

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

Generated by MacAnalog-Symbolix

December 18, 2024

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| 3.2      | BP-2 $Z(s) = \left( \infty, \infty, R_3, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$  | 5         |
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| 3.4      | BP-4 $Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty \right)$  | 6         |
| 3.5      | BP-5 $Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$                        | 6         |
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| 3.8      | BP-8 $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$                    | 7         |
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| 3.10     | BP-10 $Z(s) = \left( \infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{1}{C_4 s}, \infty, \infty \right)$                                 | 7         |
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| 3.12     | BP-12 $Z(s) = \left( \infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty \right)$                   | 8         |
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| 6.4      | GE-4 $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, R_4, \infty, \infty \right)$  | 11        |
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| 8.2      | INVALID-NUMER-2 $Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty \right)$                                       | 12        |

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| 10.1      | INVALID-ORDER-1 $Z(s) = (\infty, \infty, R_3, R_4, \infty, \infty)$  | 12        |
| 10.2      | INVALID-ORDER-2 $Z(s) = \left(\infty, \infty, R_3, \frac{1}{C_4s}, \infty, \infty\right)$  | 12        |
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| 10.4      | INVALID-ORDER-4 $Z(s) = \left(\infty, \infty, R_3, R_4 + \frac{1}{C_4s}, \infty, \infty\right)$  | 12        |
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| 10.6      | INVALID-ORDER-6 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, \frac{1}{C_4s}, \infty, \infty\right)$                                       | 12        |
| 10.7      | INVALID-ORDER-7 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, \frac{R_4}{C_4R_4s+1}, \infty, \infty\right)$                                | 13        |
| 10.8      | INVALID-ORDER-8 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                                 | 13        |
| 10.9      | INVALID-ORDER-9 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, L_4s + \frac{1}{C_4s}, \infty, \infty\right)$                                | 13        |
| 10.10     | INVALID-ORDER-10 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1}, \infty, \infty\right)$                            | 13        |
| 10.11     | INVALID-ORDER-11 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                         | 13        |
| 10.12     | INVALID-ORDER-12 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty\right)$                      | 13        |
| 10.13     | INVALID-ORDER-13 $Z(s) = \left(\infty, \infty, \frac{1}{C_3s}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)$        | 13        |
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| 10.15     | INVALID-ORDER-15 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, \frac{1}{C_4s}, \infty, \infty\right)$                               | 13        |
| 10.16     | INVALID-ORDER-16 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, \frac{R_4}{C_4R_4s+1}, \infty, \infty\right)$                        | 13        |
| 10.17     | INVALID-ORDER-17 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, L_4s + \frac{1}{C_4s}, \infty, \infty\right)$                        | 14        |
| 10.18     | INVALID-ORDER-18 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                  | 14        |
| 10.19     | INVALID-ORDER-19 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty\right)$               | 14        |
| 10.20     | INVALID-ORDER-20 $Z(s) = \left(\infty, \infty, \frac{R_3}{C_3R_3s+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)$ | 14        |
| 10.21     | INVALID-ORDER-21 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, R_4, \infty, \infty\right)$   | 14        |
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| 10.23     | INVALID-ORDER-23 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                          | 14        |
| 10.24     | INVALID-ORDER-24 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, L_4s + \frac{1}{C_4s}, \infty, \infty\right)$                         | 14        |
| 10.25     | INVALID-ORDER-25 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1}, \infty, \infty\right)$                      | 14        |
| 10.26     | INVALID-ORDER-26 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                   | 14        |
| 10.27     | INVALID-ORDER-27 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \infty\right)$         | 15        |
| 10.28     | INVALID-ORDER-28 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty\right)$                | 15        |
| 10.29     | INVALID-ORDER-29 $Z(s) = \left(\infty, \infty, R_3 + \frac{1}{C_3s}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)$  | 15        |
| 10.30     | INVALID-ORDER-30 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{1}{C_4s}, \infty, \infty\right)$                               | 15        |
| 10.31     | INVALID-ORDER-31 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{R_4}{C_4R_4s+1}, \infty, \infty\right)$                        | 15        |
| 10.32     | INVALID-ORDER-32 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                         | 15        |
| 10.33     | INVALID-ORDER-33 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, L_4s + \frac{1}{C_4s}, \infty, \infty\right)$                        | 15        |
| 10.34     | INVALID-ORDER-34 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1}, \infty, \infty\right)$                     | 15        |
| 10.35     | INVALID-ORDER-35 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty\right)$                  | 15        |
| 10.36     | INVALID-ORDER-36 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \infty\right)$        | 16        |
| 10.37     | INVALID-ORDER-37 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty\right)$               | 16        |
| 10.38     | INVALID-ORDER-38 $Z(s) = \left(\infty, \infty, L_3s + \frac{1}{C_3s}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty\right)$ | 16        |



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| 10.76     | INVALID-ORDER-76       | $Z(s) = \left( \infty, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \infty \right)$                      | 20        |
| 10.77     | INVALID-ORDER-77       | $Z(s) = \left( \infty, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \frac{R_4(C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$ | 20        |
| <b>11</b> | <b>PolynomialError</b> |  | <b>20</b> |

# 1 Examined $H(z)$ for TIA simple Z3 Z4: $\frac{Z_3 Z_4 g_m}{2Z_3 g_m + Z_4 g_m}$

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

## 2 HP

## 3 BP

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

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

Parameters:

Q:  $2C_4 R_3 \sqrt{\frac{1}{C_4 L_4}}$   
 wo:  $\sqrt{\frac{1}{C_4 L_4}}$   
 bandwidth:  $\frac{1}{2C_4 R_3}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $R_3$   
 Qz: 0  
 Wz: None

