z_L + R_4 Z_L + s^2 \left(C_4 L_4 R_3 R_4 + 2C_4 L_4 R_3 Z_L + C_4 L_4 R_4 Z_L\right)}$$

$$H(s) = \frac{C_3 L_3 R_4 Z_L s^2 + R_4 Z_L}{C_3 R_4 Z_L s + R_4 + 2 Z_L + s^2 \left(C_3 L_3 R_4 + 2 C_3 L_3 Z_L\right)}$$

K-HP:
$$\frac{R_4Z_L}{R_4+2Z_L}$$

K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_3L_3}}$

5.4 BS-4
$$Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, R_4, \infty\right)$$

$$\begin{array}{l} \text{Q:} \ \frac{L_{3}R_{3}R_{4}\sqrt{\frac{1}{C_{3}L_{3}}}+2L_{3}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{3}}}+L_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{3}}}}{R_{3}R_{4}Z_{L}} \\ \text{wo:} \ \sqrt{\frac{1}{C_{3}L_{3}}} \\ \text{bandwidth:} \ \frac{R_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{3}}}}{L_{3}R_{3}A_{4}\sqrt{\frac{1}{C_{3}L_{3}}}+2L_{3}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}L_{3}}}+L_{3}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}L_{3}}}} \\ \text{K-LP:} \ \frac{R_{3}R_{4}+2L}{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}}}{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}} \\ \text{K-HP:} \ \frac{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}}{R_{3}R_{4}+2R_{3}Z_{L}+R_{4}Z_{L}}} \\ \text{K-BP:} \ 0 \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \sqrt{\frac{1}{C_{3}L_{3}}} \end{array}$$

6 GE

6.1 GE-1
$$Z(s) = \left(\infty, \infty, R_3, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

Parameters:

$$\begin{aligned} &\text{Q: } \frac{L_4 R_3 \sqrt{\frac{1}{C_4 L_4}} + L_4 Z_L \sqrt{\frac{1}{C_4 L_4}}}{R_3 R_4 + 2 R_3 Z_L + R_4 Z_L} \\ &\text{wo: } \sqrt{\frac{1}{C_4 L_4}} \\ &\text{bandwidth: } \frac{\sqrt{\frac{1}{C_4 L_4}} (R_3 R_4 + 2 R_3 Z_L + R_4 Z_L)}{L_4 R_3 \sqrt{\frac{1}{C_4 L_4}} + L_4 Z_L \sqrt{\frac{1}{C_4 L_4}}} \\ &\text{K-LP: } \frac{R_3 Z_L}{R_3 + Z_L} \\ &\text{K-HP: } \frac{R_3 Z_L}{R_3 + Z_L} \\ &\text{K-BP: } \frac{R_3 R_4 Z_L}{R_3 R_4 + 2 R_3 Z_L + R_4 Z_L} \\ &\text{Qz: } \frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{R_4} \\ &\text{Wz: } \sqrt{\frac{1}{C_4 L_4}} \end{aligned}$$

6.2 GE-2
$$Z(s) = \left(\infty, \infty, R_3, \frac{C_4L_4R_4s^2 + L_4s + R_4}{C_4L_4s^2 + 1}, \infty\right)$$

$$\begin{aligned} &\text{Q:} \ \frac{C_4 R_3 R_4 \sqrt{\frac{1}{C_4 L_4}} + 2 C_4 R_3 Z_L \sqrt{\frac{1}{C_4 L_4}} + C_4 R_4 Z_L \sqrt{\frac{1}{C_4 L_4}}}{R_3 + Z_L} \\ &\text{wo:} \ \sqrt{\frac{1}{C_4 L_4}} \\ &\text{bandwidth:} \ \frac{\sqrt{\frac{1}{C_4 L_4}} (R_3 + Z_L)}{C_4 R_3 R_4 \sqrt{\frac{1}{C_4 L_4}} + 2 C_4 R_3 Z_L \sqrt{\frac{1}{C_4 L_4}} + C_4 R_4 Z_L \sqrt{\frac{1}{C_4 L_4}}} \end{aligned}$$

$$H(s) = \frac{C_3L_3R_3R_4Z_Ls^2 + R_3R_4Z_L}{C_3R_3R_4Z_Ls + R_3R_4 + 2R_3Z_L + R_4Z_L + s^2\left(C_3L_3R_3R_4 + 2C_3L_3R_3Z_L + C_3L_3R_4Z_L\right)}$$

$$H(s) = \frac{C_4 L_4 R_3 Z_L s^2 + C_4 R_3 R_4 Z_L s + R_3 Z_L}{R_3 + Z_L + s^2 \left(C_4 L_4 R_3 + C_4 L_4 Z_L \right) + s \left(C_4 R_3 R_4 + 2 C_4 R_3 Z_L + C_4 R_4 Z_L \right)}$$

$$H(s) = \frac{C_4 L_4 R_3 R_4 Z_L s^2 + L_4 R_3 Z_L s + R_3 R_4 Z_L}{R_3 R_4 + 2 R_3 Z_L + R_4 Z_L + s^2 \left(C_4 L_4 R_3 R_4 + 2 C_4 L_4 R_3 Z_L + C_4 L_4 R_4 Z_L \right) + s \left(L_4 R_3 + L_4 Z_L \right)}$$

K-LP:
$$\frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L}$$
K-HP:
$$\frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L}$$
K-BP:
$$\frac{R_3Z_L}{R_3+Z_L}$$
Qz:
$$C_4R_4\sqrt{\frac{1}{C_4L_4}}$$
Wz:
$$\sqrt{\frac{1}{C_4L_4}}$$

6.3 GE-3
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, R_4, \infty\right)$$

$$\begin{aligned} & \text{Q:} \ \frac{L_3R_4\sqrt{\frac{1}{C_3L_3}} + 2L_3Z_L\sqrt{\frac{1}{C_3L_3}}}{R_3R_4 + 2R_3Z_L + R_4Z_L} \\ & \text{wo:} \ \sqrt{\frac{1}{C_3L_3}} \\ & \text{bandwidth:} \ \frac{\sqrt{\frac{1}{C_3L_3}}(R_3R_4 + 2R_3Z_L + R_4Z_L)}{L_3R_4\sqrt{\frac{1}{C_3L_3}} + 2L_3Z_L\sqrt{\frac{1}{C_3L_3}}} \\ & \text{K-LP:} \ \frac{R_4Z_L}{R_4 + 2Z_L} \\ & \text{K-HP:} \ \frac{R_4Z_L}{R_3R_4 + 2R_3Z_L + R_4Z_L} \\ & \text{K-BP:} \ \frac{R_3R_4Z_L}{R_3R_3 + 2R_3Z_L + R_4Z_L} \\ & \text{Qz:} \ \frac{L_3\sqrt{\frac{1}{C_3L_3}}}{R_3} \\ & \text{Wz:} \ \sqrt{\frac{1}{C_3L_3}} \end{aligned}$$

