Filter Summary Report: CG,TIA,simple,Z1,Z4

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Contents

1 Examined $H(z)$ for CG TIA simple Z1 Z4: $\frac{Z_1 Z_4 Z_L g_m}{Z_1 Z_4 g_m + 2Z_1 Z_L g_m + Z_4 + 2Z_L}$

$$H(z) = \frac{Z_1 Z_4 Z_L g_m}{Z_1 Z_4 g_m + 2Z_1 Z_L g_m + Z_4 + 2Z_L}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{L_4 R_1 Z_L g_m s}{2R_1 Z_L g_m + 2Z_L + s^2 \left(2C_4 L_4 R_1 Z_L g_m + 2C_4 L_4 Z_L \right) + s \left(L_4 R_1 g_m + L_4 \right)}$$

Parameters:

Q: $2C_4 Z_L \sqrt{\frac{1}{C_4 L_4}}$

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

bandwidth: $\frac{1}{2C_4 Z_L}$

K-LP: 0

K-HP: 0

K-BP: $\frac{R_1 Z_L g_m}{R_1 g_m + 1}$

Qz: None

Wz: None

3.2 BP-2 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{L_4 R_1 R_4 Z_L g_m s}{2R_1 R_4 Z_L g_m + 2R_4 Z_L + s^2 \left(2C_4 L_4 R_1 R_4 Z_L g_m + 2C_4 L_4 R_4 Z_L \right) + s \left(L_4 R_1 R_4 g_m + 2L_4 R_1 Z_L g_m + L_4 R_4 + 2L_4 Z_L \right)}$$

Parameters:

Q: $\frac{2C_4 R_4 Z_L \sqrt{\frac{1}{C_4 L_4}}}{R_4 + 2Z_L}$

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

bandwidth: $\frac{R_4 + 2Z_L}{2C_4 R_4 Z_L}$

K-LP: 0

K-HP: 0

K-BP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L}$

Qz: None

Wz: None

3.3 BP-3 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{L_1 Z_L g_m s}{2C_4 L_1 Z_L g_m s^2 + s \left(2C_4 Z_L + L_1 g_m \right) + 1}$$

Parameters:

Q: $\frac{\sqrt{2} C_4 L_1 Z_L g_m \sqrt{\frac{1}{C_4 L_1 Z_L g_m}}}{2C_4 Z_L + L_1 g_m}$

wo: $\frac{\sqrt{2} \sqrt{\frac{1}{C_4 L_1 Z_L g_m}}}{2}$

bandwidth: $\frac{2C_4 Z_L + L_1 g_m}{2C_4 L_1 Z_L g_m}$

K-LP: 0

K-HP: 0

K-BP: $\frac{L_1 Z_L g_m}{2C_4 Z_L + L_1 g_m}$

Qz: None

3.4 BP-4 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{L_1 R_4 Z_L g_m s}{2 C_4 L_1 R_4 Z_L g_m s^2 + R_4 + 2 Z_L + s\left(2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m\right)}$$

Parameters:

Q: $\frac{\sqrt{2} C_4 L_1 R_4 Z_L g_m \sqrt{\frac{1}{C_4 L_1 Z_L g_m} + \frac{2}{C_4 L_1 R_4 g_m}}}{2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m}$

wo: $\frac{\sqrt{2}\sqrt{\frac{R_4 + 2 Z_L}{C_4 L_1 R_4 Z_L g_m}}}{2}$

bandwidth: $\frac{\sqrt{\frac{R_4 + 2 Z_L}{C_4 L_1 R_4 Z_L g_m}}\left(2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m\right)}{2 C_4 L_1 R_4 Z_L g_m \sqrt{\frac{1}{C_4 L_1 Z_L g_m} + \frac{2}{C_4 L_1 R_4 g_m}}}$

K-LP: 0
K-HP: 0
K-BP: $\frac{L_1 R_4 Z_L g_m}{2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m}$
Qz: None
Wz: None

3.5 BP-5 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ R_4, \ \infty\right)$

$$H(s) = \frac{L_1 R_4 Z_L g_m s}{R_4 + 2 Z_L + s^2\left(C_1 L_1 R_4 + 2 C_1 L_1 Z_L\right) + s\left(L_1 R_4 g_m + 2 L_1 Z_L g_m\right)}$$

Parameters:

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{g_m}{C_1}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_4 Z_L}{R_4 + 2 Z_L}$
Qz: None
Wz: None