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

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

Parameters:

Q:  $\frac{2C_4 R_3 R_4 \sqrt{\frac{1}{C_4 L_4}}}{2R_3 + R_4}$   
 wo:  $\sqrt{\frac{1}{C_4 L_4}}$   
 bandwidth:  $\frac{2R_3 + R_4}{2C_4 R_3 R_4}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_3 R_4}{2R_3 + R_4}$   
 Qz: 0  
 Wz: None

### 3.3 BP-3 $Z(s) = \left( \infty, \infty, \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$

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

Parameters:

Q:  $\frac{\sqrt{2} R_4 \sqrt{\frac{1}{L_4(C_3 + 2C_4)}}(C_3 + 2C_4)}{2}$   
 wo:  $\sqrt{2} \sqrt{\frac{1}{L_4(C_3 + 2C_4)}}$   
 bandwidth:  $\frac{2}{R_4(C_3 + 2C_4)}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_4}{2}$   
 Qz: 0

Wz: None

**3.4 BP-4**  $Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty \right)$

**Parameters:**

Q:  $\sqrt{2} R_3 \sqrt{\frac{1}{L_4 (C_3 + 2C_4)}} (C_3 + 2C_4)$

wo:  $\sqrt{2} \sqrt{\frac{1}{L_4 (C_3 + 2C_4)}}$

bandwidth:  $\frac{1}{R_3 (C_3 + 2C_4)}$

K-LP: 0

K-HP: 0

K-BP:  $R_3$

Qz: 0

Wz: None

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

**3.5 BP-5**  $Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{\sqrt{2} R_3 R_4 \sqrt{\frac{1}{L_4 (C_3 + 2C_4)}} (C_3 + 2C_4)}{2R_3 + R_4}$

wo:  $\sqrt{2} \sqrt{\frac{1}{L_4 (C_3 + 2C_4)}}$

bandwidth:  $\frac{2R_3 + R_4}{R_3 R_4 (C_3 + 2C_4)}$

K-LP: 0

K-HP: 0

K-BP:  $\frac{R_3 R_4}{2R_3 + R_4}$

Qz: 0

Wz: None

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

**3.6 BP-6**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, R_4, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{C_3 R_4 \sqrt{\frac{1}{C_3 L_3}}}{2}$

wo:  $\sqrt{\frac{1}{C_3 L_3}}$

bandwidth:  $\frac{2}{C_3 R_4}$

K-LP: 0

K-HP: 0

K-BP:  $\frac{R_4}{2}$

Qz: 0

Wz: None

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

**3.7 BP-7**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{R_4 \sqrt{\frac{1}{L_3(C_3 + 2C_4)}} (C_3 + 2C_4)}{2}$   
 wo:  $\sqrt{\frac{1}{L_3(C_3 + 2C_4)}}$   
 bandwidth:  $\frac{2}{R_4(C_3 + 2C_4)}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_4}{2}$   
 Qz: 0  
 Wz: None

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

**3.8 BP-8**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{R_4 \sqrt{\frac{2L_3 + L_4}{L_3 L_4 (C_3 + 2C_4)}} (C_3 + 2C_4)}{2}$   
 wo:  $\sqrt{\frac{2L_3 + L_4}{L_3 L_4 (C_3 + 2C_4)}}$   
 bandwidth:  $\frac{2}{R_4(C_3 + 2C_4)}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_4}{2}$   
 Qz: 0  
 Wz: None

$$H(s) = \frac{L_3 L_4 R_4 s}{2L_3 L_4 s + 2L_3 R_4 + L_4 R_4 + s^2 (C_3 L_3 L_4 R_4 + 2C_4 L_3 L_4 R_4)}$$

**3.9 BP-9**  $Z(s) = \left( \infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, R_4, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{C_3 R_3 R_4 \sqrt{\frac{1}{C_3 L_3}}}{2R_3 + R_4}$   
 wo:  $\sqrt{\frac{1}{C_3 L_3}}$   
 bandwidth:  $\frac{2R_3 + R_4}{C_3 R_3 R_4}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_3 R_4}{2R_3 + R_4}$   
 Qz: 0  
 Wz: None

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

**3.10 BP-10**  $Z(s) = \left( \infty, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \frac{1}{C_4 s}, \infty, \infty \right)$

**Parameters:**

Q:  $R_3 \sqrt{\frac{1}{L_3(C_3 + 2C_4)}} (C_3 + 2C_4)$   
 wo:  $\sqrt{\frac{1}{L_3(C_3 + 2C_4)}}$

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

bandwidth:  $\frac{1}{R_3(C_3+2C_4)}$   
K-LP: 0  
K-HP: 0  
K-BP:  $R_3$   
Qz: 0  
Wz: None

$$\mathbf{3.11 \quad BP-11} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \frac{R_4}{C_4 R_4 s + 1}, \quad \infty, \quad \infty \right)$$

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

**Parameters:**

Q:  $\frac{R_3 R_4 \sqrt{\frac{1}{L_3(C_3+2C_4)}} (C_3+2C_4)}{2R_3+R_4}$   
wo:  $\sqrt{\frac{1}{L_3(C_3+2C_4)}}$   
bandwidth:  $\frac{2R_3+R_4}{R_3 R_4 (C_3+2C_4)}$   
K-LP: 0  
K-HP: 0  
K-BP:  $\frac{R_3 R_4}{2R_3+R_4}$   
Qz: 0  
Wz: None

$$\mathbf{3.12 \quad BP-12} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \frac{L_4 s}{C_4 L_4 s^2 + 1}, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 L_4 R_3 s}{L_3 L_4 s + 2 L_3 R_3 + L_4 R_3 + s^2 (C_3 L_3 L_4 R_3 + 2 C_4 L_3 L_4 R_3)}$$

