

Filter Summary Report: CG,TIA,simple,Z2,Z3

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Contents

1 Examined $H(z)$ for CG TIA simple **Z2 Z3:** $\frac{Z_2Z_3g_m+Z_3}{Z_2g_m+1}$

$$H(z) = \frac{Z_2Z_3g_m + Z_3}{Z_2g_m + 1}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\infty, \ R_2, \ \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \ \infty, \ \infty, \ \infty\right)$

$$H(s) = \frac{L_3R_3s}{C_3L_3R_3s^2 + L_3s + R_3}$$

Parameters:

Q: $C_3R_3\sqrt{\frac{1}{C_3L_3}}$
wo: $\sqrt{\frac{1}{C_3L_3}}$
bandwidth: $\frac{1}{C_3R_3}$
K-LP: 0
K-HP: 0
K-BP: R_3
Qz: 0
Wz: None

3.2 BP-2 $Z(s) = \left(\infty, \ \frac{1}{C_2s}, \ \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \ \infty, \ \infty, \ \infty\right)$

$$H(s) = \frac{L_3R_3s}{C_3L_3R_3s^2 + L_3s + R_3}$$

Parameters:

Q: $C_3R_3\sqrt{\frac{1}{C_3L_3}}$
wo: $\sqrt{\frac{1}{C_3L_3}}$
bandwidth: $\frac{1}{C_3R_3}$
K-LP: 0
K-HP: 0
K-BP: R_3
Qz: 0
Wz: None

3.3 BP-3 $Z(s) = \left(\infty, \ \frac{R_2}{C_2R_2s+1}, \ \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \ \infty, \ \infty, \ \infty\right)$

$$H(s) = \frac{L_3R_3s}{C_3L_3R_3s^2 + L_3s + R_3}$$

Parameters:

Q: $C_3R_3\sqrt{\frac{1}{C_3L_3}}$
wo: $\sqrt{\frac{1}{C_3L_3}}$
bandwidth: $\frac{1}{C_3R_3}$
K-LP: 0
K-HP: 0
K-BP: R_3
Qz: 0
Wz: None

$$\mathbf{3.4 \quad BP-4} \quad Z(s) = \left(\infty, \quad R_2 + \frac{1}{C_2 s}, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

Parameters:

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

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

$$\mathbf{3.5 \quad BP-5} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

Parameters:

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

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

$$\mathbf{3.6 \quad BP-6} \quad Z(s) = \left(\infty, \quad L_2 s + R_2 + \frac{1}{C_2 s}, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

Parameters:

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

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

$$\mathbf{3.7 \quad BP-7} \quad Z(s) = \left(\infty, \quad \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

Parameters:

Q: $C_3 R_3 \sqrt{\frac{1}{C_3 L_3}}$
wo: $\sqrt{\frac{1}{C_3 L_3}}$
bandwidth: $\frac{1}{C_3 R_3}$

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

K-LP: 0
 K-HP: 0
 K-BP: R_3
 Qz: 0
 Wz: None

3.8 BP-8 $Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3}, \infty, \infty, \infty \right)$

Parameters:

Q: $C_3R_3\sqrt{\frac{1}{C_3L_3}}$
 wo: $\sqrt{\frac{1}{C_3L_3}}$
 bandwidth: $\frac{1}{C_3R_3}$
 K-LP: 0
 K-HP: 0
 K-BP: R_3
 Qz: 0
 Wz: None

$$H(s) = \frac{L_3R_3s}{C_3L_3R_3s^2 + L_3s + R_3}$$

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(\infty, R_2, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \infty, \infty, \infty \right)$

Parameters:

Q: $\frac{L_3\sqrt{\frac{1}{C_3L_3}}}{R_3}$
 wo: $\sqrt{\frac{1}{C_3L_3}}$
 bandwidth: $\frac{R_3}{L_3}$
 K-LP: R_3
 K-HP: R_3
 K-BP: 0
 Qz: None
 Wz: $\sqrt{\frac{1}{C_3L_3}}$

$$H(s) = \frac{C_3L_3R_3s^2 + R_3}{C_3L_3s^2 + C_3R_3s + 1}$$

5.2 BS-2 $Z(s) = \left(\infty, \frac{1}{C_2s}, \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \infty, \infty, \infty \right)$

