Filter Summary Report: TIA,simple,Z4,ZL

Generated by MacAnalog-Symbolix

December 5, 2024

Contents

1 Examined $H(z)$ for TIA simple Z4 ZL: $\frac{Z_4 Z_L g_m}{Z_4 g_m + 2 Z_L g_m}$ **2**

2 HP **2**

3 BP **2**

3.1 BP-1 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ . . . 2

3.2 BP-2 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ . . . 2

3.3 BP-3 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ . . . 3

3.4 BP-4 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ . . . 3

3.5 BP-5 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ . . . 4

3.6 BP-6 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ R_L\right)$ . . . 4

3.7 BP-7 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 5

3.8 BP-8 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ . . . 5

3.9 BP-9 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ R_L\right)$ . . . 6

3.10 BP-10 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{1}{C_L s}\right)$ . . . 6

3.11 BP-11 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 7
3.12 BP-12 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ . . . 7
3.13 BP-13 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ . . . 8

4 LP **8**

5 BS **8**
5.1 BS-1 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ L_L s+\frac{1}{C_L s}\right)$ . . . 8
5.2 BS-2 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$ . . . 9
5.3 BS-3 $Z(s)=\left(\infty,\ \infty,\ \infty,\ L_4 s+\frac{1}{C_4 s},\ \infty,\ R_L\right)$ . . . 9
5.4 BS-4 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ R_L\right)$ . . . 10

6 GE **10**
6.1 GE-1 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$ . . . 11
6.2 GE-2 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$ . . . 11
6.3 GE-3 $Z(s)=\left(\infty,\ \infty,\ \infty,\ L_4 s+R_4+\frac{1}{C_4 s},\ \infty,\ R_L\right)$ . . . 12
6.4 GE-4 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1}+R_4,\ \infty,\ R_L\right)$ . . . 12

7 AP **13**

8 INVALID-NUMER **13**
8.1 INVALID-NUMER-1 $Z(s)=\left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ R_L+\frac{1}{C_L s}\right)$ . . . 13
8.2 INVALID-NUMER-2 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4+\frac{1}{C_4 s},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 13

9 INVALID-WZ **14**

10 INVALID-ORDER **14**
10.1 INVALID-ORDER-1 $Z(s)=(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ R_L)$ . . . 14
10.2 INVALID-ORDER-2 $Z(s)=\left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{1}{C_L s}\right)$ . . . 14

10.3 INVALID-ORDER-3 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 14
10.4 INVALID-ORDER-4 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ R_L + \frac{1}{C_L s}\right)$ . . . 15
10.5 INVALID-ORDER-5 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ R_L\right)$ . . . 15
10.6 INVALID-ORDER-6 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s}\right)$ . . . 15
10.7 INVALID-ORDER-7 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 15
10.8 INVALID-ORDER-8 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ . . . 15
10.9 INVALID-ORDER-9 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ . . . 15
10.10INVALID-ORDER-10 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ . . . 16
10.11INVALID-ORDER-11 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ . . . 16
10.12INVALID-ORDER-12 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$ . . . 16
10.13INVALID-ORDER-13 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$ . . . 16
10.14INVALID-ORDER-14 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ R_L\right)$ . . . 16
10.15INVALID-ORDER-15 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{1}{C_L s}\right)$ . . . 16
10.16INVALID-ORDER-16 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ . . . 17
10.17INVALID-ORDER-17 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ . . . 17
10.18INVALID-ORDER-18 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ . . . 17
10.19INVALID-ORDER-19 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$ . . . 17
10.20INVALID-ORDER-20 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$ . . . 17
10.21INVALID-ORDER-21 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ R_L\right)$ . . . 18
10.22INVALID-ORDER-22 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s}\right)$ . . . 18
10.23INVALID-ORDER-23 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ . . . 18
10.24INVALID-ORDER-24 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ . . . 18
10.25INVALID-ORDER-25 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ . . . 18

10.26INVALID-ORDER-26 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 18
10.27INVALID-ORDER-27 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$ 19
10.28INVALID-ORDER-28 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$ 19
10.29INVALID-ORDER-29 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$ 19
10.30INVALID-ORDER-30 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s}\right)$ 19
10.31INVALID-ORDER-31 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$ 19
10.32INVALID-ORDER-32 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ 20
10.33INVALID-ORDER-33 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ 20
10.34INVALID-ORDER-34 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$ 20
10.35INVALID-ORDER-35 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 20
10.36INVALID-ORDER-36 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$ 20
10.37INVALID-ORDER-37 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$ 21
10.38INVALID-ORDER-38 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$ 21
10.39INVALID-ORDER-39 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \frac{1}{C_L s}\right)$ 21
10.40INVALID-ORDER-40 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ 21
10.41INVALID-ORDER-41 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ 21
10.42INVALID-ORDER-42 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$ 21
10.43INVALID-ORDER-43 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 22
10.44INVALID-ORDER-44 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$ 22
10.45INVALID-ORDER-45 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$ 22
10.46INVALID-ORDER-46 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s}\right)$ 22
10.47INVALID-ORDER-47 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L}{C_L R_L s + 1}\right)$ 22