**Parameters:**

Q:  $R_3 \sqrt{\frac{2L_3+L_4}{L_3 L_4 (C_3+2C_4)}} (C_3 + 2C_4)$   
wo:  $\sqrt{\frac{2L_3+L_4}{L_3 L_4 (C_3+2C_4)}}$   
bandwidth:  $\frac{1}{R_3(C_3+2C_4)}$   
K-LP: 0  
K-HP: 0  
K-BP:  $R_3$   
Qz: 0  
Wz: None

$$\mathbf{3.13 \quad BP-13} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 L_4 R_3 R_4 s}{2 L_3 R_3 R_4 + L_4 R_3 R_4 + s^2 (C_3 L_3 L_4 R_3 R_4 + 2 C_4 L_3 L_4 R_3 R_4) + s (2 L_3 L_4 R_3 + L_3 L_4 R_4)}$$

**Parameters:**

Q:  $\frac{R_3 R_4 \sqrt{\frac{2L_3+L_4}{L_3 L_4 (C_3+2C_4)}} (C_3+2C_4)}{2R_3+R_4}$   
wo:  $\sqrt{\frac{2L_3+L_4}{L_3 L_4 (C_3+2C_4)}}$   
bandwidth:  $\frac{2R_3+R_4}{R_3 R_4 (C_3+2C_4)}$   
K-LP: 0  
K-HP: 0  
K-BP:  $\frac{R_3 R_4}{2R_3+R_4}$   
Qz: 0  
Wz: None



## 4 LP

## 5 BS

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

$$H(s) = \frac{C_4 L_4 R_3 s^2 + R_3}{C_4 L_4 s^2 + 2C_4 R_3 s + 1}$$

**Parameters:**

Q:  $\frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{2R_3}$   
 wo:  $\sqrt{\frac{1}{C_4 L_4}}$   
 bandwidth:  $\frac{2R_3}{L_4}$   
 K-LP:  $R_3$   
 K-HP:  $R_3$   
 K-BP: 0  
 Qz: None  
 Wz:  $\sqrt{\frac{1}{C_4 L_4}}$

**5.2 BS-2**  $Z(s) = \left( \infty, \infty, R_3, \frac{R_4(C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$

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

**Parameters:**

Q:  $\frac{L_4 \sqrt{\frac{1}{C_4 L_4}} (2R_3 + R_4)}{2R_3 R_4}$   
 wo:  $\sqrt{\frac{1}{C_4 L_4}}$   
 bandwidth:  $\frac{2R_3 R_4}{L_4 (2R_3 + R_4)}$   
 K-LP:  $\frac{R_3 R_4}{2R_3 + R_4}$   
 K-HP:  $\frac{R_3 R_4}{2R_3 + R_4}$   
 K-BP: 0  
 Qz: None  
 Wz:  $\sqrt{\frac{1}{C_4 L_4}}$

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

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

**Parameters:**

Q:  $\frac{2L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_4}$   
 wo:  $\sqrt{\frac{1}{C_3 L_3}}$   
 bandwidth:  $\frac{R_4}{2L_3}$   
 K-LP:  $\frac{R_4}{2}$   
 K-HP:  $\frac{R_4}{2}$   
 K-BP: 0  
 Qz: None  
 Wz:  $\sqrt{\frac{1}{C_3 L_3}}$

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

$$H(s) = \frac{C_3L_3R_3R_4s^2 + R_3R_4}{C_3R_3R_4s + 2R_3 + R_4 + s^2(2C_3L_3R_3 + C_3L_3R_4)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{L_3\sqrt{\frac{1}{C_3L_3}}(2R_3+R_4)}{R_3R_4} \\ \text{wo: } & \sqrt{\frac{1}{C_3L_3}} \\ \text{bandwidth: } & \frac{R_3R_4}{L_3(2R_3+R_4)} \\ \text{K-LP: } & \frac{R_3R_4}{2R_3+R_4} \\ \text{K-HP: } & \frac{R_3R_4}{2R_3+R_4} \\ \text{K-BP: } & 0 \\ \text{Qz: } & \text{None} \\ \text{Wz: } & \sqrt{\frac{1}{C_3L_3}} \end{aligned}$$

## 6 GE

**6.1 GE-1**  $Z(s) = \left( \infty, \infty, R_3, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_4R_3s^2 + C_4R_3R_4s + R_3}{C_4L_4s^2 + s(2C_4R_3 + C_4R_4) + 1}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{L_4\sqrt{\frac{1}{C_4L_4}}}{2R_3+R_4} \\ \text{wo: } & \sqrt{\frac{1}{C_4L_4}} \\ \text{bandwidth: } & \frac{2R_3+R_4}{L_4} \\ \text{K-LP: } & R_3 \\ \text{K-HP: } & R_3 \\ \text{K-BP: } & \frac{R_3R_4}{2R_3+R_4} \\ \text{Qz: } & \frac{L_4\sqrt{\frac{1}{C_4L_4}}}{R_4} \\ \text{Wz: } & \sqrt{\frac{1}{C_4L_4}} \end{aligned}$$