6.4 GE-4
$$Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, R_4, \infty\right)$$

Parameters:

$$\begin{array}{l} \text{Q:} \ \frac{C_3R_3R_4\sqrt{\frac{1}{C_3L_3}}+2C_3R_3Z_L\sqrt{\frac{1}{C_3L_3}}+C_3R_4Z_L\sqrt{\frac{1}{C_3L_3}}}{R_4+2Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_3L_3}} \\ \text{bandwidth:} \ \frac{\sqrt{\frac{1}{C_3L_3}}(R_4+2Z_L)}{C_3R_3R_4\sqrt{\frac{1}{C_3L_3}}+2C_3R_3Z_L\sqrt{\frac{1}{C_3L_3}}+C_3R_4Z_L\sqrt{\frac{1}{C_3L_3}}} \\ \text{K-LP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{K-HP:} \ \frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L} \\ \text{K-BP:} \ \frac{R_4Z_L}{R_4+2Z_L} \\ \text{Qz:} \ C_3R_3\sqrt{\frac{1}{C_3L_3}} \\ \text{Wz:} \ \sqrt{\frac{1}{C_3L_3}} \end{array}$$

7 AP

8 INVALID-NUMER

$$H(s) = \frac{C_3 L_3 R_4 Z_L s^2 + C_3 R_3 R_4 Z_L s + R_4 Z_L}{R_4 + 2Z_L + s^2 (C_3 L_3 R_4 + 2C_3 L_3 Z_L) + s (C_3 R_3 R_4 + 2C_3 R_3 Z_L + C_3 R_4 Z_L)}$$

$$H(s) = \frac{C_3L_3R_3R_4Z_Ls^2 + L_3R_4Z_Ls + R_3R_4Z_L}{R_3R_4 + 2R_3Z_L + R_4Z_L + s^2\left(C_3L_3R_3R_4 + 2C_3L_3R_3Z_L + C_3L_3R_4Z_L\right) + s\left(L_3R_4 + 2L_3Z_L\right)}$$

8.1 INVALID-NUMER-1 $Z(s) = \left(\infty, \infty, \frac{1}{C_{3s}}, R_4 + \frac{1}{C_{4s}}, \infty\right)$

$$H(s) = \frac{C_4 R_4 Z_L s + Z_L}{C_3 C_4 R_4 Z_L s^2 + s \left(C_3 Z_L + C_4 R_4 + 2 C_4 Z_L\right) + 1}$$

Parameters:

 $\begin{array}{l} \text{Q:} \ \frac{C_3C_4R_4Z_L\sqrt{\frac{1}{C_3C_4R_4Z_L}}}{C_3Z_L+C_4R_4+2C_4Z_L} \\ \text{wo:} \ \sqrt{\frac{1}{C_3C_4R_4Z_L}} \\ \text{bandwidth:} \ \frac{C_3Z_L+C_4R_4+2C_4Z_L}{C_3C_4R_4Z_L} \\ \text{K-LP:} \ Z_L \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{C_4R_4Z_L}{C_3Z_L+C_4R_4+2C_4Z_L} \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \text{None} \end{array}$

8.2 INVALID-NUMER-2 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_4 R_3 R_4 Z_L s + R_3 Z_L}{C_3 C_4 R_3 R_4 Z_L s^2 + R_3 + Z_L + s \left(C_3 R_3 Z_L + C_4 R_3 R_4 + 2 C_4 R_3 Z_L + C_4 R_4 Z_L \right)}$$

Parameters:

 $\begin{array}{l} \text{Q:} \ \frac{C_3C_4R_3R_4Z_L\sqrt{\frac{1}{C_3C_4R_4Z_L}+\frac{1}{C_3C_4R_3R_4}}}{C_3R_3Z_L+C_4R_3R_4+2C_4R_3Z_L+C_4R_4Z_L} \\ \text{wo:} \ \sqrt{\frac{R_3+Z_L}{C_3C_4R_3R_4Z_L}} \\ \text{bandwidth:} \ \frac{\sqrt{\frac{R_3+Z_L}{C_3C_4R_3R_4Z_L}}}{C_3C_4R_3R_4Z_L\sqrt{\frac{1}{C_3C_4R_4Z_L}+\frac{1}{C_3C_4R_3R_4}}} \\ \text{K-LP:} \ \frac{R_3Z_L}{R_3+Z_L} \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{C_4R_3R_4Z_L}{C_3R_3Z_L+C_4R_3Z_L+C_4R_4Z_L} \\ \text{Qz:} \ \text{None} \\ \\ \text{Wz:} \ \text{None} \end{array}$

8.3 INVALID-NUMER-3 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_3 R_3 Z_L s + Z_L}{2 C_3 C_4 R_3 Z_L s^2 + s \left(C_3 R_3 + C_3 Z_L + 2 C_4 Z_L\right) + 1}$$

Parameters:

 $\begin{array}{l} \text{Q:} \ \frac{\sqrt{2}C_3C_4R_3Z_L\sqrt{\frac{1}{C_3C_4R_3Z_L}}}{C_3R_3+C_3Z_L+2C_4Z_L} \\ \text{wo:} \ \frac{\sqrt{2}\sqrt{\frac{1}{C_3C_4R_3Z_L}}}{2} \\ \text{bandwidth:} \ \frac{C_3R_3+C_3Z_L+2C_4Z_L}{2C_3C_4R_3Z_L} \\ \text{K-LP:} \ Z_L \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{C_3R_3Z_L}{C_3R_3+C_3Z_L+2C_4Z_L} \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \text{None} \end{array}$

8.4 INVALID-NUMER-4 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$

$$H(s) = \frac{C_3 R_3 R_4 Z_L s + R_4 Z_L}{2C_3 C_4 R_3 R_4 Z_L s^2 + R_4 + 2Z_L + s \left(C_3 R_3 R_4 + 2C_3 R_3 Z_L + C_3 R_4 Z_L + 2C_4 R_4 Z_L \right)}$$

Parameters:

 $\text{Q: } \frac{\sqrt{2}C_3C_4R_3R_4Z_L\sqrt{\frac{1}{C_3C_4R_3Z_L}+\frac{2}{C_3C_4R_3R_4}}}{C_3R_3R_4+2C_3R_3Z_L+C_3R_4Z_L+2C_4R_4Z_L}$

WO:
$$\frac{\sqrt{2}\sqrt{\frac{R_4+2Z_L}{C_3C_4R_3R_4Z_L}}}{2}$$

bandwidth:
$$\frac{\sqrt{\frac{R_4+2Z_L}{C_3C_4R_3R_4Z_L}}(C_3R_3R_4+2C_3R_3Z_L+C_3R_4Z_L+2C_4R_4Z_L)}{2C_3C_4R_3R_4Z_L\sqrt{\frac{1}{C_3C_4R_3Z_L}+\frac{1}{C_3C_4R_3R_4}}}$$

K-LP: $\frac{R_4Z_L}{R_4+2Z_L}$ K-HP: 0

K-BP: $\frac{C_3R_3R_4Z_L}{C_3R_3R_4+2C_3R_3Z_L+C_3R_4Z_L+2C_4R_4Z_L}$ Qz: None

Wz: None

INVALID-WZ

9.1 INVALID-WZ-1
$$Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ R_4 + \frac{1}{C_4 s}, \ \infty\right)$$

$$H(s) = \frac{C_3C_4R_3R_4Z_Ls^2 + Z_L + s\left(C_3R_3Z_L + C_4R_4Z_L\right)}{s^2\left(C_3C_4R_3R_4 + 2C_3C_4R_3Z_L + C_3C_4R_4Z_L\right) + s\left(C_3R_3 + C_3Z_L + C_4R_4 + 2C_4Z_L\right) + 1}$$

