Filter Summary Report: CG,TIA,simple,Z2,Z4

Generated by MacAnalog-Symbolix

January 17, 2025

Contents

1 Examined $H(z)$ for CG TIA simple Z2 Z4: $\frac{Z_2 Z_4 g_m + Z_4}{2 Z_2 g_m + 2}$

$$H(z) = \frac{Z_2 Z_4 g_m + Z_4}{2 Z_2 g_m + 2}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.2 BP-2 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.3 BP-3 $Z(s) = \left(\infty,\ \frac{R_2}{C_2 R_2 s + 1},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.4 BP-4 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.5 BP-5 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.6 BP-6 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

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

3.7 BP-7 $Z(s) = \left(\infty,\ \frac{C_2 L_2 R_2 s^2 + L_2 s + R_2}{C_2 L_2 s^2 + 1},\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty,\ \infty\right)$

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

Parameters:

Q: $C_4 R_4 \sqrt{\frac{1}{C_4 L_4}}$
wo: $\sqrt{\frac{1}{C_4 L_4}}$
bandwidth: $\frac{1}{C_4 R_4}$

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

3.8 BP-8 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4},\ \infty,\ \infty\right)$

$$H(s) = \frac{L_4R_4s}{2C_4L_4R_4s^2 + 2L_4s + 2R_4}$$

Parameters:

Q: $C_4R_4\sqrt{\frac{1}{C_4L_4}}$
wo: $\sqrt{\frac{1}{C_4L_4}}$
bandwidth: $\frac{1}{C_4R_4}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4}{2}$
Qz: None
Wz: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{R_4\left(C_4L_4s^2+1\right)}{C_4L_4s^2+C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_4R_4s^2 + R_4}{2C_4L_4s^2 + 2C_4R_4s + 2}$$

Parameters:

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

5.2 BS-2 $Z(s) = \left(\infty,\ \frac{1}{C_2s},\ \infty,\ \frac{R_4\left(C_4L_4s^2+1\right)}{C_4L_4s^2+C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_4R_4s^2 + R_4}{2C_4L_4s^2 + 2C_4R_4s + 2}$$

Parameters:

Q: $\frac{L_4\sqrt{\frac{1}{C_4L_4}}}{R_4}$
wo: $\sqrt{\frac{1}{C_4L_4}}$
bandwidth: $\frac{R_4}{L_4}$
K-LP: $\frac{R_4}{2}$

K-HP: $\frac{R_4}{2}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_4 L_4}}$

5.3 BS-3 $Z(s) = \left(\infty,\ \frac{R_2}{C_2 R_2 s+1},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

5.4 BS-4 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

5.5 BS-5 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

5.6 BS-6 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

5.7 BS-7 $Z(s) = \left(\infty,\ \frac{C_2 L_2 R_2 s^2+L_2 s+R_2}{C_2 L_2 s^2+1},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

5.8 BS-8 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2 L_2 s^2+1\right)}{C_2 L_2 s^2+C_2 R_2 s+1},\ \infty,\ \frac{R_4\left(C_4 L_4 s^2+1\right)}{C_4 L_4 s^2+C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

Parameters:

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

6 GE

7 AP

8 INVALID-NUMER

9 INVALID-WZ

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (\infty,\ R_2,\ \infty,\ R_4,\ \infty,\ \infty)$

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

10.2 INVALID-ORDER-2 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \infty\right)$

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

10.3 INVALID-ORDER-3 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

10.4 INVALID-ORDER-4 $Z(s) = \left(\infty,\ R_2,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2 g_m + s\left(C_4 R_2 R_4 g_m + C_4 R_4\right) + 1}{s\left(2C_4 R_2 g_m + 2C_4\right)}$$

10.5 INVALID-ORDER-5 $Z(s) = \left(\infty,\ R_2,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2 g_m + s^2\left(C_4 L_4 R_2 g_m + C_4 L_4\right) + 1}{s\left(2C_4 R_2 g_m + 2C_4\right)}$$

10.6 INVALID-ORDER-6 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \infty\right)$

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

10.7 INVALID-ORDER-7 $Z(s) = \left(\infty,\ R_2,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2 g_m + s^2\left(C_4 L_4 R_2 g_m + C_4 L_4\right) + s\left(C_4 R_2 R_4 g_m + C_4 R_4\right) + 1}{s\left(2C_4 R_2 g_m + 2C_4\right)}$$