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

$$H(s) = \frac{C_4L_4R_3R_4s^2 + L_4R_3s + R_3R_4}{L_4s + 2R_3 + R_4 + s^2(2C_4L_4R_3 + C_4L_4R_4)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & C_4\sqrt{\frac{1}{C_4L_4}}(2R_3 + R_4) \\ \text{wo: } & \sqrt{\frac{1}{C_4L_4}} \\ \text{bandwidth: } & \frac{1}{C_4(2R_3+R_4)} \\ \text{K-LP: } & \frac{R_3R_4}{2R_3+R_4} \\ \text{K-HP: } & \frac{R_3R_4}{2R_3+R_4} \\ \text{K-BP: } & R_3 \\ \text{Qz: } & C_4R_4\sqrt{\frac{1}{C_4L_4}} \\ \text{Wz: } & \sqrt{\frac{1}{C_4L_4}} \end{aligned}$$

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

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{2L_3 \sqrt{\frac{1}{C_3 L_3}}}{2R_3 + R_4} \\ \text{wo: } & \sqrt{\frac{1}{C_3 L_3}} \\ \text{bandwidth: } & \frac{2R_3 + R_4}{2L_3} \\ \text{K-LP: } & \frac{R_4}{2} \\ \text{K-HP: } & \frac{R_4}{2} \\ \text{K-BP: } & \frac{R_3 R_4}{2R_3 + R_4} \\ \text{Qz: } & \frac{L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

**6.4 GE-4**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, R_4, \infty, \infty \right)$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_3 \sqrt{\frac{1}{C_3 L_3}} (2R_3 + R_4)}{2} \\ \text{wo: } & \sqrt{\frac{1}{C_3 L_3}} \\ \text{bandwidth: } & \frac{2}{C_3 (2R_3 + R_4)} \\ \text{K-LP: } & \frac{R_3 R_4}{2R_3 + R_4} \\ \text{K-HP: } & \frac{R_3 R_4}{2R_3 + R_4} \\ \text{K-BP: } & \frac{R_4}{2} \\ \text{Qz: } & C_3 R_3 \sqrt{\frac{1}{C_3 L_3}} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

## 7 AP

## 8 INVALID-NUMER

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

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_3 C_4 R_3 R_4 \sqrt{\frac{1}{C_3 C_4 R_3 R_4}}}{C_3 R_3 + 2C_4 R_3 + C_4 R_4} \\ \text{wo: } & \sqrt{\frac{1}{C_3 C_4 R_3 R_4}} \\ \text{bandwidth: } & \frac{C_3 R_3 + 2C_4 R_3 + C_4 R_4}{C_3 C_4 R_3 R_4} \\ \text{K-LP: } & R_3 \\ \text{K-HP: } & 0 \\ \text{K-BP: } & \frac{C_4 R_3 R_4}{C_3 R_3 + 2C_4 R_3 + C_4 R_4} \\ \text{Qz: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

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

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

$$H(s) = \frac{C_4 R_3 R_4 s + R_3}{C_3 C_4 R_3 R_4 s^2 + s(C_3 R_3 + 2C_4 R_3 + C_4 R_4) + 1}$$

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

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

**Parameters:**

Q:  $\frac{2C_3 C_4 R_3 R_4 \sqrt{\frac{1}{C_3 C_4 R_3 R_4}}}{2C_3 R_3 + C_3 R_4 + 2C_4 R_4}$   
 wo:  $\sqrt{\frac{1}{C_3 C_4 R_3 R_4}}$   
 bandwidth:  $\frac{2C_3 R_3 + C_3 R_4 + 2C_4 R_4}{2C_3 C_4 R_3 R_4}$   
 K-LP:  $\frac{R_4}{2}$   
 K-HP: 0  
 K-BP:  $\frac{C_3 R_3 R_4}{2C_3 R_3 + C_3 R_4 + 2C_4 R_4}$   
 Qz: 0  
 Wz: None

## 9 INVALID-WZ

## 10 INVALID-ORDER

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

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

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

$$H(s) = \frac{R_3}{2C_4 R_3 s + 1}$$

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

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

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

$$H(s) = \frac{C_4 R_3 R_4 s + R_3}{s(2C_4 R_3 + C_4 R_4) + 1}$$

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

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

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

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

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

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

$$\mathbf{10.8 \quad INVALID-ORDER-8} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{1}{C_3 s}, \quad R_4 + \frac{1}{C_4 s}, \quad \infty, \quad \infty \right)$$

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

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

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

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

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

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

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

$$\mathbf{10.12 \quad INVALID-ORDER-12} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{1}{C_3 s}, \quad \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \quad \infty, \quad \infty \right)$$

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

$$\mathbf{10.13 \quad INVALID-ORDER-13} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{1}{C_3 s}, \quad \frac{R_4(C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \quad \infty, \quad \infty \right)$$

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

$$\mathbf{10.14 \quad INVALID-ORDER-14} \quad Z(s) = \left( \infty, \quad \infty, \quad \frac{R_3}{C_3 R_3 s + 1}, \quad R_4, \quad \infty, \quad \infty \right)$$

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

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

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

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

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

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

$$H(s) = \frac{C_4 L_4 R_3 s^2 + R_3}{C_3 C_4 L_4 R_3 s^3 + C_4 L_4 s^2 + s(C_3 R_3 + 2C_4 R_3) + 1}$$

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

$$H(s) = \frac{C_4 L_4 R_3 s^2 + C_4 R_3 R_4 s + R_3}{C_3 C_4 L_4 R_3 s^3 + s^2(C_3 C_4 R_3 R_4 + C_4 L_4) + s(C_3 R_3 + 2C_4 R_3 + C_4 R_4) + 1}$$

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \infty \right)$$

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

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left( \infty, \infty, \frac{R_3}{C_3 R_3 s + 1}, \frac{R_4(C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$$

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

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, R_4, \infty, \infty \right)$$