Parameters:

$$\text{Q:} \frac{ C_{3}C_{4}R_{3}R_{4}\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{3}Z_{L}} + 2C_{3}C_{4}R_{3}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{L}\sqrt{\frac{1}{C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}} + C_{3}C_{4}R_{4}Z_{$$

WO:
$$\sqrt{\frac{1}{C_3C_4R_3R_4+2C_3C_4R_3Z_L+C_3C_4R_4Z_L}}$$

$$\frac{(C_{3}R_{3}+C_{3}Z_{L}+C_{4}R_{4}+2C_{4}Z_{L})\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}C_{4}R_{4}Z_{L}}}{C_{3}C_{4}R_{3}R_{4}\sqrt{\frac{1}{C_{3}C_{4}R_{3}R_{4}+2C_{3}C_{4}R_{3}Z_{L}+C_{3}$$

K-LP: Z_L K-HP: $\frac{R_3R_4Z_L}{R_3R_4+2R_3Z_L+R_4Z_L}$ K-BP: $\frac{C_3R_3Z_L+C_4R_4Z_L}{C_3R_3+C_3Z_L+C_4R_4+2C_4Z_L}$ Qz: None

Wz: $\sqrt{\frac{1}{C_3 C_4 R_3 R_4}}$

INVALID-ORDER

10.1 INVALID-ORDER-1
$$Z(s) = (\infty, \infty, R_3, R_4, \infty)$$

$$H(s) = \frac{R_3 R_4 Z_L}{R_3 R_4 + 2R_3 Z_L + R_4 Z_L}$$

10.2 INVALID-ORDER-2
$$Z(s) = \left(\infty, \infty, R_3, \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{R_3 Z_L}{2C_4 R_3 Z_L s + R_3 + Z_L}$$

10.3 INVALID-ORDER-3
$$Z(s) = \left(\infty, \infty, R_3, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{R_3 R_4 Z_L}{2C_4 R_3 R_4 Z_L s + R_3 R_4 + 2R_3 Z_L + R_4 Z_L}$$

10.4 INVALID-ORDER-4
$$Z(s) = \left(\infty, \infty, R_3, R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4 R_3 R_4 Z_L s + R_3 Z_L}{R_3 + Z_L + s \left(C_4 R_3 R_4 + 2C_4 R_3 Z_L + C_4 R_4 Z_L\right)}$$

10.5 INVALID-ORDER-5
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, R_4, \infty\right)$$

$$H(s) = \frac{R_4 Z_L}{C_3 R_4 Z_L s + R_4 + 2 Z_L}$$

10.6 INVALID-ORDER-6
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{Z_L}{s(C_3 Z_L + 2C_4 Z_L) + 1}$$

10.7 INVALID-ORDER-7
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{R_4 Z_L}{R_4 + 2Z_L + s \left(C_3 R_4 Z_L + 2C_4 R_4 Z_L\right)}$$

10.8 INVALID-ORDER-8
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, L_4 s + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 Z_L s^2 + Z_L}{C_3 C_4 L_4 Z_L s^3 + C_4 L_4 s^2 + s \left(C_3 Z_L + 2C_4 Z_L\right) + 1}$$

10.9 INVALID-ORDER-9
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 Z_L s^2 + C_4 R_4 Z_L s + Z_L}{C_3 C_4 L_4 Z_L s^3 + s^2 \left(C_3 C_4 R_4 Z_L + C_4 L_4 \right) + s \left(C_3 Z_L + C_4 R_4 + 2 C_4 Z_L \right) + 1}$$

10.10 INVALID-ORDER-10
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 R_4 Z_L s^2 + L_4 Z_L s + R_4 Z_L}{C_3 C_4 L_4 R_4 Z_L s^3 + R_4 + 2 Z_L + s^2 \left(C_3 L_4 Z_L + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(C_3 R_4 Z_L + L_4 \right)}$$

10.11 INVALID-ORDER-11
$$Z(s) = \left(\infty, \infty, \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 R_4 Z_L s^2 + R_4 Z_L}{C_3 C_4 L_4 R_4 Z_L s^3 + R_4 + 2 Z_L + s^2 \left(C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(C_3 R_4 Z_L + 2 C_4 R_4 Z_L \right)}$$

10.12 INVALID-ORDER-12 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, R_4, \infty\right)$

$$H(s) = \frac{R_3 R_4 Z_L}{C_3 R_3 R_4 Z_L s + R_3 R_4 + 2 R_3 Z_L + R_4 Z_L}$$

10.13 INVALID-ORDER-13
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{R_3 Z_L}{R_3 + Z_L + s \left(C_3 R_3 Z_L + 2C_4 R_3 Z_L\right)}$$

10.14 INVALID-ORDER-14
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, \frac{R_4}{C_4R_4s+1}, \infty\right)$$

$$H(s) = \frac{R_3 R_4 Z_L}{R_3 R_4 + 2R_3 Z_L + R_4 Z_L + s \left(C_3 R_3 R_4 Z_L + 2C_4 R_3 R_4 Z_L\right)}$$

10.15 INVALID-ORDER-15
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, L_4 s + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 R_3 Z_L s^2 + R_3 Z_L}{C_3 C_4 L_4 R_3 Z_L s^3 + R_3 + Z_L + s^2 \left(C_4 L_4 R_3 + C_4 L_4 Z_L \right) + s \left(C_3 R_3 Z_L + 2 C_4 R_3 Z_L \right)}$$

10.16 INVALID-ORDER-16
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 R_3 Z_L s^2 + C_4 R_3 R_4 Z_L s + R_3 Z_L}{C_3 C_4 L_4 R_3 Z_L s^3 + R_3 + Z_L + s^2 \left(C_3 C_4 R_3 R_4 Z_L + C_4 L_4 R_3 + C_4 L_4 Z_L \right) + s \left(C_3 R_3 Z_L + C_4 R_3 R_4 + 2 C_4 R_3 Z_L + C_4 R_4 Z_L \right)}$$

10.17 INVALID-ORDER-17
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_4L_4R_3R_4Z_Ls^2 + L_4R_3Z_Ls + R_3R_4Z_L}{C_3C_4L_4R_3R_4Z_Ls^3 + R_3R_4 + 2R_3Z_L + R_4Z_L + s^2\left(C_3L_4R_3Z_L + C_4L_4R_3R_4 + 2C_4L_4R_3Z_L + C_4L_4R_4Z_L\right) + s\left(C_3R_3R_4Z_L + L_4R_3 + L_4Z_L\right)}$$