10.8 INVALID-ORDER-8 $Z(s) = \left(\infty,\ R_2,\ \infty,\ \frac{C_4 L_4 R_4 s^2+L_4 s+R_4}{C_4 L_4 s^2+1},\ \infty,\ \infty\right)$

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

10.9 INVALID-ORDER-9 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.10 INVALID-ORDER-10 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \infty\right)$

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

10.11 INVALID-ORDER-11 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ \frac{R_4}{C_4 R_4 s+1},\ \infty,\ \infty\right)$

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

10.12 INVALID-ORDER-12 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 R_4 s^2 + g_m + s\left(C_2 + C_4 R_4 g_m\right)}{2C_2 C_4 s^2 + 2C_4 g_m s}$$

10.13 INVALID-ORDER-13 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_4 s^3 + C_2 s + C_4 L_4 g_m s^2 + g_m}{2C_2 C_4 s^2 + 2C_4 g_m s}$$

10.14 INVALID-ORDER-14 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2+1},\ \infty,\ \infty\right)$

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

10.15 INVALID-ORDER-15 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_4 s^3 + g_m + s^2\left(C_2 C_4 R_4 + C_4 L_4 g_m\right) + s\left(C_2 + C_4 R_4 g_m\right)}{2C_2 C_4 s^2 + 2C_4 g_m s}$$

10.16 INVALID-ORDER-16 $Z(s) = \left(\infty,\ \frac{1}{C_2 s},\ \infty,\ \frac{C_4 L_4 R_4 s^2+L_4 s+R_4}{C_4 L_4 s^2+1},\ \infty,\ \infty\right)$

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

10.17 INVALID-ORDER-17 $Z(s) = \left(\infty,\ \frac{R_2}{C_2 R_2 s+1},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.18 INVALID-ORDER-18 $Z(s) = \left(\infty,\ \frac{R_2}{C_2 R_2 s+1},\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \infty\right)$

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

10.19 INVALID-ORDER-19 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_4}{2C_4R_4s + 2}$$

10.20 INVALID-ORDER-20 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ R_4 + \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2C_4R_2R_4s^2 + R_2g_m + s\left(C_2R_2 + C_4R_2R_4g_m + C_4R_4\right) + 1}{2C_2C_4R_2s^2 + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.21 INVALID-ORDER-21 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ L_4s + \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2C_4L_4R_2s^3 + C_2R_2s + R_2g_m + s^2\left(C_4L_4R_2g_m + C_4L_4\right) + 1}{2C_2C_4R_2s^2 + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.22 INVALID-ORDER-22 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ \frac{L_4s}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{L_4s}{2C_4L_4s^2 + 2}$$

10.23 INVALID-ORDER-23 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ L_4s + R_4 + \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2C_4L_4R_2s^3 + R_2g_m + s^2\left(C_2C_4R_2R_4 + C_4L_4R_2g_m + C_4L_4\right) + s\left(C_2R_2 + C_4R_2R_4g_m + C_4R_4\right) + 1}{2C_2C_4R_2s^2 + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.24 INVALID-ORDER-24 $Z(s) = \left(\infty,\ \frac{R_2}{C_2R_2s+1},\ \infty,\ \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_4R_4s^2 + L_4s + R_4}{2C_4L_4s^2 + 2}$$

10.25 INVALID-ORDER-25 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2s},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.26 INVALID-ORDER-26 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2s},\ \infty,\ \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{1}{2C_4s}$$

10.27 INVALID-ORDER-27 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2s},\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_4}{2C_4R_4s + 2}$$

10.28 INVALID-ORDER-28 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2s},\ \infty,\ R_4 + \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{g_m + s^2\left(C_2C_4R_2R_4g_m + C_2C_4R_4\right) + s\left(C_2R_2g_m + C_2 + C_4R_4g_m\right)}{2C_4g_ms + s^2\left(2C_2C_4R_2g_m + 2C_2C_4\right)}$$

10.29 INVALID-ORDER-29 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4 L_4 g_m s^2 + g_m + s^3 \left(C_2 C_4 L_4 R_2 g_m + C_2 C_4 L_4\right) + s \left(C_2 R_2 g_m + C_2\right)}{2 C_4 g_m s + s^2 \left(2 C_2 C_4 R_2 g_m + 2 C_2 C_4\right)}$$