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

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

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

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

$$H(s) = \frac{C_3 C_4 R_3 R_4 s^2 + s(C_3 R_3 + C_4 R_4) + 1}{s^2(2C_3 C_4 R_3 + C_3 C_4 R_4) + s(C_3 + 2C_4)}$$

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

$$H(s) = \frac{C_3 C_4 L_4 R_3 s^3 + C_3 R_3 s + C_4 L_4 s^2 + 1}{C_3 C_4 L_4 s^3 + 2C_3 C_4 R_3 s^2 + s(C_3 + 2C_4)}$$

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

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

$$10.26 \quad \text{INVALID-ORDER-26} \quad Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty \right)$$

$$H(s) = \frac{C_3 C_4 L_4 R_3 s^3 + s^2(C_3 C_4 R_3 R_4 + C_4 L_4) + s(C_3 R_3 + C_4 R_4) + 1}{C_3 C_4 L_4 s^3 + s^2(2C_3 C_4 R_3 + C_3 C_4 R_4) + s(C_3 + 2C_4)}$$

**10.27 INVALID-ORDER-27**  $Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$

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

**10.28 INVALID-ORDER-28**  $Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \infty \right)$

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

**10.29 INVALID-ORDER-29**  $Z(s) = \left( \infty, \infty, R_3 + \frac{1}{C_3 s}, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$

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

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

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

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

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

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

$$H(s) = \frac{C_3 C_4 L_3 R_4 s^3 + C_3 L_3 s^2 + C_4 R_4 s + 1}{2C_3 C_4 L_3 s^3 + C_3 C_4 R_4 s^2 + s (C_3 + 2C_4)}$$

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

$$H(s) = \frac{C_3 C_4 L_3 L_4 s^4 + s^2 (C_3 L_3 + C_4 L_4) + 1}{s^3 (2C_3 C_4 L_3 + C_3 C_4 L_4) + s (C_3 + 2C_4)}$$

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

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

**10.35 INVALID-ORDER-35**  $Z(s) = \left( \infty, \infty, L_3 s + \frac{1}{C_3 s}, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 L_4 s^4 + C_3 C_4 L_3 R_4 s^3 + C_4 R_4 s + s^2 (C_3 L_3 + C_4 L_4) + 1}{C_3 C_4 R_4 s^2 + s^3 (2C_3 C_4 L_3 + C_3 C_4 L_4) + s (C_3 + 2C_4)}$$

**10.36 INVALID-ORDER-36**  $Z(s) = \left( \infty, \infty, L_3s + \frac{1}{C_3s}, \frac{L_4R_4s}{C_4L_4R_4s^2 + L_4s + R_4}, \infty, \infty \right)$

$$H(s) = \frac{C_3L_3L_4R_4s^3 + L_4R_4s}{2C_3C_4L_3L_4R_4s^4 + 2C_3L_3L_4s^3 + 2L_4s + 2R_4 + s^2(2C_3L_3R_4 + C_3L_4R_4 + 2C_4L_4R_4)}$$

**10.37 INVALID-ORDER-37**  $Z(s) = \left( \infty, \infty, L_3s + \frac{1}{C_3s}, \frac{L_4s}{C_4L_4s^2 + 1} + R_4, \infty, \infty \right)$

$$H(s) = \frac{C_3C_4L_3L_4R_4s^4 + C_3L_3L_4s^3 + L_4s + R_4 + s^2(C_3L_3R_4 + C_4L_4R_4)}{2C_3C_4L_3L_4s^4 + C_3C_4L_4R_4s^3 + C_3R_4s + s^2(2C_3L_3 + C_3L_4 + 2C_4L_4) + 2}$$

**10.38 INVALID-ORDER-38**  $Z(s) = \left( \infty, \infty, L_3s + \frac{1}{C_3s}, \frac{R_4(C_4L_4s^2 + 1)}{C_4L_4s^2 + C_4R_4s + 1}, \infty, \infty \right)$

$$H(s) = \frac{C_3C_4L_3L_4R_4s^4 + R_4 + s^2(C_3L_3R_4 + C_4L_4R_4)}{2C_3C_4L_3L_4s^4 + s^3(2C_3C_4L_3R_4 + C_3C_4L_4R_4) + s^2(2C_3L_3 + 2C_4L_4) + s(C_3R_4 + 2C_4R_4) + 2}$$

**10.39 INVALID-ORDER-39**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{L_3s}{s^2(C_3L_3 + 2C_4L_3) + 1}$$

**10.40 INVALID-ORDER-40**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3R_4s^2 + L_3s}{C_3C_4L_3R_4s^3 + C_4R_4s + s^2(C_3L_3 + 2C_4L_3) + 1}$$

**10.41 INVALID-ORDER-41**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, L_4s + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4s^3 + L_3s}{C_3C_4L_3L_4s^4 + s^2(C_3L_3 + 2C_4L_3 + C_4L_4) + 1}$$

**10.42 INVALID-ORDER-42**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, \frac{L_4s}{C_4L_4s^2 + 1}, \infty, \infty \right)$

$$H(s) = \frac{L_3L_4s}{2L_3 + L_4 + s^2(C_3L_3L_4 + 2C_4L_3L_4)}$$

**10.43 INVALID-ORDER-43**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4s^3 + C_4L_3R_4s^2 + L_3s}{C_3C_4L_3L_4s^4 + C_3C_4L_3R_4s^3 + C_4R_4s + s^2(C_3L_3 + 2C_4L_3 + C_4L_4) + 1}$$