10.18 INVALID-ORDER-18
$$Z(s) = \left(\infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_4 L_4 R_3 R_4 Z_L s^2 + R_3 R_4 Z_L}{C_3 C_4 L_4 R_3 R_4 Z_L s^3 + R_3 R_4 + 2 R_3 Z_L + R_4 Z_L + s^2 \left(C_4 L_4 R_3 R_4 + 2 C_4 L_4 R_3 Z_L + C_4 L_4 R_4 Z_L \right) + s \left(C_3 R_3 R_4 Z_L + 2 C_4 R_3 R_4 Z_L \right)}$$

10.19 INVALID-ORDER-19 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, R_4, \infty\right)$

$$H(s) = \frac{C_3 R_3 R_4 Z_L s + R_4 Z_L}{R_4 + 2Z_L + s \left(C_3 R_3 R_4 + 2C_3 R_3 Z_L + C_3 R_4 Z_L\right)}$$

10.20 INVALID-ORDER-20 $Z(s) = \left(\infty, \ \infty, \ R_3 + \frac{1}{C_3 s}, \ L_4 s + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_3C_4L_4R_3Z_Ls^3 + C_3R_3Z_Ls + C_4L_4Z_Ls^2 + Z_L}{s^3\left(C_3C_4L_4R_3 + C_3C_4L_4Z_L\right) + s^2\left(2C_3C_4R_3Z_L + C_4L_4\right) + s\left(C_3R_3 + C_3Z_L + 2C_4Z_L\right) + 1}$$

10.21 INVALID-ORDER-21 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$

$$H(s) = \frac{C_3L_4R_3Z_Ls^2 + L_4Z_Ls}{2C_3C_4L_4R_3Z_Ls^3 + 2Z_L + s^2\left(C_3L_4R_3 + C_3L_4Z_L + 2C_4L_4Z_L\right) + s\left(2C_3R_3Z_L + L_4\right)}$$

10.22 INVALID-ORDER-22 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_3C_4L_4R_3Z_Ls^3 + Z_L + s^2\left(C_3C_4R_3R_4Z_L + C_4L_4Z_L\right) + s\left(C_3R_3Z_L + C_4R_4Z_L\right)}{s^3\left(C_3C_4L_4R_3 + C_3C_4L_4Z_L\right) + s^2\left(C_3C_4R_3R_4 + 2C_3C_4R_3Z_L + C_3C_4R_4Z_L + C_4L_4\right) + s\left(C_3R_3 + C_3Z_L + C_4R_4 + 2C_4Z_L\right) + 1}$$

10.23 INVALID-ORDER-23 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$

$$H(s) = \frac{C_3L_4R_3R_4Z_Ls^2 + L_4R_4Z_Ls}{2C_3C_4L_4R_3R_4Z_Ls^3 + 2R_4Z_L + s^2\left(C_3L_4R_3R_4 + 2C_3L_4R_3Z_L + C_3L_4R_4Z_L + 2C_4L_4R_4Z_L\right) + s\left(2C_3R_3R_4Z_L + L_4R_4 + 2L_4Z_L\right)}$$

10.24 INVALID-ORDER-24 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$

$$H(s) = \frac{C_3C_4L_4R_3R_4Z_Ls^3 + R_4Z_L + s^2\left(C_3L_4R_3Z_L + C_4L_4R_4Z_L\right) + s\left(C_3R_3R_4Z_L + L_4Z_L\right)}{R_4 + 2Z_L + s^3\left(C_3C_4L_4R_3R_4 + 2C_3C_4L_4R_3Z_L + C_3C_4L_4R_4Z_L\right) + s^2\left(C_3L_4R_3 + C_3L_4Z_L + C_4L_4R_4 + 2C_4L_4Z_L\right) + s\left(C_3R_3R_4 + 2C_3R_3Z_L + C_3R_4Z_L + L_4Z_L\right)}$$

10.25 INVALID-ORDER-25
$$Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_4R_3R_4Z_Ls^3 + C_3R_3R_4Z_Ls + C_4L_4R_4Z_Ls^2 + R_4Z_L}{R_4 + 2Z_L + s^3\left(C_3C_4L_4R_3R_4 + 2C_3C_4L_4R_3Z_L + C_3C_4L_4R_4Z_L\right) + s^2\left(2C_3C_4R_3R_4Z_L + C_4L_4R_4 + 2C_4L_4Z_L\right) + s\left(C_3R_3R_4 + 2C_3R_3Z_L + C_3R_4Z_L + 2C_4R_4Z_L\right)}$$

10.26 INVALID-ORDER-26
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3 L_3 Z_L s^2 + Z_L}{2C_3 C_4 L_3 Z_L s^3 + C_3 L_3 s^2 + s \left(C_3 Z_L + 2C_4 Z_L\right) + 1}$$

10.27 INVALID-ORDER-27
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_3L_3R_4Z_Ls^2 + R_4Z_L}{2C_3C_4L_3R_4Z_Ls^3 + R_4 + 2Z_L + s^2\left(C_3L_3R_4 + 2C_3L_3Z_L\right) + s\left(C_3R_4Z_L + 2C_4R_4Z_L\right)}$$

10.28 INVALID-ORDER-28
$$Z(s) = \left(\infty, \ \infty, \ L_3 s + \frac{1}{C_3 s}, \ R_4 + \frac{1}{C_4 s}, \ \infty\right)$$

$$H(s) = \frac{C_3C_4L_3R_4Z_Ls^3 + C_3L_3Z_Ls^2 + C_4R_4Z_Ls + Z_L}{s^3\left(C_3C_4L_3R_4 + 2C_3C_4L_3Z_L\right) + s^2\left(C_3C_4R_4Z_L + C_3L_3\right) + s\left(C_3Z_L + C_4R_4 + 2C_4Z_L\right) + 1}$$

10.29 INVALID-ORDER-29
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, L_4 s + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4Z_Ls^4 + Z_L + s^2\left(C_3L_3Z_L + C_4L_4Z_L\right)}{C_3C_4L_3L_4s^4 + s^3\left(2C_3C_4L_3Z_L + C_3C_4L_4Z_L\right) + s^2\left(C_3L_3 + C_4L_4\right) + s\left(C_3Z_L + 2C_4Z_L\right) + 1}$$

10.30 INVALID-ORDER-30
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_3L_3L_4Z_Ls^3 + L_4Z_Ls}{2C_3C_4L_3L_4Z_Ls^4 + C_3L_3L_4s^3 + L_4s + 2Z_L + s^2\left(2C_3L_3Z_L + C_3L_4Z_L + 2C_4L_4Z_L\right)}$$

10.31 INVALID-ORDER-31
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4Z_Ls^4 + C_3C_4L_3R_4Z_Ls^3 + C_4R_4Z_Ls + Z_L + s^2\left(C_3L_3Z_L + C_4L_4Z_L\right)}{C_3C_4L_3L_4s^4 + s^3\left(C_3C_4L_3R_4 + 2C_3C_4L_3Z_L + C_3C_4L_4Z_L\right) + s^2\left(C_3C_4R_4Z_L + C_3L_3 + C_4L_4\right) + s\left(C_3Z_L + C_4R_4 + 2C_4Z_L\right) + 1}$$