10.30 INVALID-ORDER-30 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.31 INVALID-ORDER-31 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{g_m + s^3 \left(C_2 C_4 L_4 R_2 g_m + C_2 C_4 L_4\right) + s^2 \left(C_2 C_4 R_2 R_4 g_m + C_2 C_4 R_4 + C_4 L_4 g_m\right) + s \left(C_2 R_2 g_m + C_2 + C_4 R_4 g_m\right)}{2 C_4 g_m s + s^2 \left(2 C_2 C_4 R_2 g_m + 2 C_2 C_4\right)}$$

10.32 INVALID-ORDER-32 $Z(s) = \left(\infty,\ R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.33 INVALID-ORDER-33 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.34 INVALID-ORDER-34 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \infty\right)$

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

10.35 INVALID-ORDER-35 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{R_4}{C_4 R_4 s + 1},\ \infty,\ \infty\right)$

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

10.36 INVALID-ORDER-36 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 R_4 g_m s^3 + g_m + s^2 \left(C_2 C_4 R_4 + C_2 L_2 g_m\right) + s \left(C_2 + C_4 R_4 g_m\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_2 C_4 s^2 + 2 C_4 g_m s}$$

10.37 INVALID-ORDER-37 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 L_4 g_m s^4 + C_2 C_4 L_4 s^3 + C_2 s + g_m + s^2 \left(C_2 L_2 g_m + C_4 L_4 g_m\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_2 C_4 s^2 + 2 C_4 g_m s}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.39 INVALID-ORDER-39 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 L_4 g_m s^4 + g_m + s^3 \left(C_2 C_4 L_2 R_4 g_m + C_2 C_4 L_4\right) + s^2 \left(C_2 C_4 R_4 + C_2 L_2 g_m + C_4 L_4 g_m\right) + s \left(C_2 + C_4 R_4 g_m\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_2 C_4 s^2 + 2 C_4 g_m s}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(\infty,\ L_2 s + \frac{1}{C_2 s},\ \infty,\ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.41 INVALID-ORDER-41 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.42 INVALID-ORDER-42 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{1}{C_4 s},\ \infty,\ \infty\right)$

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

10.43 INVALID-ORDER-43 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{R_4}{C_4 R_4 s + 1},\ \infty,\ \infty\right)$

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

10.44 INVALID-ORDER-44 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 R_4 g_m s^3 + g_m + s^2 \left(C_2 C_4 R_2 R_4 g_m + C_2 C_4 R_4 + C_2 L_2 g_m\right) + s \left(C_2 R_2 g_m + C_2 + C_4 R_4 g_m\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_4 g_m s + s^2 \left(2 C_2 C_4 R_2 g_m + 2 C_2 C_4\right)}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 L_4 g_m s^4 + g_m + s^3 \left(C_2 C_4 L_4 R_2 g_m + C_2 C_4 L_4\right) + s^2 \left(C_2 L_2 g_m + C_4 L_4 g_m\right) + s \left(C_2 R_2 g_m + C_2\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_4 g_m s + s^2 \left(2 C_2 C_4 R_2 g_m + 2 C_2 C_4\right)}$$

10.46 INVALID-ORDER-46 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.47 INVALID-ORDER-47 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2 C_4 L_2 L_4 g_m s^4 + g_m + s^3 \left(C_2 C_4 L_2 R_4 g_m + C_2 C_4 L_4 R_2 g_m + C_2 C_4 L_4\right) + s^2 \left(C_2 C_4 R_2 R_4 g_m + C_2 C_4 R_4 + C_2 L_2 g_m + C_4 L_4 g_m\right) + s \left(C_2 R_2 g_m + C_2 + C_4 R_4 g_m\right)}{2 C_2 C_4 L_2 g_m s^3 + 2 C_4 g_m s + s^2 \left(2 C_2 C_4 R_2 g_m + 2 C_2 C_4\right)}$$

10.48 INVALID-ORDER-48 $Z(s) = \left(\infty,\ L_2 s + R_2 + \frac{1}{C_2 s},\ \infty,\ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1},\ \infty,\ \infty\right)$

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

10.49 INVALID-ORDER-49 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.50 INVALID-ORDER-50 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{1}{2C_4s}$$