3.6 BP-6 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \ \infty, \ \infty, \ R_4, \ \infty\right)$

$$H(s) = \frac{L_1 R_1 R_4 Z_L g_m s}{R_1 R_4 + 2 R_1 Z_L + s^2\left(C_1 L_1 R_1 R_4 + 2 C_1 L_1 R_1 Z_L\right) + s\left(L_1 R_1 R_4 g_m + 2 L_1 R_1 Z_L g_m + L_1 R_4 + 2 L_1 Z_L\right)}$$

Parameters:

Q: $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{R_1 g_m + 1}{C_1 R_1}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$
Qz: None
Wz: None

4 LP

4.1 LP-1 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{Z_L g_m}{2C_1 C_4 Z_L s^2 + g_m + s\left(C_1 + 2C_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{\sqrt{2} C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 Z_L}}}{C_1 + 2C_4 Z_L g_m}$

wo: $\dfrac{\sqrt{2}\sqrt{\frac{g_m}{C_1 C_4 Z_L}}}{2}$

bandwidth: $\dfrac{C_1 + 2C_4 Z_L g_m}{2C_1 C_4 Z_L}$

K-LP: Z_L

K-HP: 0

K-BP: 0

Qz: None

Wz: None

4.2 LP-2 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{R_4 Z_L g_m}{2C_1 C_4 R_4 Z_L s^2 + R_4 g_m + 2Z_L g_m + s\left(C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{\sqrt{2} C_1 C_4 R_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 Z_L} + \frac{2g_m}{C_1 C_4 R_4}}}{C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m}$

wo: $\dfrac{\sqrt{2}\sqrt{\frac{R_4 g_m + 2Z_L g_m}{C_1 C_4 R_4 Z_L}}}{2}$

bandwidth: $\dfrac{\sqrt{\frac{R_4 g_m + 2Z_L g_m}{C_1 C_4 R_4 Z_L}}\left(C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m\right)}{2C_1 C_4 R_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 Z_L} + \frac{2g_m}{C_1 C_4 R_4}}}$

K-LP: $\dfrac{R_4 Z_L}{R_4 + 2Z_L}$

K-HP: 0

K-BP: 0

Qz: None

Wz: None

4.3 LP-3 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{R_1 Z_L g_m}{2C_1 C_4 R_1 Z_L s^2 + R_1 g_m + s\left(C_1 R_1 + 2C_4 R_1 Z_L g_m + 2C_4 Z_L\right) + 1}$$

Parameters:

Q: $\dfrac{\sqrt{2} C_1 C_4 R_1 Z_L \sqrt{\frac{g_m}{C_1 C_4 Z_L} + \frac{1}{C_1 C_4 R_1 Z_L}}}{C_1 R_1 + 2C_4 R_1 Z_L g_m + 2C_4 Z_L}$

wo: $\dfrac{\sqrt{2}\sqrt{\frac{R_1 g_m + 1}{C_1 C_4 R_1 Z_L}}}{2}$

bandwidth: $\dfrac{\sqrt{\frac{R_1 g_m + 1}{C_1 C_4 R_1 Z_L}}\left(C_1 R_1 + 2C_4 R_1 Z_L g_m + 2C_4 Z_L\right)}{2C_1 C_4 R_1 Z_L \sqrt{\frac{g_m}{C_1 C_4 Z_L} + \frac{1}{C_1 C_4 R_1 Z_L}}}$

K-LP: $\dfrac{R_1 Z_L g_m}{R_1 g_m + 1}$

K-HP: 0

K-BP: 0

Qz: None

Wz: None

4.4 LP-4 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{R_1 R_4 Z_L g_m}{2C_1 C_4 R_1 R_4 Z_L s^2 + R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L + s\left(C_1 R_1 R_4 + 2C_1 R_1 Z_L + 2C_4 R_1 R_4 Z_L g_m + 2C_4 R_4 Z_L\right)}$$

Parameters:

Q: $\dfrac{\sqrt{2}C_1C_4R_1R_4Z_L\sqrt{\frac{g_m}{C_1C_4Z_L}+\frac{2g_m}{C_1C_4R_4}+\frac{1}{C_1C_4R_1Z_L}+\frac{2}{C_1C_4R_1R_4}}}{C_1R_1R_4+2C_1R_1Z_L+2C_4R_1R_4Z_Lg_m+2C_4R_4Z_L}$

wo: $\dfrac{\sqrt{2}\sqrt{\frac{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L}{C_1C_4R_1R_4Z_L}}}{2}$

bandwidth: $\dfrac{\sqrt{\frac{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L}{C_1C_4R_1R_4Z_L}}(C_1R_1R_4+2C_1R_1Z_L+2C_4R_1R_4Z_Lg_m+2C_4R_4Z_L)}{2C_1C_4R_1R_4Z_L\sqrt{\frac{g_m}{C_1C_4Z_L}+\frac{2g_m}{C_1C_4R_4}+\frac{1}{C_1C_4R_1Z_L}+\frac{2}{C_1C_4R_1R_4}}}$

K-LP: $\dfrac{R_1R_4Z_Lg_m}{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L}$

K-HP: 0

K-BP: 0

Qz: None

Wz: None

5 BS

5.1 BS-1 $Z(s)=\left(R_1,\ \infty,\ \infty,\ L_4s+\dfrac{1}{C_4s},\ \infty\right)$

$$H(s)=\frac{C_4L_4R_1Z_Lg_ms^2+R_1Z_Lg_m}{R_1g_m+s^2\left(C_4L_4R_1g_m+C_4L_4\right)+s\left(2C_4R_1Z_Lg_m+2C_4Z_L\right)+1}$$

Parameters:

Q: $\dfrac{L_4\sqrt{\frac{1}{C_4L_4}}}{2Z_L}$

wo: $\sqrt{\dfrac{1}{C_4L_4}}$

bandwidth: $\dfrac{2Z_L}{L_4}$

K-LP: $\dfrac{R_1Z_Lg_m}{R_1g_m+1}$

K-HP: $\dfrac{R_1Z_Lg_m}{R_1g_m+1}$

K-BP: 0

Qz: None

Wz: $\sqrt{\dfrac{1}{C_4L_4}}$

5.2 BS-2 $Z(s)=\left(R_1,\ \infty,\ \infty,\ \dfrac{R_4\left(C_4L_4s^2+1\right)}{C_4L_4s^2+C_4R_4s+1},\ \infty\right)$

$$H(s)=\frac{C_4L_4R_1R_4Z_Lg_ms^2+R_1R_4Z_Lg_m}{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L+s^2\left(C_4L_4R_1R_4g_m+2C_4L_4R_1Z_Lg_m+C_4L_4R_4+2C_4L_4Z_L\right)+s\left(2C_4R_1R_4Z_Lg_m+2C_4R_4Z_L\right)}$$

Parameters:

Q: $\dfrac{L_4R_4\sqrt{\frac{1}{C_4L_4}}+2L_4Z_L\sqrt{\frac{1}{C_4L_4}}}{2R_4Z_L}$

wo: $\sqrt{\dfrac{1}{C_4L_4}}$

bandwidth: $\dfrac{2R_4Z_L\sqrt{\frac{1}{C_4L_4}}}{L_4R_4\sqrt{\frac{1}{C_4L_4}}+2L_4Z_L\sqrt{\frac{1}{C_4L_4}}}$

K-LP: $\dfrac{R_1R_4Z_Lg_m}{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L}$

K-HP: $\dfrac{R_1R_4Z_Lg_m}{R_1R_4g_m+2R_1Z_Lg_m+R_4+2Z_L}$

K-BP: 0

Qz: None

Wz: $\sqrt{\dfrac{1}{C_4L_4}}$

5.3 BS-3 $Z(s)=\left(L_1s+\dfrac{1}{C_1s},\ \infty,\ \infty,\ R_4,\ \infty\right)$

$$H(s)=\frac{C_1L_1R_4Z_Lg_ms^2+R_4Z_Lg_m}{R_4g_m+2Z_Lg_m+s^2\left(C_1L_1R_4g_m+2C_1L_1Z_Lg_m\right)+s\left(C_1R_4+2C_1Z_L\right)}$$

Parameters:

Q: $L_1g_m\sqrt{\dfrac{1}{C_1L_1}}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{1}{L_1 g_m}$

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

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

K-BP: 0

Qz: None

Wz: $\sqrt{\frac{1}{C_1 L_1}}$

5.4   BS-4 $Z(s) = \left(\frac{R_1\left(C_1 L_1 s^2 + 1\right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_4 Z_L g_m s^2 + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L + s^2\left(C_1 L_1 R_1 R_4 g_m + 2C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2C_1 L_1 Z_L\right) + s\left(C_1 R_1 R_4 + 2C_1 R_1 Z_L\right)}$$