10.48INVALID-ORDER-48 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ 23
10.49INVALID-ORDER-49 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ 23
10.50INVALID-ORDER-50 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ 23
10.51INVALID-ORDER-51 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 23
10.52INVALID-ORDER-52 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ 23
10.53INVALID-ORDER-53 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$ 24
10.54INVALID-ORDER-54 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$ 24
10.55INVALID-ORDER-55 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ R_L + \frac{1}{C_L s}\right)$ 24
10.56INVALID-ORDER-56 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ 24
10.57INVALID-ORDER-57 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 24
10.58INVALID-ORDER-58 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$ 25
10.59INVALID-ORDER-59 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$ 25
10.60INVALID-ORDER-60 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{1}{C_L s}\right)$ 25
10.61INVALID-ORDER-61 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ 25
10.62INVALID-ORDER-62 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ R_L + \frac{1}{C_L s}\right)$ 25
10.63INVALID-ORDER-63 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$ 26
10.64INVALID-ORDER-64 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ 26
10.65INVALID-ORDER-65 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$ 26
10.66INVALID-ORDER-66 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ 26
10.67INVALID-ORDER-67 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$ 26
10.68INVALID-ORDER-68 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$ 27

10.69INVALID-ORDER-69 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{1}{C_L s}\right)$ 27
10.70INVALID-ORDER-70 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$ 27
10.71INVALID-ORDER-71 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ R_L+\frac{1}{C_L s}\right)$ 27
10.72INVALID-ORDER-72 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ L_L s+\frac{1}{C_L s}\right)$ 27
10.73INVALID-ORDER-73 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$ 28
10.74INVALID-ORDER-74 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$ 28
10.75INVALID-ORDER-75 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$ 28
10.76INVALID-ORDER-76 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$ 28
10.77INVALID-ORDER-77 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$ 28

1 Examined $H(z)$ for TIA simple Z4 ZL: $\frac{Z_4 Z_L g_m}{Z_4 g_m + 2 Z_L g_m}$

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

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$$H(s) = \frac{L_L R_4 s}{C_L L_L R_4 s^2 + 2 L_L s + R_4}$$

Parameters:

Q: $\frac{C_L R_4 \sqrt{\frac{1}{C_L L_L}}}{2}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{2}{C_L R_4}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4}{2}$
Qz: 0
Wz: None

3.2 BP-2 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_4 R_L s}{C_L L_L R_4 R_L s^2 + L_L R_4 s + 2 L_L R_L s + R_4 R_L}$$

Parameters:

Q: $\frac{C_L R_4 R_L \sqrt{\frac{1}{C_L L_L}}}{R_4+2R_L}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{R_4+2R_L}{C_L R_4 R_L}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: 0
Wz: None

3.3 BP-3 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_L s}{2C_4 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

Parameters:

Q: $R_L \sqrt{\frac{1}{L_L(2C_4+C_L)}}\,(2C_4+C_L)$
wo: $\sqrt{\frac{1}{L_L(2C_4+C_L)}}$
bandwidth: $\frac{1}{R_L(2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: R_L
Qz: 0
Wz: None

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

$$H(s) = \frac{L_L R_4 s}{2C_4 L_L R_4 s^2 + C_L L_L R_4 s^2 + 2L_L s + R_4}$$

Parameters:

Q: $\frac{R_4 \sqrt{\frac{1}{L_L(2C_4+C_L)}}(2C_4+C_L)}{2}$

wo: $\sqrt{\frac{1}{L_L(2C_4+C_L)}}$
bandwidth: $\frac{2}{R_4(2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4}{2}$
Qz: 0
Wz: None

3.5 BP-5 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \frac{1}{C_Ls+\frac{1}{R_L}+\frac{1}{L_Ls}}\right)$

$$H(s) = \frac{L_LR_4R_Ls}{2C_4L_LR_4R_Ls^2 + C_LL_LR_4R_Ls^2 + L_LR_4s + 2L_LR_Ls + R_4R_L}$$

Parameters:

Q: $\frac{R_4R_L\sqrt{\frac{1}{L_L(2C_4+C_L)}}(2C_4+C_L)}{R_4+2R_L}$
wo: $\sqrt{\frac{1}{L_L(2C_4+C_L)}}$
bandwidth: $\frac{R_4+2R_L}{R_4R_L(2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4R_L}{R_4+2R_L}$
Qz: 0
Wz: None

3.6 BP-6 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4s}{C_4L_4s^2+1},\ \infty,\ R_L\right)$

$$H(s) = \frac{L_4R_Ls}{2C_4L_4R_Ls^2 + L_4s + 2R_L}$$

Parameters:

Q: $2C_4R_L\sqrt{\frac{1}{C_4L_4}}$
wo: $\sqrt{\frac{1}{C_4L_4}}$

bandwidth: $\frac{1}{2C_4R_L}$
K-LP: 0
K-HP: 0
K-BP: R_L
Qz: 0
Wz: None

3.7 BP-7 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

$$H(s) = \frac{L_4 R_L s}{2C_4 L_4 R_L s^2 + C_L L_4 R_L s^2 + L_4 s + 2R_L}$$

Parameters:

Q: $\sqrt{2}R_L\sqrt{\frac{1}{L_4(2C_4+C_L)}}\,(2C_4+C_L)$
wo: $\sqrt{2}\sqrt{\frac{1}{L_4(2C_4+C_L)}}$
bandwidth: $\frac{1}{R_L(2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: R_L
Qz: 0
Wz: None

3.8 BP-8 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_4 L_L R_L s}{2C_4 L_4 L_L R_L s^2 + C_L L_4 L_L R_L s^2 + L_4 L_L s + L_4 R_L + 2L_L R_L}$$

Parameters:

Q: $R_L\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}\,(2C_4+C_L)$
wo: $\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}$
bandwidth: $\frac{1}{R_L(2C_4+C_L)}$

K-LP: 0
K-HP: 0
K-BP: R_L
Qz: 0
Wz: None

3.9 BP-9 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ R_L\right)$

$$H(s) = \frac{L_4 R_4 R_L s}{2C_4 L_4 R_4 R_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2R_4 R_L}$$

Parameters:

Q: $\frac{2C_4 R_4 R_L \sqrt{\frac{1}{C_4 L_4}}}{R_4+2R_L}$
wo: $\sqrt{\frac{1}{C_4 L_4}}$
bandwidth: $\frac{R_4+2R_L}{2C_4 R_4 R_L}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: 0
Wz: None

3.10 BP-10 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 R_4 s}{2C_4 L_4 R_4 s^2 + C_L L_4 R_4 s^2 + 2L_4 s + 2R_4}$$

Parameters:

Q: $\frac{\sqrt{2} R_4 \sqrt{\frac{1}{L_4(2C_4+C_L)}}(2C_4+C_L)}{2}$
wo: $\sqrt{2}\sqrt{\frac{1}{L_4(2C_4+C_L)}}$
bandwidth: $\frac{2}{R_4(2C_4+C_L)}$
K-LP: 0

K-HP: 0
K-BP: $\frac{R_4}{2}$
Qz: 0
Wz: None

3.11 BP-11 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

$$H(s) = \frac{L_4 R_4 R_L s}{2C_4 L_4 R_4 R_L s^2 + C_L L_4 R_4 R_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2R_4 R_L}$$

Parameters:

Q: $\frac{\sqrt{2} R_4 R_L \sqrt{\frac{1}{L_4(2C_4+C_L)}}(2C_4+C_L)}{R_4+2R_L}$
wo: $\sqrt{2}\sqrt{\frac{1}{L_4(2C_4+C_L)}}$
bandwidth: $\frac{R_4+2R_L}{R_4 R_L(2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: 0
Wz: None

3.12 BP-12 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

$$H(s) = \frac{L_4 L_L R_4 s}{2C_4 L_4 L_L R_4 s^2 + C_L L_4 L_L R_4 s^2 + 2L_4 L_L s + L_4 R_4 + 2L_L R_4}$$

Parameters:

Q: $\frac{R_4\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}(2C_4+C_L)}{2}$
wo: $\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}$
bandwidth: $\frac{2}{R_4(2C_4+C_L)}$
K-LP: 0

K-HP: 0
K-BP: $\frac{R_4}{2}$
Qz: 0
Wz: None

3.13 BP-13 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_4 L_L R_4 R_L s}{2C_4 L_4 L_L R_4 R_L s^2 + C_L L_4 L_L R_4 R_L s^2 + L_4 L_L R_4 s + 2L_4 L_L R_L s + L_4 R_4 R_L + 2L_L R_4 R_L}$$

Parameters:

Q: $\frac{R_4 R_L \sqrt{\frac{L_4+2L_L}{L_4 L_L (2C_4+C_L)}}(2C_4+C_L)}{R_4+2R_L}$
wo: $\sqrt{\frac{L_4+2L_L}{L_4 L_L (2C_4+C_L)}}$
bandwidth: $\frac{R_4+2R_L}{R_4 R_L (2C_4+C_L)}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: 0
Wz: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4\left(C_L L_L s^2 + 1\right)}{2C_L L_L s^2 + C_L R_4 s + 2}$$

Parameters:

Q: $\frac{2L_L\sqrt{\frac{1}{C_L L_L}}}{R_4}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{R_4}{2L_L}$
K-LP: $\frac{R_4}{2}$
K-HP: $\frac{R_4}{2}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_L L_L}}$

5.2 BS-2 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_4 R_L\left(C_L L_L s^2+1\right)}{C_L L_L R_4 s^2+2C_L L_L R_L s^2+C_L R_4 R_L s+R_4+2R_L}$$