10.32 INVALID-ORDER-32
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$H(s) = \frac{C_3L_3L_4R_4Z_Ls^3 + L_4R_4Z_Ls}{2C_3C_4L_3L_4R_4Z_Ls^4 + 2R_4Z_L + s^3\left(C_3L_3L_4R_4 + 2C_3L_3L_4Z_L\right) + s^2\left(2C_3L_3R_4Z_L + C_3L_4R_4Z_L + 2C_4L_4R_4Z_L\right) + s\left(L_4R_4 + 2L_4Z_L\right)}$$

10.33 INVALID-ORDER-33
$$Z(s) = \left(\infty, \infty, L_3 s + \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_4Z_Ls^4 + C_3L_3L_4Z_Ls^3 + L_4Z_Ls + R_4Z_L + s^2\left(C_3L_3R_4Z_L + C_4L_4R_4Z_L\right)}{R_4 + 2Z_L + s^4\left(C_3C_4L_3L_4R_4 + 2C_3C_4L_3L_4Z_L\right) + s^3\left(C_3C_4L_4R_4Z_L + C_3L_3L_4\right) + s^2\left(C_3L_3R_4 + 2C_3L_3Z_L + C_3L_4Z_L + C_4L_4R_4 + 2C_4L_4Z_L\right) + s\left(C_3R_4Z_L + L_4\right)}$$

$$\textbf{10.34} \quad \textbf{INVALID-ORDER-34} \ Z(s) = \left(\infty, \ \infty, \ L_3 s + \frac{1}{C_3 s}, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$$

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_4 Z_L s^4 + R_4 Z_L + s^2 \left(C_3 L_3 R_4 Z_L + C_4 L_4 R_4 Z_L \right)}{R_4 + 2 Z_L + s^4 \left(C_3 C_4 L_3 L_4 R_4 + 2 C_3 C_4 L_3 L_4 Z_L \right) + s^3 \left(2 C_3 C_4 L_3 R_4 Z_L + C_3 C_4 L_4 R_4 Z_L \right) + s^2 \left(C_3 L_3 R_4 + 2 C_3 L_3 Z_L + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(C_3 R_4 Z_L + 2 C_4 R_4 Z_L \right)$$

10.35 INVALID-ORDER-35 $Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3 L_3 s^2 + 1}, R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_4 L_3 R_4 Z_L s^2 + L_3 Z_L s}{C_3 C_4 L_3 R_4 Z_L s^3 + Z_L + s^2 \left(C_3 L_3 Z_L + C_4 L_3 R_4 + 2 C_4 L_3 Z_L \right) + s \left(C_4 R_4 Z_L + L_3 \right)}$$

10.36 INVALID-ORDER-36 $Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_3s^2+1}, L_4s + \frac{1}{C_4s}, \infty\right)$

$$H(s) = \frac{C_4 L_3 L_4 Z_L s^3 + L_3 Z_L s}{C_3 C_4 L_3 L_4 Z_L s^4 + C_4 L_3 L_4 s^3 + L_3 s + Z_L + s^2 \left(C_3 L_3 Z_L + 2 C_4 L_3 Z_L + C_4 L_4 Z_L \right)}$$

10.37 INVALID-ORDER-37 $Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3 L_3 s^2 + 1}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_4 L_3 L_4 Z_L s^3 + C_4 L_3 R_4 Z_L s^2 + L_3 Z_L s}{C_3 C_4 L_3 L_4 Z_L s^4 + Z_L + s^3 \left(C_3 C_4 L_3 R_4 Z_L + C_4 L_3 L_4 \right) + s^2 \left(C_3 L_3 Z_L + C_4 L_3 Z_L + C_4 L_4 Z_L \right) + s \left(C_4 R_4 Z_L + L_3 \right)}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(\infty, \ \infty, \ \frac{L_3s}{C_3L_3s^2+1}, \ \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1}, \ \infty\right)$

$$H(s) = \frac{C_4 L_3 L_4 R_4 Z_L s^3 + L_3 L_4 Z_L s^2 + L_3 R_4 Z_L s}{C_3 C_4 L_3 L_4 R_4 Z_L s^4 + R_4 Z_L + s^3 \left(C_3 L_3 L_4 Z_L + C_4 L_3 L_4 R_4 + 2 C_4 L_3 L_4 Z_L \right) + s^2 \left(C_3 L_3 R_4 Z_L + C_4 L_4 R_4 Z_L + L_3 L_4 \right) + s \left(L_3 R_4 + 2 L_3 Z_L + L_4 Z_L \right)}$$

10.39 INVALID-ORDER-39 $Z(s) = \left(\infty, \infty, \frac{L_{3s}}{C_3L_{3s}^2+1}, \frac{R_4\left(C_4L_4s^2+1\right)}{C_4L_4s^2+C_4R_4s+1}, \infty\right)$

$$H(s) = \frac{C_4L_3L_4R_4Z_Ls^3 + L_3R_4Z_Ls}{C_3C_4L_3L_4R_4Z_Ls^4 + R_4Z_L + s^3\left(C_4L_3L_4R_4 + 2C_4L_3L_4Z_L\right) + s^2\left(C_3L_3R_4Z_L + 2C_4L_3R_4Z_L + C_4L_4R_4Z_L\right) + s\left(L_3R_4 + 2L_3Z_L\right)}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_3L_3Z_Ls^2 + C_3R_3Z_Ls + Z_L}{2C_3C_4L_3Z_Ls^3 + s^2\left(2C_3C_4R_3Z_L + C_3L_3\right) + s\left(C_3R_3 + C_3Z_L + 2C_4Z_L\right) + 1}$$

10.41 INVALID-ORDER-41 $Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty\right)$

$$H(s) = \frac{C_3L_3R_4Z_Ls^2 + C_3R_3R_4Z_Ls + R_4Z_L}{2C_3C_4L_3R_4Z_Ls^3 + R_4 + 2Z_L + s^2\left(2C_3C_4R_3R_4Z_L + C_3L_3R_4 + 2C_3L_3Z_L\right) + s\left(C_3R_3R_4 + 2C_3R_3Z_L + C_3R_4Z_L + 2C_4R_4Z_L\right)}$$

10.42 INVALID-ORDER-42 $Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_3C_4L_3R_4Z_Ls^3 + Z_L + s^2\left(C_3C_4R_3R_4Z_L + C_3L_3Z_L\right) + s\left(C_3R_3Z_L + C_4R_4Z_L\right)}{s^3\left(C_3C_4L_3R_4 + 2C_3C_4L_3Z_L\right) + s^2\left(C_3C_4R_3R_4 + 2C_3C_4R_3Z_L + C_3C_4R_4Z_L + C_3L_3\right) + s\left(C_3R_3 + C_3Z_L + C_4R_4 + 2C_4Z_L\right) + 1}$$

10.43 INVALID-ORDER-43
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, L_4 s + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4Z_Ls^4 + C_3C_4L_4R_3Z_Ls^3 + C_3R_3Z_Ls + Z_L + s^2\left(C_3L_3Z_L + C_4L_4Z_L\right)}{C_3C_4L_3L_4s^4 + s^3\left(2C_3C_4L_3Z_L + C_3C_4L_4R_3 + C_3C_4L_4Z_L\right) + s^2\left(2C_3C_4R_3Z_L + C_3L_3 + C_4L_4\right) + s\left(C_3R_3 + C_3Z_L + 2C_4Z_L\right) + 1}$$