**10.44 INVALID-ORDER-44**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2 + 1}, \frac{L_4s}{C_4L_4s^2 + 1} + R_4, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4R_4s^3 + L_3L_4s^2 + L_3R_4s}{C_3C_4L_3L_4R_4s^4 + R_4 + s^3(C_3L_3L_4 + 2C_4L_3L_4) + s^2(C_3L_3R_4 + C_4L_4R_4) + s(2L_3 + L_4)}$$



$$10.45 \quad \text{INVALID-ORDER-45} \quad Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$$

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

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

$$H(s) = \frac{C_3 L_3 s^2 + C_3 R_3 s + 1}{2 C_3 C_4 L_3 s^3 + 2 C_3 C_4 R_3 s^2 + s (C_3 + 2 C_4)}$$

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

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

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

$$H(s) = \frac{C_3 C_4 L_3 R_4 s^3 + s^2 (C_3 C_4 R_3 R_4 + C_3 L_3) + s (C_3 R_3 + C_4 R_4) + 1}{2 C_3 C_4 L_3 s^3 + s^2 (2 C_3 C_4 R_3 + C_3 C_4 R_4) + s (C_3 + 2 C_4)}$$

$$10.49 \quad \text{INVALID-ORDER-49} \quad Z(s) = \left( \infty, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, L_4 s + \frac{1}{C_4 s}, \infty, \infty \right)$$

$$H(s) = \frac{C_3 C_4 L_3 L_4 s^4 + C_3 C_4 L_4 R_3 s^3 + C_3 R_3 s + s^2 (C_3 L_3 + C_4 L_4) + 1}{2 C_3 C_4 R_3 s^2 + s^3 (2 C_3 C_4 L_3 + C_3 C_4 L_4) + s (C_3 + 2 C_4)}$$

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

$$H(s) = \frac{C_3 L_3 L_4 s^3 + C_3 L_4 R_3 s^2 + L_4 s}{2 C_3 C_4 L_3 L_4 s^4 + 2 C_3 C_4 L_4 R_3 s^3 + 2 C_3 R_3 s + s^2 (2 C_3 L_3 + C_3 L_4 + 2 C_4 L_4) + 2}$$

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

$$H(s) = \frac{C_3 C_4 L_3 L_4 s^4 + s^3 (C_3 C_4 L_3 R_4 + C_3 C_4 L_4 R_3) + s^2 (C_3 C_4 R_3 R_4 + C_3 L_3 + C_4 L_4) + s (C_3 R_3 + C_4 R_4) + 1}{s^3 (2 C_3 C_4 L_3 + C_3 C_4 L_4) + s^2 (2 C_3 C_4 R_3 + C_3 C_4 R_4) + s (C_3 + 2 C_4)}$$

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

$$H(s) = \frac{C_3 L_3 L_4 R_4 s^3 + C_3 L_4 R_3 R_4 s^2 + L_4 R_4 s}{2 C_3 C_4 L_3 L_4 R_4 s^4 + 2 R_4 + s^3 (2 C_3 C_4 L_4 R_3 R_4 + 2 C_3 L_3 L_4) + s^2 (2 C_3 L_3 R_4 + 2 C_3 L_4 R_3 + C_3 L_4 R_4 + 2 C_4 L_4 R_4) + s (2 C_3 R_3 R_4 + 2 L_4)}$$

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

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_4 s^4 + R_4 + s^3 (C_3 C_4 L_4 R_3 R_4 + C_3 L_3 L_4) + s^2 (C_3 L_3 R_4 + C_3 L_4 R_3 + C_4 L_4 R_4) + s (C_3 R_3 R_4 + L_4)}{2 C_3 C_4 L_3 L_4 s^4 + s^3 (2 C_3 C_4 L_4 R_3 + C_3 C_4 L_4 R_4) + s^2 (2 C_3 L_3 + C_3 L_4 + 2 C_4 L_4) + s (2 C_3 R_3 + C_3 R_4) + 2}$$

**10.54 INVALID-ORDER-54**  $Z(s) = \left( \infty, \infty, L_3s + R_3 + \frac{1}{C_3s}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty \right)$

$$H(s) = \frac{C_3C_4L_3L_4R_4s^4 + C_3C_4L_4R_3R_4s^3 + C_3R_3R_4s + R_4 + s^2(C_3L_3R_4 + C_4L_4R_4)}{2C_3C_4L_3L_4s^4 + s^3(2C_3C_4L_3R_4 + 2C_3C_4L_4R_3 + C_3C_4L_4R_4) + s^2(2C_3C_4R_3R_4 + 2C_3L_3 + 2C_4L_4) + s(2C_3R_3 + C_3R_4 + 2C_4R_4) + 2}$$

**10.55 INVALID-ORDER-55**  $Z(s) = \left( \infty, \infty, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3R_3R_4s^2 + L_3R_3s}{C_3C_4L_3R_3R_4s^3 + R_3 + s^2(C_3L_3R_3 + 2C_4L_3R_3 + C_4L_3R_4) + s(C_4R_3R_4 + L_3)}$$

**10.56 INVALID-ORDER-56**  $Z(s) = \left( \infty, \infty, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, L_4s + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4R_3s^3 + L_3R_3s}{C_3C_4L_3L_4R_3s^4 + C_4L_3L_4s^3 + L_3s + R_3 + s^2(C_3L_3R_3 + 2C_4L_3R_3 + C_4L_4R_3)}$$

**10.57 INVALID-ORDER-57**  $Z(s) = \left( \infty, \infty, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4R_3s^3 + C_4L_3R_3R_4s^2 + L_3R_3s}{C_3C_4L_3L_4R_3s^4 + R_3 + s^3(C_3C_4L_3R_3R_4 + C_4L_3L_4) + s^2(C_3L_3R_3 + 2C_4L_3R_3 + C_4L_3R_4 + C_4L_4R_3) + s(C_4R_3R_4 + L_3)}$$