Parameters:

Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}(R_4+2R_L)}{R_4 R_L}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{R_4 R_L}{L_L(R_4+2R_L)}$
K-LP: $\frac{R_4 R_L}{R_4+2R_L}$
K-HP: $\frac{R_4 R_L}{R_4+2R_L}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_L L_L}}$

5.3 BS-3 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s+\frac{1}{C_4 s},\ \infty,\ R_L\right)$

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

Parameters:

Q: $\frac{L_4\sqrt{\frac{1}{C_4L_4}}}{2R_L}$
wo: $\sqrt{\frac{1}{C_4L_4}}$
bandwidth: $\frac{2R_L}{L_4}$
K-LP: R_L
K-HP: R_L
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_4L_4}}$

5.4 BS-4 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4s+\frac{1}{C_4s}\right)}{L_4s+R_4+\frac{1}{C_4s}},\ \infty,\ R_L\right)$

$$H(s) = \frac{R_4R_L\left(C_4L_4s^2+1\right)}{C_4L_4R_4s^2+2C_4L_4R_Ls^2+2C_4R_4R_Ls+R_4+2R_L}$$

Parameters:

Q: $\frac{L_4\sqrt{\frac{1}{C_4L_4}}(R_4+2R_L)}{2R_4R_L}$
wo: $\sqrt{\frac{1}{C_4L_4}}$
bandwidth: $\frac{2R_4R_L}{L_4(R_4+2R_L)}$
K-LP: $\frac{R_4R_L}{R_4+2R_L}$
K-HP: $\frac{R_4R_L}{R_4+2R_L}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_4L_4}}$

6 GE

6.1 GE-1 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4\left(C_L L_L s^2 + C_L R_L s + 1\right)}{2C_L L_L s^2 + C_L R_4 s + 2C_L R_L s + 2}$$

Parameters:

Q: $\frac{2L_L\sqrt{\frac{1}{C_L L_L}}}{R_4+2R_L}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{R_4+2R_L}{2L_L}$
K-LP: $\frac{R_4}{2}$
K-HP: $\frac{R_4}{2}$
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}}{R_L}$
Wz: $\sqrt{\frac{1}{C_L L_L}}$

6.2 GE-2 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$

$$H(s) = \frac{R_4\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + 2L_L s + R_4 + 2R_L}$$

Parameters:

Q: $\frac{C_L\sqrt{\frac{1}{C_L L_L}}(R_4+2R_L)}{2}$
wo: $\sqrt{\frac{1}{C_L L_L}}$
bandwidth: $\frac{2}{C_L(R_4+2R_L)}$
K-LP: $\frac{R_4 R_L}{R_4+2R_L}$
K-HP: $\frac{R_4 R_L}{R_4+2R_L}$
K-BP: $\frac{R_4}{2}$
Qz: $C_L R_L\sqrt{\frac{1}{C_L L_L}}$
Wz: $\sqrt{\frac{1}{C_L L_L}}$

6.3 GE-3 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ R_L\right)$

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

Parameters:

Q: $\frac{L_4\sqrt{\frac{1}{C_4 L_4}}}{R_4+2R_L}$
wo: $\sqrt{\frac{1}{C_4 L_4}}$
bandwidth: $\frac{R_4+2R_L}{L_4}$
K-LP: R_L
K-HP: R_L
K-BP: $\frac{R_4 R_L}{R_4+2R_L}$
Qz: $\frac{L_4\sqrt{\frac{1}{C_4 L_4}}}{R_4}$
Wz: $\sqrt{\frac{1}{C_4 L_4}}$

6.4 GE-4 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ R_L\right)$

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

Parameters:

Q: $C_4\sqrt{\frac{1}{C_4 L_4}}\,(R_4 + 2R_L)$
wo: $\sqrt{\frac{1}{C_4 L_4}}$
bandwidth: $\frac{1}{C_4(R_4+2R_L)}$
K-LP: $\frac{R_4 R_L}{R_4+2R_L}$
K-HP: $\frac{R_4 R_L}{R_4+2R_L}$
K-BP: R_L
Qz: $C_4 R_4\sqrt{\frac{1}{C_4 L_4}}$

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

7 AP

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

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

Parameters:

Q: $\frac{2C_4 C_L R_4 R_L \sqrt{\frac{1}{C_4 C_L R_4 R_L}}}{2C_4 R_4 + C_L R_4 + 2C_L R_L}$
wo: $\sqrt{\frac{1}{C_4 C_L R_4 R_L}}$
bandwidth: $\frac{2C_4 R_4 + C_L R_4 + 2C_L R_L}{2C_4 C_L R_4 R_L}$
K-LP: $\frac{R_4}{2}$
K-HP: 0
K-BP: $\frac{C_L R_4 R_L}{2C_4 R_4 + C_L R_4 + 2C_L R_L}$
Qz: 0
Wz: None

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

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

Parameters:

Q: $\frac{C_4 C_L R_4 R_L \sqrt{\frac{1}{C_4 C_L R_4 R_L}}}{C_4 R_4 + 2C_4 R_L + C_L R_L}$

wo: $\sqrt{\frac{1}{C_4 C_L R_4 R_L}}$
bandwidth: $\frac{C_4 R_4 + 2C_4 R_L + C_L R_L}{C_4 C_L R_4 R_L}$
K-LP: R_L
K-HP: 0
K-BP: $\frac{C_4 R_4 R_L}{C_4 R_4 + 2C_4 R_L + C_L R_L}$
Qz: 0
Wz: None

9 INVALID-WZ

10 INVALID-ORDER

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

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

10.2 INVALID-ORDER-2 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4,\ \infty,\ \frac{1}{C_L s}\right)$

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

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

$$H(s) = \frac{R_4 R_L}{C_L R_4 R_L s + R_4 + 2R_L}$$

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

$$H(s) = \frac{R_4 \left(C_L R_L s + 1\right)}{C_L R_4 s + 2 C_L R_L s + 2}$$

10.5 INVALID-ORDER-5 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ R_L\right)$

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

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

$$H(s) = \frac{1}{s \left(2 C_4 + C_L\right)}$$

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

$$H(s) = \frac{R_L}{2 C_4 R_L s + C_L R_L s + 1}$$

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

$$H(s) = \frac{C_L R_L s + 1}{s \left(2 C_4 C_L R_L s + 2 C_4 + C_L\right)}$$

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

$$H(s) = \frac{C_L L_L s^2 + 1}{s \left(2 C_4 C_L L_L s^2 + 2 C_4 + C_L\right)}$$

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

$$H(s) = \frac{L_L s}{2C_4 L_L s^2 + C_L L_L s^2 + 1}$$

10.11 INVALID-ORDER-11 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{C_L L_L s^2 + C_L R_L s + 1}{s\left(2C_4 C_L L_L s^2 + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.12 INVALID-ORDER-12 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$

$$H(s) = \frac{C_L L_L R_L s^2 + L_L s + R_L}{2C_4 C_L L_L R_L s^3 + 2C_4 L_L s^2 + 2C_4 R_L s + C_L L_L s^2 + 1}$$

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

$$H(s) = \frac{R_L\left(C_L L_L s^2 + 1\right)}{2C_4 C_L L_L R_L s^3 + 2C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.14 INVALID-ORDER-14 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ R_L\right)$

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

10.15 INVALID-ORDER-15 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \frac{1}{C_L s}\right)$

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

10.16 INVALID-ORDER-16 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \frac{R_L}{C_LR_Ls+1}\right)$

$$H(s) = \frac{R_4R_L}{2C_4R_4R_Ls + C_LR_4R_Ls + R_4 + 2R_L}$$

10.17 INVALID-ORDER-17 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ L_Ls + \frac{1}{C_Ls}\right)$

$$H(s) = \frac{R_4\left(C_LL_Ls^2 + 1\right)}{2C_4C_LL_LR_4s^3 + 2C_4R_4s + 2C_LL_Ls^2 + C_LR_4s + 2}$$

10.18 INVALID-ORDER-18 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ L_Ls + R_L + \frac{1}{C_Ls}\right)$

$$H(s) = \frac{R_4\left(C_LL_Ls^2 + C_LR_Ls + 1\right)}{2C_4C_LL_LR_4s^3 + 2C_4C_LR_4R_Ls^2 + 2C_4R_4s + 2C_LL_Ls^2 + C_LR_4s + 2C_LR_Ls + 2}$$

10.19 INVALID-ORDER-19 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \frac{L_Ls}{C_LL_Ls^2+1} + R_L\right)$

$$H(s) = \frac{R_4\left(C_LL_LR_Ls^2 + L_Ls + R_L\right)}{2C_4C_LL_LR_4R_Ls^3 + 2C_4L_LR_4s^2 + 2C_4R_4R_Ls + C_LL_LR_4s^2 + 2C_LL_LR_Ls^2 + 2L_Ls + R_4 + 2R_L}$$

10.20 INVALID-ORDER-20 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \frac{R_L\left(L_Ls+\frac{1}{C_Ls}\right)}{L_Ls+R_L+\frac{1}{C_Ls}}\right)$

$$H(s) = \frac{R_4R_L\left(C_LL_Ls^2 + 1\right)}{2C_4C_LL_LR_4R_Ls^3 + 2C_4R_4R_Ls + C_LL_LR_4s^2 + 2C_LL_LR_Ls^2 + C_LR_4R_Ls + R_4 + 2R_L}$$

10.21 INVALID-ORDER-21 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ R_L\right)$

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

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

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

10.23 INVALID-ORDER-23 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 R_4 s + 1\right)\left(C_L R_L s + 1\right)}{s\left(C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.24 INVALID-ORDER-24 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