Parameters:

Q: $\frac{L_3\sqrt{\frac{1}{C_3L_3}}}{R_3}$
 wo: $\sqrt{\frac{1}{C_3L_3}}$
 bandwidth: $\frac{R_3}{L_3}$
 K-LP: R_3

$$H(s) = \frac{C_3L_3R_3s^2 + R_3}{C_3L_3s^2 + C_3R_3s + 1}$$

K-HP: R_3
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_3 L_3}}$

$$\mathbf{5.3 \quad BS-3} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

Parameters:

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

$$\mathbf{5.4 \quad BS-4} \quad Z(s) = \left(\infty, R_2 + \frac{1}{C_2 s}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

Parameters:

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

$$\mathbf{5.5 \quad BS-5} \quad Z(s) = \left(\infty, L_2 s + \frac{1}{C_2 s}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

Parameters:

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

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

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

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

5.6 BS-6 $Z(s) = \left(\infty, L_2 s + R_2 + \frac{1}{C_2 s}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

Parameters:

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

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

5.7 BS-7 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

Parameters:

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

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

5.8 BS-8 $Z(s) = \left(\infty, \frac{R_2(C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

Parameters:

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

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

6 GE

7 AP

8 INVALID-NUMER

9 INVALID-WZ

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (\infty, R_2, R_3, \infty, \infty, \infty)$

$$H(s) = R_3$$

10.2 INVALID-ORDER-2 $Z(s) = \left(\infty, R_2, \frac{1}{C_3 s}, \infty, \infty, \infty\right)$

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

10.3 INVALID-ORDER-3 $Z(s) = \left(\infty, R_2, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty\right)$

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

10.4 INVALID-ORDER-4 $Z(s) = \left(\infty, R_2, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty\right)$

$$H(s) = \frac{R_2 g_m + s (C_3 R_2 R_3 g_m + C_3 R_3) + 1}{s (C_3 R_2 g_m + C_3)}$$

10.5 INVALID-ORDER-5 $Z(s) = \left(\infty, R_2, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty\right)$

$$H(s) = \frac{R_2 g_m + s^2 (C_3 L_3 R_2 g_m + C_3 L_3) + 1}{s (C_3 R_2 g_m + C_3)}$$

10.6 INVALID-ORDER-6 $Z(s) = \left(\infty, R_2, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty\right)$

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

10.7 INVALID-ORDER-7 $Z(s) = \left(\infty, R_2, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty\right)$

$$H(s) = \frac{R_2 g_m + s^2 (C_3 L_3 R_2 g_m + C_3 L_3) + s (C_3 R_2 R_3 g_m + C_3 R_3) + 1}{s (C_3 R_2 g_m + C_3)}$$

10.8 INVALID-ORDER-8 $Z(s) = \left(\infty, R_2, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty\right)$

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

$$10.9 \quad \text{INVALID-ORDER-9} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, R_3, \infty, \infty, \infty \right)$$

$$H(s) = R_3$$

$$10.10 \quad \text{INVALID-ORDER-10} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

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

$$10.11 \quad \text{INVALID-ORDER-11} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

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

$$10.12 \quad \text{INVALID-ORDER-12} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 R_3 s^2 + g_m + s (C_2 + C_3 R_3 g_m)}{C_2 C_3 s^2 + C_3 g_m s}$$

$$10.13 \quad \text{INVALID-ORDER-13} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_3 s^3 + C_2 s + C_3 L_3 g_m s^2 + g_m}{C_2 C_3 s^2 + C_3 g_m s}$$

$$10.14 \quad \text{INVALID-ORDER-14} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$$

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

$$10.15 \quad \text{INVALID-ORDER-15} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_3 s^3 + g_m + s^2 (C_2 C_3 R_3 + C_3 L_3 g_m) + s (C_2 + C_3 R_3 g_m)}{C_2 C_3 s^2 + C_3 g_m s}$$

$$10.16 \quad \text{INVALID-ORDER-16} \quad Z(s) = \left(\infty, \frac{1}{C_2 s}, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$$

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

$$10.17 \quad \text{INVALID-ORDER-17} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, R_3, \infty, \infty, \infty \right)$$

$$H(s) = R_3$$

$$10.18 \quad \text{INVALID-ORDER-18} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