10.44 INVALID-ORDER-44
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_3L_3L_4Z_Ls^3 + C_3L_4R_3Z_Ls^2 + L_4Z_Ls}{2C_3C_4L_3L_4Z_Ls^4 + 2Z_L + s^3\left(2C_3C_4L_4R_3Z_L + C_3L_3L_4\right) + s^2\left(2C_3L_3Z_L + C_3L_4R_3 + C_3L_4Z_L + 2C_4L_4Z_L\right) + s\left(2C_3R_3Z_L + L_4\right)}$$

10.45 INVALID-ORDER-45
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4Z_Ls^4 + Z_L + s^3\left(C_3C_4L_3R_4Z_L + C_3C_4L_4R_3Z_L\right) + s^2\left(C_3C_4R_3R_4Z_L + C_3L_3Z_L + C_4L_4Z_L\right) + s\left(C_3R_3Z_L + C_4R_4Z_L\right)}{C_3C_4L_3L_4s^4 + s^3\left(C_3C_4L_3Z_L + C_3C_4L_3Z_L + C_3C_4L_4Z_L\right) + s^2\left(C_3C_4R_3R_4 + 2C_3C_4R_3Z_L + C_3L_4Z_L\right) + s\left(C_3R_3Z_L + C_4R_4Z_L\right) + s\left(C_3R_3Z_L\right) + s\left(C_3R_3Z_L\right)$$

10.46 INVALID-ORDER-46
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$H(s) = \frac{C_3L_3L_4R_4Z_Ls^3 + C_3L_4R_3R_4Z_Ls^2 + L_4R_4Z_Ls}{2C_3C_4L_3L_4R_4Z_Ls^4 + 2R_4Z_L + s^3\left(2C_3C_4L_4R_3R_4Z_L + C_3L_3L_4R_4 + 2C_3L_3R_4Z_L + C_3L_4R_3Z_L + C_3L_4R_3Z_L + 2C_4L_4R_4Z_L\right) + s\left(2C_3R_3R_4Z_L + L_4R_4 + 2L_4Z_L\right)}{2C_3C_4L_3L_4R_4Z_Ls^4 + 2C_3L_4R_3Z_L + C_3L_4R_3Z_L + C_3L_4R_3Z_L + 2C_4L_4R_4Z_L\right) + s\left(2C_3R_3R_4Z_L + L_4R_4 + 2L_4Z_L\right)}$$

10.47 INVALID-ORDER-47
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_4Z_Ls^4 + R_4Z_L + s^3\left(C_3C_4L_4R_3R_4Z_L + C_3L_3L_4Z_L\right) + s^2\left(C_3L_3R_4Z_L + C_3L_4R_3Z_L + C_4L_4R_4Z_L\right) + s\left(C_3R_3R_4Z_L + L_4Z_L\right)}{R_4 + 2Z_L + s^4\left(C_3C_4L_3L_4R_4 + 2C_3C_4L_3L_4Z_L\right) + s^3\left(C_3C_4L_4R_3R_4 + 2C_3C_4L_4R_3Z_L + C_3L_3L_4\right) + s^2\left(C_3L_3R_4 + 2C_3L_3Z_L + C_3L_4R_3 + C_3L_4Z_L\right) + s\left(C_3R_3R_4Z_L + L_4Z_L\right)}$$

10.48 INVALID-ORDER-48
$$Z(s) = \left(\infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_4Z_Ls^4 + C_3C_4L_4R_3R_4Z_Ls^3 + C_3R_3R_4Z_Ls + R_4Z_L + s^2\left(C_3L_3R_4Z_L + C_4L_4R_4Z_L\right)}{R_4 + 2Z_L + s^4\left(C_3C_4L_3L_4R_4 + 2C_3C_4L_3R_4Z_L + S_3C_4L_4R_3Z_L + C_3C_4L_4R_3Z_L + C_3C_4L_4R_4Z_L\right) + s^2\left(2C_3C_4R_3R_4Z_L + C_4L_4R_4 + 2C_4L_4Z_L\right) + s\left(C_3R_3R_4 + 2C_3R_3Z_L + C_3R_4Z_L + C_3R_4Z_L + C_3R_4Z_L + C_3R_4Z_L\right)}$$

10.49 INVALID-ORDER-49 $Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, R_4 + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_4 L_3 R_3 R_4 Z_L s^2 + L_3 R_3 Z_L s}{C_3 C_4 L_3 R_3 R_4 Z_L s^3 + R_3 Z_L + s^2 \left(C_3 L_3 R_3 Z_L + C_4 L_3 R_3 R_4 + 2 C_4 L_3 R_3 Z_L + C_4 L_3 R_4 Z_L \right) + s \left(C_4 R_3 R_4 Z_L + L_3 R_3 + L_3 Z_L \right)}$$

10.50 INVALID-ORDER-50 $Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, L_4 s + \frac{1}{C_4 s}, \infty\right)$

$$H(s) = \frac{C_4L_3L_4R_3Z_Ls^3 + L_3R_3Z_Ls}{C_3C_4L_3L_4R_3Z_Ls^4 + R_3Z_L + s^3\left(C_4L_3L_4R_3 + C_4L_3L_4Z_L\right) + s^2\left(C_3L_3R_3Z_L + 2C_4L_3R_3Z_L + C_4L_4R_3Z_L\right) + s\left(L_3R_3 + L_3Z_L\right)}$$

10.51 INVALID-ORDER-51
$$Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_4L_3L_4R_3Z_Ls^3 + C_4L_3R_3R_4Z_Ls^2 + L_3R_3Z_Ls}{C_3C_4L_3L_4R_3Z_Ls^4 + R_3Z_L + s^3\left(C_3C_4L_3R_3R_4Z_L + C_4L_3L_4R_3 + C_4L_3L_4Z_L\right) + s^2\left(C_3L_3R_3Z_L + C_4L_3R_3Z_L + C_4L_3R_4Z_L + C_4L_4R_3Z_L\right) + s\left(C_4R_3R_4Z_L + L_3R_3 + L_3Z_L\right)}$$

10.52 INVALID-ORDER-52
$$Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \infty\right)$$

$$H(s) = \frac{C_4L_3L_4R_3R_4Z_Ls^3 + L_3L_4R_3Z_Ls^2 + L_3R_3R_4Z_Ls}{C_3C_4L_3L_4R_3R_4Z_Ls^4 + R_3R_4Z_L + s^3\left(C_3L_3L_4R_3Z_L + C_4L_3L_4R_3R_4 + 2C_4L_3L_4R_3Z_L + C_4L_3L_4R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + L_4L_4R_3R_4Z_L + L_4L_4R_3Z_L\right) + s\left(L_3R_3R_4 + 2L_3R_3Z_L + L_4R_3Z_L + L_4R_3Z_L\right) + s\left(L_3R_3R_4 + 2L_3R_3Z_L + L_3R_3Z_L\right) + s\left(L_3R_3R_4 + 2L_3R_3Z_L\right) + s\left(L_3R_3R_4 + 2L_3$$