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

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

$$H(s) = \frac{L_L s\left(C_4 R_4 s + 1\right)}{C_4 C_L L_L R_4 s^3 + 2C_4 L_L s^2 + C_4 R_4 s + C_L L_L s^2 + 1}$$

10.26 INVALID-ORDER-26 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 R_4 s + 1\right)\left(C_L L_L s^2 + C_L R_L s + 1\right)}{s\left(2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

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

$$H(s) = \frac{L_L R_L s \left(C_4 R_4 s + 1\right)}{C_4 C_L L_L R_4 R_L s^3 + C_4 L_L R_4 s^2 + 2 C_4 L_L R_L s^2 + C_4 R_4 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

10.28 INVALID-ORDER-28 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$$H(s) = \frac{\left(C_4 R_4 s + 1\right)\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_4 C_L L_L R_4 s^3 + 2 C_4 C_L L_L R_L s^3 + 2 C_4 L_L s^2 + C_4 R_4 s + 2 C_4 R_L s + C_L L_L s^2 + 1}$$

10.29 INVALID-ORDER-29 $Z(s) = \left(\infty,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_L \left(C_4 R_4 s + 1\right)\left(C_L L_L s^2 + 1\right)}{C_4 C_L L_L R_4 s^3 + 2 C_4 C_L L_L R_L s^3 + C_4 C_L R_4 R_L s^2 + C_4 R_4 s + 2 C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

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

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

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

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

10.32 INVALID-ORDER-32 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 L_4 s^2 + 1\right)\left(C_L R_L s + 1\right)}{s\left(C_4 C_L L_4 s^2 + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.33 INVALID-ORDER-33 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 L_4 s^2 + 1\right)\left(C_L L_L s^2 + 1\right)}{s\left(C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + 2C_4 + C_L\right)}$$

10.34 INVALID-ORDER-34 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$$H(s) = \frac{L_L s\left(C_4 L_4 s^2 + 1\right)}{C_4 C_L L_4 L_L s^4 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_L L_L s^2 + 1}$$

10.35 INVALID-ORDER-35 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 L_4 s^2 + 1\right)\left(C_L L_L s^2 + C_L R_L s + 1\right)}{s\left(C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.36 INVALID-ORDER-36 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_L s\left(C_4 L_4 s^2 + 1\right)}{C_4 C_L L_4 L_L R_L s^4 + C_4 L_4 L_L s^3 + C_4 L_4 R_L s^2 + 2C_4 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

10.37 INVALID-ORDER-37 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$

$$H(s) = \frac{\left(C_4 L_4 s^2 + 1\right)\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_4 C_L L_4 L_L s^4 + 2C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2C_4 L_L s^2 + 2C_4 R_L s + C_L L_L s^2 + 1}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_L\left(C_4 L_4 s^2 + 1\right)\left(C_L L_L s^2 + 1\right)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_L s^3 + 2C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.39 INVALID-ORDER-39 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 s}{2C_4 L_4 s^2 + C_L L_4 s^2 + 2}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

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

10.41 INVALID-ORDER-41 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 s\left(C_L L_L s^2 + 1\right)}{2C_4 C_L L_4 L_L s^4 + 2C_4 L_4 s^2 + C_L L_4 s^2 + 2C_L L_L s^2 + 2}$$

10.42 INVALID-ORDER-42 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

$$H(s) = \frac{L_4 L_L s}{2C_4 L_4 L_L s^2 + C_L L_4 L_L s^2 + L_4 + 2L_L}$$

10.43 INVALID-ORDER-43 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 s \left(C_L L_L s^2 + C_L R_L s + 1\right)}{2C_4 C_L L_4 L_L s^4 + 2C_4 C_L L_4 R_L s^3 + 2C_4 L_4 s^2 + C_L L_4 s^2 + 2C_L L_L s^2 + 2C_L R_L s + 2}$$

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

$$H(s) = \frac{L_4 s \left(C_L L_L R_L s^2 + L_L s + R_L\right)}{2C_4 C_L L_4 L_L R_L s^4 + 2C_4 L_4 L_L s^3 + 2C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + 2C_L L_L R_L s^2 + L_4 s + 2L_L s + 2R_L}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{L_4 R_L s \left(C_L L_L s^2 + 1\right)}{2C_4 C_L L_4 L_L R_L s^4 + 2C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_4 R_L s^2 + 2C_L L_L R_L s^2 + L_4 s + 2R_L}$$

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

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

10.47 INVALID-ORDER-47 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

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

10.48 INVALID-ORDER-48 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{(C_L R_L s + 1)\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)}{s\left(C_4 C_L L_4 s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.49 INVALID-ORDER-49 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right)\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)}{s\left(C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 + C_L\right)}$$

10.50 INVALID-ORDER-50 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{L_L s}{C_L L_L s^2 + 1}\right)$

$$H(s) = \frac{L_L s\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_L R_4 s^3 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_4 R_4 s + C_L L_L s^2 + 1}$$

10.51 INVALID-ORDER-51 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)\left(C_L L_L s^2 + C_L R_L s + 1\right)}{s\left(C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L\right)}$$