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

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

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

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 R_2 R_3 s^2 + R_2 g_m + s (C_2 R_2 + C_3 R_2 R_3 g_m + C_3 R_3) + 1}{C_2 C_3 R_2 s^2 + s (C_3 R_2 g_m + C_3)}$$

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_3 R_2 s^3 + C_2 R_2 s + R_2 g_m + s^2 (C_3 L_3 R_2 g_m + C_3 L_3) + 1}{C_2 C_3 R_2 s^2 + s (C_3 R_2 g_m + C_3)}$$

$$10.22 \quad \text{INVALID-ORDER-22} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$$

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

$$10.23 \quad \text{INVALID-ORDER-23} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_3 R_2 s^3 + R_2 g_m + s^2 (C_2 C_3 R_2 R_3 + C_3 L_3 R_2 g_m + C_3 L_3) + s (C_2 R_2 + C_3 R_2 R_3 g_m + C_3 R_3) + 1}{C_2 C_3 R_2 s^2 + s (C_3 R_2 g_m + C_3)}$$

$$10.24 \quad \text{INVALID-ORDER-24} \quad Z(s) = \left(\infty, \frac{R_2}{C_2 R_2 s + 1}, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$$

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

$$10.25 \quad \text{INVALID-ORDER-25} \quad Z(s) = \left(\infty, R_2 + \frac{1}{C_2 s}, R_3, \infty, \infty, \infty \right)$$

$$H(s) = R_3$$

$$10.26 \quad \text{INVALID-ORDER-26} \quad Z(s) = \left(\infty, R_2 + \frac{1}{C_2 s}, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

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

$$10.27 \quad \text{INVALID-ORDER-27} \quad Z(s) = \left(\infty, R_2 + \frac{1}{C_2 s}, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$$

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

$$10.28 \quad \text{INVALID-ORDER-28} \quad Z(s) = \left(\infty, R_2 + \frac{1}{C_2 s}, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{g_m + s^2 (C_2 C_3 R_2 R_3 g_m + C_2 C_3 R_3) + s (C_2 R_2 g_m + C_2 + C_3 R_3 g_m)}{C_3 g_m s + s^2 (C_2 C_3 R_2 g_m + C_2 C_3)}$$

$$10.29 \quad \text{INVALID-ORDER-29} \quad Z(s) = \left(\infty, \quad R_2 + \frac{1}{C_2 s}, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 g_m s^2 + g_m + s^3 (C_2 C_3 L_3 R_2 g_m + C_2 C_3 L_3) + s (C_2 R_2 g_m + C_2)}{C_3 g_m s + s^2 (C_2 C_3 R_2 g_m + C_2 C_3)}$$

$$10.30 \quad \text{INVALID-ORDER-30} \quad Z(s) = \left(\infty, \quad R_2 + \frac{1}{C_2 s}, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

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

$$10.31 \quad \text{INVALID-ORDER-31} \quad Z(s) = \left(\infty, \quad R_2 + \frac{1}{C_2 s}, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{g_m + s^3 (C_2 C_3 L_3 R_2 g_m + C_2 C_3 L_3) + s^2 (C_2 C_3 R_2 R_3 g_m + C_2 C_3 R_3 + C_3 L_3 g_m) + s (C_2 R_2 g_m + C_2 + C_3 R_3 g_m)}{C_3 g_m s + s^2 (C_2 C_3 R_2 g_m + C_2 C_3)}$$

$$10.32 \quad \text{INVALID-ORDER-32} \quad Z(s) = \left(\infty, \quad R_2 + \frac{1}{C_2 s}, \quad \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

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

$$10.33 \quad \text{INVALID-ORDER-33} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = R_3$$

$$10.34 \quad \text{INVALID-ORDER-34} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

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

$$10.35 \quad \text{INVALID-ORDER-35} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad \frac{R_3}{C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