10.53 INVALID-ORDER-53
$$Z(s) = \left(\infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{R_4 \left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty\right)$$

$$H(s) = \frac{C_4L_3L_4R_3R_4Z_Ls^3 + L_3R_3R_4Z_Ls}{C_3C_4L_3L_4R_3R_4Z_Ls^4 + R_3R_4Z_L + s^3\left(C_4L_3L_4R_3R_4 + 2C_4L_3L_4R_3Z_L + C_4L_3L_4R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + 2C_4L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s\left(L_3R_3R_4 + 2L_3R_3Z_L + L_3R_4Z_L\right)}$$

10.54 INVALID-ORDER-54
$$Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{1}{C_4s}, \infty\right)$$

$$H(s) = \frac{C_3L_3R_3Z_Ls^2 + L_3Z_Ls + R_3Z_L}{2C_3C_4L_3R_3Z_Ls^3 + R_3 + Z_L + s^2\left(C_3L_3R_3 + C_3L_3Z_L + 2C_4L_3Z_L\right) + s\left(2C_4R_3Z_L + L_3\right)}$$

10.55 INVALID-ORDER-55
$$Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{R_4}{C_4R_4s + 1}, \infty\right)$$

$$H(s) = \frac{C_3L_3R_3R_4Z_Ls^2 + L_3R_4Z_Ls + R_3R_4Z_L}{2C_3C_4L_3R_3R_4Z_Ls^3 + R_3R_4 + 2R_3Z_L + R_4Z_L + s^2\left(C_3L_3R_3R_4 + 2C_3L_3R_3Z_L + C_3L_3R_4Z_L + 2C_4L_3R_4Z_L\right) + s\left(2C_4R_3R_4Z_L + L_3R_4 + 2L_3Z_L\right)}$$

10.56 INVALID-ORDER-56
$$Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, R_4 + \frac{1}{C_4s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3R_3R_4Z_Ls^3 + R_3Z_L + s^2\left(C_3L_3R_3Z_L + C_4L_3R_4Z_L\right) + s\left(C_4R_3R_4Z_L + L_3Z_L\right)}{R_3 + Z_L + s^3\left(C_3C_4L_3R_3R_4 + 2C_3C_4L_3R_3Z_L + C_3C_4L_3R_4Z_L\right) + s^2\left(C_3L_3R_3 + C_3L_3Z_L + C_4L_3Z_L\right) + s\left(C_4R_3R_4Z_L + L_3Z_L\right) + s\left(C_4R_3R_4Z_L + C_4R_3Z_L + C_4R_4Z_L + L_3Z_L\right)}$$

10.57 INVALID-ORDER-57
$$Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, L_4 s + \frac{1}{C_4 s}, \infty\right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_3Z_Ls^4 + C_4L_3L_4Z_Ls^3 + L_3Z_Ls + R_3Z_L + s^2\left(C_3L_3R_3Z_L + C_4L_4R_3Z_L\right)}{R_3 + Z_L + s^4\left(C_3C_4L_3L_4R_3 + C_3C_4L_3L_4Z_L\right) + s^3\left(2C_3C_4L_3R_3Z_L + C_4L_3L_4\right) + s^2\left(C_3L_3R_3 + C_4L_4Z_L\right) + s^2\left(C_3L_3R_3 +$$

10.58 INVALID-ORDER-58 $Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{L_4s}{C_4L_4s^2 + 1}, \infty\right)$

$$H(s) = \frac{C_3L_3L_4R_3Z_Ls^3 + L_3L_4Z_Ls^2 + L_4R_3Z_Ls}{2C_3C_4L_3L_4R_3Z_Ls^4 + 2R_3Z_L + s^3\left(C_3L_3L_4R_3 + C_3L_3L_4Z_L + 2C_4L_3L_4Z_L\right) + s^2\left(2C_3L_3R_3Z_L + 2C_4L_4R_3Z_L + L_3L_4\right) + s\left(2L_3Z_L + L_4R_3 + L_4Z_L\right)}$$

10.59 INVALID-ORDER-59 $Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, L_4s + R_4 + \frac{1}{C_4s}, \infty\right)$

$$H(s) = \frac{C_3C_4L_3L_4R_3Z_Ls^4 + R_3Z_L + s^3\left(C_3C_4L_3R_3R_4Z_L + C_4L_3L_4Z_L\right) + s^2\left(C_3L_3R_3Z_L + C_4L_3R_4Z_L + C_4L_4R_3Z_L\right) + s\left(C_4R_3R_4Z_L + L_3Z_L\right)}{R_3 + Z_L + s^4\left(C_3C_4L_3L_4Z_L\right) + s^3\left(C_3C_4L_3R_3R_4 + 2C_3C_4L_3R_3Z_L + C_4L_3L_4\right) + s^2\left(C_3L_3R_3 + C_4L_3R_4 + 2C_4L_3Z_L + C_4L_4R_3 + C_4L_4Z_L\right) + s\left(C_4R_3R_4 + 2C_4R_3Z_L + C_4R_4Z_L + L_3Z_L\right)}$$

10.60 INVALID-ORDER-60
$$Z(s) = \left(\infty, \infty, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty\right)$$

$$H(s) = \frac{C_3L_3L_4R_3R_4Z_Ls^3 + L_3L_4R_4Z_Ls^2 + L_4R_3R_4Z_Ls}{2C_3C_4L_3L_4R_3R_4Z_Ls^4 + 2R_3R_4Z_L + s^3\left(C_3L_3L_4R_3R_4 + 2C_3L_3L_4R_3Z_L + C_3L_3L_4R_4Z_L\right) + s^2\left(2C_3L_3R_3R_4Z_L + 2C_4L_4R_3R_4Z_L + L_3L_4R_4 + 2L_3L_4Z_L\right) + s\left(2L_3R_4Z_L + L_4R_3R_4 + 2L_4R_3Z_L + L_4R_4Z_L\right)}$$