**10.58 INVALID-ORDER-58**  $Z(s) = \left( \infty, \infty, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4R_3R_4s^3 + L_3L_4R_3s^2 + L_3R_3R_4s}{C_3C_4L_3L_4R_3R_4s^4 + R_3R_4 + s^3(C_3L_3L_4R_3 + 2C_4L_3L_4R_3 + C_4L_3L_4R_4) + s^2(C_3L_3R_3R_4 + C_4L_4R_3R_4 + L_3L_4) + s(2L_3R_3 + L_3R_4 + L_4R_3)}$$

**10.59 INVALID-ORDER-59**  $Z(s) = \left( \infty, \infty, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty \right)$

$$H(s) = \frac{C_4L_3L_4R_3R_4s^3 + L_3R_3R_4s}{C_3C_4L_3L_4R_3R_4s^4 + R_3R_4 + s^3(2C_4L_3L_4R_3 + C_4L_3L_4R_4) + s^2(C_3L_3R_3R_4 + 2C_4L_3R_3R_4 + C_4L_4R_3R_4) + s(2L_3R_3 + L_3R_4)}$$

**10.60 INVALID-ORDER-60**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2+1} + R_3, \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_3L_3R_3s^2 + L_3s + R_3}{2C_3C_4L_3R_3s^3 + 2C_4R_3s + s^2(C_3L_3 + 2C_4L_3) + 1}$$

**10.61 INVALID-ORDER-61**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2+1} + R_3, \frac{R_4}{C_4R_4s+1}, \infty, \infty \right)$

$$H(s) = \frac{C_3L_3R_3R_4s^2 + L_3R_4s + R_3R_4}{2C_3C_4L_3R_3R_4s^3 + 2R_3 + R_4 + s^2(2C_3L_3R_3 + C_3L_3R_4 + 2C_4L_3R_4) + s(2C_4R_3R_4 + 2L_3)}$$

**10.62 INVALID-ORDER-62**  $Z(s) = \left( \infty, \infty, \frac{L_3s}{C_3L_3s^2+1} + R_3, R_4 + \frac{1}{C_4s}, \infty, \infty \right)$

$$H(s) = \frac{C_3C_4L_3R_3R_4s^3 + R_3 + s^2(C_3L_3R_3 + C_4L_3R_4) + s(C_4R_3R_4 + L_3)}{s^3(2C_3C_4L_3R_3 + C_3C_4L_3R_4) + s^2(C_3L_3 + 2C_4L_3) + s(2C_4R_3 + C_4R_4) + 1}$$

**10.63 INVALID-ORDER-63**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, L_4 s + \frac{1}{C_4 s}, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_3 s^4 + C_4 L_3 L_4 s^3 + L_3 s + R_3 + s^2 (C_3 L_3 R_3 + C_4 L_4 R_3)}{C_3 C_4 L_3 L_4 s^4 + 2 C_3 C_4 L_3 R_3 s^3 + 2 C_4 R_3 s + s^2 (C_3 L_3 + 2 C_4 L_3 + C_4 L_4) + 1}$$

**10.64 INVALID-ORDER-64**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_3 L_4 R_3 s^3 + L_3 L_4 s^2 + L_4 R_3 s}{2 C_3 C_4 L_3 L_4 R_3 s^4 + 2 R_3 + s^3 (C_3 L_3 L_4 + 2 C_4 L_3 L_4) + s^2 (2 C_3 L_3 R_3 + 2 C_4 L_4 R_3) + s (2 L_3 + L_4)}$$

**10.65 INVALID-ORDER-65**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_3 s^4 + R_3 + s^3 (C_3 C_4 L_3 R_3 R_4 + C_4 L_3 L_4) + s^2 (C_3 L_3 R_3 + C_4 L_3 R_4 + C_4 L_4 R_3) + s (C_4 R_3 R_4 + L_3)}{C_3 C_4 L_3 L_4 s^4 + s^3 (2 C_3 C_4 L_3 R_3 + C_3 C_4 L_3 R_4) + s^2 (C_3 L_3 + 2 C_4 L_3 + C_4 L_4) + s (2 C_4 R_3 + C_4 R_4) + 1}$$

**10.66 INVALID-ORDER-66**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_3 L_4 R_3 R_4 s^3 + L_3 L_4 R_4 s^2 + L_4 R_3 R_4 s}{2 C_3 C_4 L_3 L_4 R_3 R_4 s^4 + 2 R_3 R_4 + s^3 (2 C_3 L_3 L_4 R_3 + C_3 L_3 L_4 R_4 + 2 C_4 L_3 L_4 R_4) + s^2 (2 C_3 L_3 R_3 R_4 + 2 C_4 L_4 R_3 R_4 + 2 L_3 L_4) + s (2 L_3 R_4 + 2 L_4 R_3 + L_4 R_4)}$$

**10.67 INVALID-ORDER-67**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_3 R_4 s^4 + R_3 R_4 + s^3 (C_3 L_3 L_4 R_3 + C_4 L_3 L_4 R_4) + s^2 (C_3 L_3 R_3 R_4 + C_4 L_4 R_3 R_4 + L_3 L_4) + s (L_3 R_4 + L_4 R_3)}{2 R_3 + R_4 + s^4 (2 C_3 C_4 L_3 L_4 R_3 + C_3 C_4 L_3 L_4 R_4) + s^3 (C_3 L_3 L_4 + 2 C_4 L_3 L_4) + s^2 (2 C_3 L_3 R_3 + C_3 L_3 R_4 + 2 C_4 L_4 R_3 + C_4 L_4 R_4) + s (2 L_3 + L_4)}$$