10.52 INVALID-ORDER-52 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_L s\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)}{C_4 C_L L_4 L_L R_L s^4 + C_4 C_L L_L R_4 R_L s^3 + C_4 L_4 L_L s^3 + C_4 L_4 R_L s^2 + C_4 L_L R_4 s^2 + 2C_4 L_L R_L s^2 + C_4 R_4 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

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

$$H(s) = \frac{\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_L R_4 s^3 + 2C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_4 R_4 s + 2C_4 R_L s + C_L L_L s^2 + 1}$$

10.54 INVALID-ORDER-54 $Z(s) = \left(\infty,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_L\left(C_L L_L s^2 + 1\right)\left(C_4 L_4 s^2 + C_4 R_4 s + 1\right)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_L s^3 + C_4 C_L L_L R_4 s^3 + 2C_4 C_L L_L R_L s^3 + C_4 C_L R_4 R_L s^2 + C_4 L_4 s^2 + C_4 R_4 s + 2C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.55 INVALID-ORDER-55 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

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

10.56 INVALID-ORDER-56 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 R_4 s\left(C_L L_L s^2 + 1\right)}{2C_4 C_L L_4 L_L R_4 s^4 + 2C_4 L_4 R_4 s^2 + 2C_L L_4 L_L s^3 + C_L L_4 R_4 s^2 + 2C_L L_L R_4 s^2 + 2L_4 s + 2R_4}$$

10.57 INVALID-ORDER-57 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s + \frac{1}{R_4} + \frac{1}{L_4 s}},\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{L_4 R_4 s\left(C_L L_L s^2 + C_L R_L s + 1\right)}{2C_4 C_L L_4 L_L R_4 s^4 + 2C_4 C_L L_4 R_4 R_L s^3 + 2C_4 L_4 R_4 s^2 + 2C_L L_4 L_L s^3 + C_L L_4 R_4 s^2 + 2C_L L_4 R_L s^2 + 2C_L L_L R_4 s^2 + 2C_L R_4 R_L s + 2L_4 s + 2R_4}$$

10.58 INVALID-ORDER-58 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$

$$H(s) = \frac{L_4 R_4 s\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{2C_4 C_L L_4 L_L R_4 R_L s^4 + 2C_4 L_4 L_L R_4 s^3 + 2C_4 L_4 R_4 R_L s^2 + C_L L_4 L_L R_4 s^3 + 2C_L L_4 L_L R_L s^3 + 2C_L L_L R_4 R_L s^2 + 2L_4 L_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2L_L R_4 s + 2R_4 R_L}$$

10.59 INVALID-ORDER-59 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{1}{C_4 s+\frac{1}{R_4}+\frac{1}{L_4 s}},\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

$$H(s) = \frac{L_4 R_4 R_L s\left(C_L L_L s^2 + 1\right)}{2C_4 C_L L_4 L_L R_4 R_L s^4 + 2C_4 L_4 R_4 R_L s^2 + C_L L_4 L_L R_4 s^3 + 2C_L L_4 L_L R_L s^3 + C_L L_4 R_4 R_L s^2 + 2C_L L_L R_4 R_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2R_4 R_L}$$

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

$$H(s) = \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 C_L L_4 R_4 s^3 + 2C_4 L_4 s^2 + C_L L_4 s^2 + C_L R_4 s + 2}$$

10.61 INVALID-ORDER-61 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

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

10.62 INVALID-ORDER-62 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ R_L + \frac{1}{C_L s}\right)$

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

10.63 INVALID-ORDER-63 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right)\left(C_4 L_4 R_4 s^2 + L_4 s + R_4\right)}{2C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_4 s^3 + 2C_4 L_4 s^2 + C_L L_4 s^2 + 2C_L L_L s^2 + C_L R_4 s + 2}$$

10.64 INVALID-ORDER-64 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

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

10.65 INVALID-ORDER-65 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_L L_L s^2 + C_L R_L s + 1\right)\left(C_4 L_4 R_4 s^2 + L_4 s + R_4\right)}{2C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_4 s^3 + 2C_4 C_L L_4 R_L s^3 + 2C_4 L_4 s^2 + C_L L_4 s^2 + 2C_L L_L s^2 + C_L R_4 s + 2C_L R_L s + 2}$$

10.66 INVALID-ORDER-66 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_L s\left(C_4 L_4 R_4 s^2 + L_4 s + R_4\right)}{C_4 C_L L_4 L_L R_4 R_L s^4 + C_4 L_4 L_L R_4 s^3 + 2C_4 L_4 L_L R_L s^3 + C_4 L_4 R_4 R_L s^2 + C_L L_4 L_L R_L s^3 + C_L L_L R_4 R_L s^2 + L_4 L_L s^2 + L_4 R_L s + L_L R_4 s + 2L_L R_L s + R_4 R_L}$$