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10.61 INVALID-ORDER-61 Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{C_4L_4R_4s^2 + L_4s + R_4}{C_4L_4s^2 + 1}, \infty\right)
H(s) = \frac{C_3C_4L_3L_4R_3R_4Z_L + s^3\left(C_3L_3L_4R_3Z_L + C_4L_3L_4R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + L_4L_4R_3Z_L\right) + s\left(L_3R_4Z_L + L_4R_3Z_L\right) + s\left(L_3R_4Z_L\right) + s\left(L_3
10.62 INVALID-ORDER-62 Z(s) = \left(\infty, \infty, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \frac{R_4\left(C_4L_4s^2 + 1\right)}{C_4L_4s^2 + C_4R_4s + 1}, \infty\right)
H(s) = \frac{C_3C_4L_3L_4R_3R_4Z_Ls^4 + C_4L_3L_4R_4Z_Ls^3 + L_3R_4Z_L + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L\right)}{R_3R_4 + 2R_3Z_L + R_4Z_L + s^4\left(C_3C_4L_3L_4R_3R_4 + 2C_3C_4L_3L_4R_3Z_L + C_4L_3L_4R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_3R_4Z_L + C_4L_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_4R_3Z_L + C_4L_4R_3Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L + C_4L_4R_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L + C_4L_4R_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_3R_4Z_L + C_4L_4R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L\right) + s^2\left(C_3L_3R
10.63 INVALID-ORDER-63 Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{1}{C_4s}, \infty\right)
                                                                                                                                                                                                                                                                                     H(s) = \frac{C_3L_3R_3Z_Ls^2 + R_3Z_L}{2C_3C_4L_3R_3Z_Ls^3 + R_3 + Z_L + s^2\left(C_3L_3R_3 + C_3L_3Z_L\right) + s\left(C_3R_3Z_L + 2C_4R_3Z_L\right)}
10.64 INVALID-ORDER-64 Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{R_4}{C_4R_4s+1}, \infty\right)
                                                                                                                                                                                                             H(s) = \frac{C_3L_3R_3R_4Z_Ls^2 + R_3R_4Z_L}{2C_3C_4L_3R_3R_4Z_Ls^3 + R_3R_4 + 2R_3Z_L + R_4Z_L + s^2\left(C_3L_3R_3R_4 + 2C_3L_3R_3Z_L + C_3L_3R_4Z_L\right) + s\left(C_3R_3R_4Z_L + 2C_4R_3R_4Z_L\right)}
10.65 INVALID-ORDER-65 Z(s) = \left(\infty, \infty, \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, R_4 + \frac{1}{C_4s}, \infty\right)
                                                                                                                                                           H(s) = \frac{C_3C_4L_3R_3R_4Z_Ls^3 + C_3L_3R_3Z_Ls^2 + C_4R_3R_4Z_Ls + R_3Z_L}{R_3 + Z_L + s^3\left(C_3C_4L_3R_3R_4 + 2C_3C_4L_3R_3Z_L + C_3C_4L_3R_4Z_L\right) + s^2\left(C_3C_4R_3R_4Z_L + C_3L_3R_3 + C_3L_3Z_L\right) + s\left(C_3R_3Z_L + C_4R_3R_4 + 2C_4R_3Z_L + C_4R_4Z_L\right)}
10.66 INVALID-ORDER-66 Z(s) = \left(\infty, \infty, \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, L_4s + \frac{1}{C_4s}, \infty\right)
                                                                                                                                                     H(s) = \frac{C_3C_4L_3L_4R_3Z_Ls^4 + R_3Z_L + s^2\left(C_3L_3R_3Z_L + C_4L_4R_3Z_L\right)}{R_3 + Z_L + s^4\left(C_3C_4L_3L_4R_3 + C_3C_4L_3L_4Z_L\right) + s^3\left(2C_3C_4L_3R_3Z_L + C_3C_4L_4R_3Z_L\right) + s^2\left(C_3L_3R_3 + C_4L_4R_3 + C_4L_4R_3 + C_4L_4Z_L\right) + s\left(C_3R_3Z_L + 2C_4R_3Z_L\right)}
10.67 INVALID-ORDER-67 Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4s}{C_4L_4s^2+1}, \infty\right)
                                                                                                                                                                                                       H(s) = \frac{C_3L_3L_4R_3Z_Ls^3 + L_4R_3Z_Ls}{2C_3C_4L_3L_4R_3Z_Ls^4 + 2R_3Z_L + s^3\left(C_3L_3L_4R_3 + C_3L_3L_4Z_L\right) + s^2\left(2C_3L_3R_3Z_L + C_3L_4R_3Z_L + 2C_4L_4R_3Z_L\right) + s\left(L_4R_3 + L_4Z_L\right)}
10.68 INVALID-ORDER-68 Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, L_4s + R_4 + \frac{1}{C_4s}, \infty\right)
                               H(s) = \frac{C_3C_4L_3L_4R_3Z_Ls^4 + C_3C_4L_3R_3R_4Z_Ls^3 + C_4R_3R_4Z_Ls + R_3Z_L + s^2\left(C_3L_3R_3Z_L + C_4L_4R_3Z_L\right)}{R_3 + Z_L + s^4\left(C_3C_4L_3L_4R_3 + C_3C_4L_3R_3R_4 + 2C_3C_4L_3R_3Z_L + C_3C_4L_3R_4Z_L + S_4C_4R_3Z_L\right) + s^2\left(C_3C_4R_3R_4Z_L + C_3C_4L_3R_3Z_L + C_4L_4R_3 + C_4L_4Z_L\right) + s\left(C_3R_3Z_L + C_4R_3R_4 + 2C_4R_3Z_L + C_4R_4Z_L\right)}
10.69 INVALID-ORDER-69 Z(s) = \left(\infty, \infty, \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty\right)
                                                                                                             H(s) = \frac{C_3L_3L_4R_3R_4Z_Ls^3 + L_4R_3R_4Z_Ls}{2C_3C_4L_3L_4R_3R_4Z_Ls^4 + 2R_3R_4Z_L + s^3\left(C_3L_3L_4R_3R_4 + 2C_3L_3L_4R_3Z_L + C_3L_3L_4R_3Z_L + C_3L_3R_3R_4Z_L + C_3L_4R_3R_4Z_L + 2C_4L_4R_3R_4Z_L\right) + s\left(L_4R_3R_4 + 2L_4R_3Z_L + L_4R_4Z_L\right)}{2C_3C_4L_3L_4R_3R_4Z_Ls^4 + 2R_3R_4Z_L + s^3\left(C_3L_3L_4R_3R_4 + 2C_3L_3L_4R_3Z_L + C_3L_3L_4R_3Z_L + C_3L_4R_3R_4Z_L\right) + s\left(L_4R_3R_4Z_L\right) + s\left(L_4R_3R_4 + 2L_4R_3Z_L + L_4R_4Z_L\right)}
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10.70 INVALID-ORDER-70 $Z(s) = \left(\infty, \infty, \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1}, \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1}, \infty\right)$

 $H(s) = \frac{C_3C_4L_3L_4R_3R_4Z_Ls^4 + C_3L_3L_4R_3Z_Ls^3 + L_4R_3Z_Ls + R_3R_4Z_L + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L\right)}{R_3R_4 + 2R_3Z_L + R_4Z_L + s^4\left(C_3C_4L_3L_4R_3Z_L + C_3C_4L_3L_4R_3Z_L + C_3L_4R_3Z_L + C_3L_4R_3Z_L + C_3L_4R_3Z_L + C_4L_4R_3Z_L +$

10.71 INVALID-ORDER-71 $Z(s) = \left(\infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty\right)$

 $H(s) = \frac{C_3C_4L_3L_4R_3R_4Z_Ls^4 + R_3R_4Z_L + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4Z_L\right)}{R_3R_4 + 2R_3Z_L + R_4Z_L + s^4\left(C_3C_4L_3L_4R_3R_4 + 2C_3C_4L_3L_4R_3Z_L + C_3C_4L_3L_4R_3Z_L + C_3C_4L_3R_3R_4Z_L\right) + s^2\left(C_3L_3R_3R_4Z_L + C_4L_4R_3R_4 + 2C_4L_4R_3Z_L + C_4L_4R_3Z_L + C_4L_4R_3Z$

11 PolynomialError