10.51 INVALID-ORDER-51 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_4}{2C_4R_4s+2}$$

10.52 INVALID-ORDER-52 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ R_4+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2g_m + s^3\left(C_2C_4L_2R_2R_4g_m + C_2C_4L_2R_4\right) + s^2\left(C_2L_2R_2g_m + C_2L_2 + C_4L_2R_4g_m\right) + s\left(C_4R_2R_4g_m + C_4R_4 + L_2g_m\right) + 1}{2C_4L_2g_ms^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.53 INVALID-ORDER-53 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ L_4s+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_2L_4g_ms^3 + L_2g_ms + R_2g_m + s^4\left(C_2C_4L_2L_4R_2g_m + C_2C_4L_2L_4\right) + s^2\left(C_2L_2R_2g_m + C_2L_2 + C_4L_4R_2g_m + C_4L_4\right) + 1}{2C_4L_2g_ms^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.54 INVALID-ORDER-54 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ \frac{L_4s}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{L_4s}{2C_4L_4s^2+2}$$

10.55 INVALID-ORDER-55 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ L_4s+R_4+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2g_m + s^4\left(C_2C_4L_2L_4R_2g_m + C_2C_4L_2L_4\right) + s^3\left(C_2C_4L_2R_2R_4g_m + C_2C_4L_2R_4 + C_4L_2L_4g_m\right) + s^2\left(C_2L_2R_2g_m + C_2L_2 + C_4L_2R_4g_m + C_4L_4R_2g_m + C_4L_4\right) + s\left(C_4R_2R_4g_m + C_4R_4 + L_2g_m\right) + 1}{2C_4L_2g_ms^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.56 INVALID-ORDER-56 $Z(s) = \left(\infty,\ \frac{C_2L_2R_2s^2+L_2s+R_2}{C_2L_2s^2+1},\ \infty,\ \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_4R_4s^2 + L_4s + R_4}{2C_4L_4s^2+2}$$

10.57 INVALID-ORDER-57 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ R_4,\ \infty,\ \infty\right)$

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

10.58 INVALID-ORDER-58 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ \frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{1}{2C_4s}$$

10.59 INVALID-ORDER-59 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ \frac{R_4}{C_4R_4s+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_4}{2C_4R_4s+2}$$

10.60 INVALID-ORDER-60 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ R_4+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2g_m + s^3\left(C_2C_4L_2R_2R_4g_m + C_2C_4L_2R_4\right) + s^2\left(C_2C_4R_2R_4 + C_2L_2R_2g_m + C_2L_2\right) + s\left(C_2R_2 + C_4R_2R_4g_m + C_4R_4\right) + 1}{2C_2C_4R_2s^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.61 INVALID-ORDER-61 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ L_4s+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_2C_4L_4R_2s^3 + C_2R_2s + R_2g_m + s^4\left(C_2C_4L_2L_4R_2g_m + C_2C_4L_2L_4\right) + s^2\left(C_2L_2R_2g_m + C_2L_2 + C_4L_4R_2g_m + C_4L_4\right) + 1}{2C_2C_4R_2s^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.62 INVALID-ORDER-62 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ \frac{L_4s}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{L_4s}{2C_4L_4s^2+2}$$

10.63 INVALID-ORDER-63 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ L_4s+R_4+\frac{1}{C_4s},\ \infty,\ \infty\right)$

$$H(s) = \frac{R_2g_m + s^4\left(C_2C_4L_2L_4R_2g_m + C_2C_4L_2L_4\right) + s^3\left(C_2C_4L_2R_2R_4g_m + C_2C_4L_2R_4 + C_2C_4L_4R_2\right) + s^2\left(C_2C_4R_2R_4 + C_2L_2R_2g_m + C_2L_2 + C_4L_4R_2g_m + C_4L_4\right) + s\left(C_2R_2 + C_4R_2R_4g_m + C_4R_4\right) + 1}{2C_2C_4R_2s^2 + s^3\left(2C_2C_4L_2R_2g_m + 2C_2C_4L_2\right) + s\left(2C_4R_2g_m + 2C_4\right)}$$

10.64 INVALID-ORDER-64 $Z(s) = \left(\infty,\ \frac{R_2\left(C_2L_2s^2+1\right)}{C_2L_2s^2+C_2R_2s+1},\ \infty,\ \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4L_4s^2+1},\ \infty,\ \infty\right)$

$$H(s) = \frac{C_4L_4R_4s^2 + L_4s + R_4}{2C_4L_4s^2+2}$$

11 PolynomialError