10.67 INVALID-ORDER-67 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{L_L s}{C_L L_L s^2+1} + R_L\right)$

$$H(s) = \frac{\left(C_4 L_4 R_4 s^2 + L_4 s + R_4\right)\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_4 C_L L_4 L_L R_4 s^4 + 2C_4 C_L L_4 L_L R_L s^4 + 2C_4 L_4 L_L s^3 + C_4 L_4 R_4 s^2 + 2C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + L_4 s + 2L_L s + R_4 + 2R_L}$$

10.68 INVALID-ORDER-68 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1} + R_4,\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_L\left(C_L L_L s^2+1\right)\left(C_4 L_4 R_4 s^2 + L_4 s + R_4\right)}{C_4 C_L L_4 L_L R_4 s^4 + 2C_4 C_L L_4 L_L R_L s^4 + C_4 C_L L_4 R_4 R_L s^3 + C_4 L_4 R_4 s^2 + 2C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_4 R_L s^2 + C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + C_L R_4 R_L s + L_4 s + R_4 + 2R$$

10.69 INVALID-ORDER-69 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{1}{C_L s}\right)$

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

10.70 INVALID-ORDER-70 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{R_L}{C_L R_L s+1}\right)$

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

10.71 INVALID-ORDER-71 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ R_L + \frac{1}{C_L s}\right)$

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

10.72 INVALID-ORDER-72 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4\left(C_4 L_4 s^2+1\right)\left(C_L L_L s^2+1\right)}{2C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_4 s^3 + 2C_4 C_L L_L R_4 s^3 + 2C_4 L_4 s^2 + 2C_4 R_4 s + 2C_L L_L s^2 + C_L R_4 s + 2}$$

10.73 INVALID-ORDER-73 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}\right)$

$$H(s) = \frac{L_L R_4 s\left(C_4 L_4 s^2+1\right)}{C_4 C_L L_4 L_L R_4 s^4+2C_4 L_4 L_L s^3+C_4 L_4 R_4 s^2+2C_4 L_L R_4 s^2+C_L L_L R_4 s^2+2L_L s+R_4}$$

10.74 INVALID-ORDER-74 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ L_L s+R_L+\frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4\left(C_4 L_4 s^2+1\right)\left(C_L L_L s^2+C_L R_L s+1\right)}{2C_4 C_L L_4 L_L s^4+C_4 C_L L_4 R_4 s^3+2C_4 C_L L_4 R_L s^3+2C_4 C_L L_L R_4 s^3+2C_4 C_L R_4 R_L s^2+2C_4 L_4 s^2+2C_4 R_4 s+2C_L L_L s^2+C_L R_4 s+2C_L R_L s+2}$$

10.75 INVALID-ORDER-75 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{1}{C_L s+\frac{1}{R_L}+\frac{1}{L_L s}}\right)$

$$H(s) = \frac{L_L R_4 R_L s\left(C_4 L_4 s^2+1\right)}{C_4 C_L L_4 L_L R_4 R_L s^4+C_4 L_4 L_L R_4 s^3+2C_4 L_4 L_L R_L s^3+C_4 L_4 R_4 R_L s^2+2C_4 L_L R_4 R_L s^2+C_L L_L R_4 R_L s^2+L_L R_4 s+2L_L R_L s+R_4 R_L}$$

10.76 INVALID-ORDER-76 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{L_L s}{C_L L_L s^2+1}+R_L\right)$

$$H(s) = \frac{R_4\left(C_4 L_4 s^2+1\right)\left(C_L L_L R_L s^2+L_L s+R_L\right)}{C_4 C_L L_4 L_L R_4 s^4+2C_4 C_L L_4 L_L R_L s^4+2C_4 C_L L_L R_4 R_L s^3+2C_4 L_4 L_L s^3+C_4 L_4 R_4 s^2+2C_4 L_4 R_L s^2+2C_4 L_L R_4 s^2+2C_4 R_4 R_L s+C_L L_L R_4 s^2+2C_L L_L R_L s^2+2L_L s+R_4}$$

10.77 INVALID-ORDER-77 $Z(s) = \left(\infty,\ \infty,\ \infty,\ \frac{R_4\left(L_4 s+\frac{1}{C_4 s}\right)}{L_4 s+R_4+\frac{1}{C_4 s}},\ \infty,\ \frac{R_L\left(L_L s+\frac{1}{C_L s}\right)}{L_L s+R_L+\frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_4 R_L\left(C_4 L_4 s^2+1\right)\left(C_L L_L s^2+1\right)}{C_4 C_L L_4 L_L R_4 s^4+2C_4 C_L L_4 L_L R_L s^4+C_4 C_L L_4 R_4 R_L s^3+2C_4 C_L L_L R_4 R_L s^3+C_4 L_4 R_4 s^2+2C_4 L_4 R_L s^2+2C_4 R_4 R_L s+C_L L_L R_4 s^2+2C_L L_L R_L s^2+C_L R_4 R_L s+R_4+2L}$$