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

$$10.36 \quad \text{INVALID-ORDER-36} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_2 R_3 g_m s^3 + g_m + s^2 (C_2 C_3 R_3 + C_2 L_2 g_m) + s (C_2 + C_3 R_3 g_m)}{C_2 C_3 L_2 g_m s^3 + C_2 C_3 s^2 + C_3 g_m s}$$

$$10.37 \quad \text{INVALID-ORDER-37} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_2 C_3 L_2 L_3 g_m s^4 + C_2 C_3 L_3 s^3 + C_2 s + g_m + s^2 (C_2 L_2 g_m + C_3 L_3 g_m)}{C_2 C_3 L_2 g_m s^3 + C_2 C_3 s^2 + C_3 g_m s}$$

$$10.38 \quad \text{INVALID-ORDER-38} \quad Z(s) = \left(\infty, \quad L_2 s + \frac{1}{C_2 s}, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

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

10.39 INVALID-ORDER-39 $Z(s) = \left(\infty, L_2s + \frac{1}{C_2s}, L_3s + R_3 + \frac{1}{C_3s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_2C_3L_2L_3g_ms^4 + g_m + s^3(C_2C_3L_2R_3g_m + C_2C_3L_3) + s^2(C_2C_3R_3 + C_2L_2g_m + C_3L_3g_m) + s(C_2 + C_3R_3g_m)}{C_2C_3L_2g_ms^3 + C_2C_3s^2 + C_3g_ms}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(\infty, L_2s + \frac{1}{C_2s}, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}$$

10.41 INVALID-ORDER-41 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, R_3, \infty, \infty, \infty \right)$

$$H(s) = R_3$$

10.42 INVALID-ORDER-42 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \frac{1}{C_3s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{1}{C_3s}$$

10.43 INVALID-ORDER-43 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \frac{R_3}{C_3R_3s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{R_3}{C_3R_3s + 1}$$

10.44 INVALID-ORDER-44 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, R_3 + \frac{1}{C_3s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_2C_3L_2R_3g_ms^3 + g_m + s^2(C_2C_3R_2R_3g_m + C_2C_3R_3 + C_2L_2g_m) + s(C_2R_2g_m + C_2 + C_3R_3g_m)}{C_2C_3L_2g_ms^3 + C_3g_ms + s^2(C_2C_3R_2g_m + C_2C_3)}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, L_3s + \frac{1}{C_3s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_2C_3L_2L_3g_ms^4 + g_m + s^3(C_2C_3L_3R_2g_m + C_2C_3L_3) + s^2(C_2L_2g_m + C_3L_3g_m) + s(C_2R_2g_m + C_2)}{C_2C_3L_2g_ms^3 + C_3g_ms + s^2(C_2C_3R_2g_m + C_2C_3)}$$

10.46 INVALID-ORDER-46 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \frac{L_3s}{C_3L_3s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_3s}{C_3L_3s^2 + 1}$$

10.47 INVALID-ORDER-47 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, L_3s + R_3 + \frac{1}{C_3s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_2C_3L_2L_3g_ms^4 + g_m + s^3(C_2C_3L_2R_3g_m + C_2C_3L_3R_2g_m + C_2C_3L_3) + s^2(C_2C_3R_2R_3g_m + C_2C_3R_3 + C_2L_2g_m + C_3L_3g_m) + s(C_2R_2g_m + C_2 + C_3R_3g_m)}{C_2C_3L_2g_ms^3 + C_3g_ms + s^2(C_2C_3R_2g_m + C_2C_3)}$$

10.48 INVALID-ORDER-48 $Z(s) = \left(\infty, L_2s + R_2 + \frac{1}{C_2s}, \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2 + 1}$$

10.49 INVALID-ORDER-49 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, R_3, \infty, \infty, \infty \right)$

$$H(s) = R_3$$

10.50 INVALID-ORDER-50 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

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

10.51 INVALID-ORDER-51 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

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

10.52 INVALID-ORDER-52 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^3 (C_2 C_3 L_2 R_2 R_3 g_m + C_2 C_3 L_2 R_3) + s^2 (C_2 L_2 R_2 g_m + C_2 L_2 + C_3 L_2 R_3 g_m) + s (C_3 R_2 R_3 g_m + C_3 R_3 + L_2 g_m) + 1}{C_3 L_2 g_m s^2 + s^3 (C_2 C_3 L_2 R_2 g_m + C_2 C_3 L_2) + s (C_3 R_2 g_m + C_3)}$$