**10.68 INVALID-ORDER-68**  $Z(s) = \left( \infty, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 L_4 R_3 R_4 s^4 + C_4 L_3 L_4 R_4 s^3 + L_3 R_4 s + R_3 R_4 + s^2 (C_3 L_3 R_3 R_4 + C_4 L_4 R_3 R_4)}{2 R_3 + R_4 + s^4 (2 C_3 C_4 L_3 L_4 R_3 + C_3 C_4 L_3 L_4 R_4) + s^3 (2 C_3 C_4 L_3 R_3 R_4 + 2 C_4 L_3 L_4) + s^2 (2 C_3 L_3 R_3 + C_3 L_3 R_4 + 2 C_4 L_3 R_4 + 2 C_4 L_4 R_3 + C_4 L_4 R_4) + s (2 C_4 R_3 R_4 + 2 L_3)}$$

**10.69 INVALID-ORDER-69**  $Z(s) = \left( \infty, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \frac{1}{C_4 s}, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_3 R_3 s^2 + R_3}{2 C_3 C_4 L_3 R_3 s^3 + C_3 L_3 s^2 + s (C_3 R_3 + 2 C_4 R_3) + 1}$$

**10.70 INVALID-ORDER-70**  $Z(s) = \left( \infty, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \frac{R_4}{C_4 R_4 s + 1}, \infty, \infty \right)$

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

**10.71 INVALID-ORDER-71**  $Z(s) = \left( \infty, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, R_4 + \frac{1}{C_4 s}, \infty, \infty \right)$

$$H(s) = \frac{C_3 C_4 L_3 R_3 R_4 s^3 + C_3 L_3 R_3 s^2 + C_4 R_3 R_4 s + R_3}{s^3 (2 C_3 C_4 L_3 R_3 + C_3 C_4 L_3 R_4) + s^2 (C_3 C_4 R_3 R_4 + C_3 L_3) + s (C_3 R_3 + 2 C_4 R_3 + C_4 R_4) + 1}$$

$$10.72 \quad \text{INVALID-ORDER-72} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, L_4s + \frac{1}{C_4s}, \infty, \infty \right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_3s^4 + R_3 + s^2(C_3L_3R_3 + C_4L_4R_3)}{C_3C_4L_3L_4s^4 + s^3(2C_3C_4L_3R_3 + C_3C_4L_4R_3) + s^2(C_3L_3 + C_4L_4) + s(C_3R_3 + 2C_4R_3) + 1}$$

$$10.73 \quad \text{INVALID-ORDER-73} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4s}{C_4L_4s^2+1}, \infty, \infty \right)$$

$$H(s) = \frac{C_3L_3L_4R_3s^3 + L_4R_3s}{2C_3C_4L_3L_4R_3s^4 + C_3L_3L_4s^3 + L_4s + 2R_3 + s^2(2C_3L_3R_3 + C_3L_4R_3 + 2C_4L_4R_3)}$$

$$10.74 \quad \text{INVALID-ORDER-74} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, L_4s + R_4 + \frac{1}{C_4s}, \infty, \infty \right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_3s^4 + C_3C_4L_3R_3R_4s^3 + C_4R_3R_4s + R_3 + s^2(C_3L_3R_3 + C_4L_4R_3)}{C_3C_4L_3L_4s^4 + s^3(2C_3C_4L_3R_3 + C_3C_4L_3R_4 + C_3C_4L_4R_3) + s^2(C_3C_4R_3R_4 + C_3L_3 + C_4L_4) + s(C_3R_3 + 2C_4R_3 + C_4R_4) + 1}$$

$$10.75 \quad \text{INVALID-ORDER-75} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \infty \right)$$

$$H(s) = \frac{C_3L_3L_4R_3R_4s^3 + L_4R_3R_4s}{2C_3C_4L_3L_4R_3R_4s^4 + 2R_3R_4 + s^3(2C_3L_3L_4R_3 + C_3L_3L_4R_4) + s^2(2C_3L_3R_3R_4 + C_3L_4R_3R_4 + 2C_4L_4R_3R_4) + s(2L_4R_3 + L_4R_4)}$$

$$10.76 \quad \text{INVALID-ORDER-76} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \infty \right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_3R_4s^4 + C_3L_3L_4R_3s^3 + L_4R_3s + R_3R_4 + s^2(C_3L_3R_3R_4 + C_4L_4R_3R_4)}{2R_3 + R_4 + s^4(2C_3C_4L_3L_4R_3 + C_3C_4L_3L_4R_4) + s^3(C_3C_4L_4R_3R_4 + C_3L_3L_4) + s^2(2C_3L_3R_3 + C_3L_3R_4 + C_3L_4R_3 + 2C_4L_4R_3 + C_4L_4R_4) + s(C_3R_3R_4 + L_4)}$$

$$10.77 \quad \text{INVALID-ORDER-77} \quad Z(s) = \left( \infty, \infty, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \infty \right)$$

$$H(s) = \frac{C_3C_4L_3L_4R_3R_4s^4 + R_3R_4 + s^2(C_3L_3R_3R_4 + C_4L_4R_3R_4)}{2R_3 + R_4 + s^4(2C_3C_4L_3L_4R_3 + C_3C_4L_3L_4R_4) + s^3(2C_3C_4L_3R_3R_4 + C_3C_4L_4R_3R_4) + s^2(2C_3L_3R_3 + C_3L_3R_4 + 2C_4L_4R_3 + C_4L_4R_4) + s(C_3R_3R_4 + 2C_4R_3R_4)}$$

## 11 PolynomialError