10.53 INVALID-ORDER-53 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_2 L_3 g_m s^3 + L_2 g_m s + R_2 g_m + s^4 (C_2 C_3 L_2 L_3 R_2 g_m + C_2 C_3 L_2 L_3) + s^2 (C_2 L_2 R_2 g_m + C_2 L_2 + C_3 L_3 R_2 g_m + C_3 L_3) + 1}{C_3 L_2 g_m s^2 + s^3 (C_2 C_3 L_2 R_2 g_m + C_2 C_3 L_2) + s (C_3 R_2 g_m + C_3)}$$

10.54 INVALID-ORDER-54 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

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

10.55 INVALID-ORDER-55 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^4 (C_2 C_3 L_2 L_3 R_2 g_m + C_2 C_3 L_2 L_3) + s^3 (C_2 C_3 L_2 R_2 R_3 g_m + C_2 C_3 L_2 R_3 + C_3 L_2 L_3 g_m) + s^2 (C_2 L_2 R_2 g_m + C_2 L_2 + C_3 L_2 R_3 g_m + C_3 L_3 R_2 g_m + C_3 L_3) + s (C_3 R_2 R_3 g_m + C_3 R_3 + L_2 g_m) + 1}{C_3 L_2 g_m s^2 + s^3 (C_2 C_3 L_2 R_2 g_m + C_2 C_3 L_2) + s (C_3 R_2 g_m + C_3)}$$

10.56 INVALID-ORDER-56 $Z(s) = \left(\infty, \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1}, \frac{C_3 L_3 R_3 s^2 + L_3 s + R_3}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

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

10.57 INVALID-ORDER-57 $Z(s) = \left(\infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, R_3, \infty, \infty, \infty \right)$

$$H(s) = R_3$$

10.58 INVALID-ORDER-58 $Z(s) = \left(\infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

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

$$10.59 \quad \text{INVALID-ORDER-59} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \frac{R_3}{C_3R_3s+1}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{R_3}{C_3R_3s+1}$$

$$10.60 \quad \text{INVALID-ORDER-60} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, R_3 + \frac{1}{C_3s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{R_2g_m + s^3(C_2C_3L_2R_2R_3g_m + C_2C_3L_2R_3) + s^2(C_2C_3R_2R_3 + C_2L_2R_2g_m + C_2L_2) + s(C_2R_2 + C_3R_2R_3g_m + C_3R_3) + 1}{C_2C_3R_2s^2 + s^3(C_2C_3L_2R_2g_m + C_2C_3L_2) + s(C_3R_2g_m + C_3)}$$

$$10.61 \quad \text{INVALID-ORDER-61} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, L_3s + \frac{1}{C_3s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_2C_3L_3R_2s^3 + C_2R_2s + R_2g_m + s^4(C_2C_3L_2L_3R_2g_m + C_2C_3L_2L_3) + s^2(C_2L_2R_2g_m + C_2L_2 + C_3L_3R_2g_m + C_3L_3) + 1}{C_2C_3R_2s^2 + s^3(C_2C_3L_2R_2g_m + C_2C_3L_2) + s(C_3R_2g_m + C_3)}$$

$$10.62 \quad \text{INVALID-ORDER-62} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \frac{L_3s}{C_3L_3s^2+1}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{L_3s}{C_3L_3s^2+1}$$

$$10.63 \quad \text{INVALID-ORDER-63} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, L_3s + R_3 + \frac{1}{C_3s}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{R_2g_m + s^4(C_2C_3L_2L_3R_2g_m + C_2C_3L_2L_3) + s^3(C_2C_3L_2R_2R_3g_m + C_2C_3L_2R_3 + C_2C_3L_3R_2) + s^2(C_2C_3R_2R_3 + C_2L_2R_2g_m + C_2L_2 + C_3L_3R_2g_m + C_3L_3) + s(C_2R_2 + C_3R_2R_3g_m + C_3R_3) + 1}{C_2C_3R_2s^2 + s^3(C_2C_3L_2R_2g_m + C_2C_3L_2) + s(C_3R_2g_m + C_3)}$$

$$10.64 \quad \text{INVALID-ORDER-64} \quad Z(s) = \left(\infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1}, \infty, \infty, \infty \right)$$

$$H(s) = \frac{C_3L_3R_3s^2 + L_3s + R_3}{C_3L_3s^2+1}$$

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