Parameters:

Q: $\frac{L_1 R_1 g_m \sqrt{\frac{1}{C_1 L_1}} + L_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{R_1 \sqrt{\frac{1}{C_1 L_1}}}{L_1 R_1 g_m \sqrt{\frac{1}{C_1 L_1}} + L_1 \sqrt{\frac{1}{C_1 L_1}}}$

K-LP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L}$

K-HP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L}$

K-BP: 0

Qz: None

Wz: $\sqrt{\frac{1}{C_1 L_1}}$

6   GE

6.1   GE-1 $Z(s) = \left(R_1, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 Z_L g_m s^2 + C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m}{R_1 g_m + s^2\left(C_4 L_4 R_1 g_m + C_4 L_4\right) + s\left(C_4 R_1 R_4 g_m + 2C_4 R_1 Z_L g_m + C_4 R_4 + 2C_4 Z_L\right) + 1}$$

Parameters:

Q: $\frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{R_4 + 2Z_L}$

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

bandwidth: $\frac{R_4 + 2Z_L}{L_4}$

K-LP: $\frac{R_1 Z_L g_m}{R_1 g_m + 1}$

K-HP: $\frac{R_1 Z_L g_m}{R_1 g_m + 1}$

K-BP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L}$

Qz: $\frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{R_4}$

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

6.2   GE-2 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 R_4 Z_L g_m s^2 + L_4 R_1 Z_L g_m s + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L + s^2\left(C_4 L_4 R_1 R_4 g_m + 2C_4 L_4 R_1 Z_L g_m + C_4 L_4 R_4 + 2C_4 L_4 Z_L\right) + s\left(L_4 R_1 g_m + L_4\right)}$$

Parameters:

Q: $C_4 R_4 \sqrt{\frac{1}{C_4 L_4}} + 2C_4 Z_L \sqrt{\frac{1}{C_4 L_4}}$

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

bandwidth: $\frac{\sqrt{\frac{1}{C_4 L_4}}}{C_4 R_4 \sqrt{\frac{1}{C_4 L_4}} + 2 C_4 Z_L \sqrt{\frac{1}{C_4 L_4}}}$

K-LP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$

K-HP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$

K-BP: $\frac{R_1 Z_L g_m}{R_1 g_m + 1}$

Qz: $C_4 R_4 \sqrt{\frac{1}{C_4 L_4}}$

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

6.3 GE-3 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_4 Z_L g_m s^2 + C_1 R_1 R_4 Z_L g_m s + R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s^2 \left(C_1 L_1 R_4 g_m + 2 C_1 L_1 Z_L g_m \right) + s \left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + C_1 R_4 + 2 C_1 Z_L \right)}$$

Parameters:

Q: $\frac{L_1 g_m \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{R_1 g_m + 1}{L_1 g_m}$

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

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

K-BP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$

Qz: $\frac{L_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1}$

Wz: $\sqrt{\frac{1}{C_1 L_1}}$

6.4 GE-4 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_4 Z_L g_m s^2 + L_1 R_4 Z_L g_m s + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^2 \left(C_1 L_1 R_1 R_4 g_m + 2 C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2 C_1 L_1 Z_L \right) + s \left(L_1 R_4 g_m + 2 L_1 Z_L g_m \right)}$$

Parameters:

Q: $\frac{C_1 R_1 g_m \sqrt{\frac{1}{C_1 L_1}} + C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m}$

wo: $\sqrt{\frac{1}{C_1 L_1}}$

bandwidth: $\frac{g_m \sqrt{\frac{1}{C_1 L_1}}}{C_1 R_1 g_m \sqrt{\frac{1}{C_1 L_1}} + C_1 \sqrt{\frac{1}{C_1 L_1}}}$

K-LP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$

K-HP: $\frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$

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

Qz: $C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}$

Wz: $\sqrt{\frac{1}{C_1 L_1}}$

7 AP

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(L_1 s,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 R_4 Z_L g_m s^2 + L_1 Z_L g_m s}{s^2 \left(C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m\right) + s \left(C_4 R_4 + 2 C_4 Z_L + L_1 g_m\right) + 1}$$

Parameters:

Q: $\dfrac{C_4 L_1 R_4 g_m \sqrt{\frac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}} + 2 C_4 L_1 Z_L g_m \sqrt{\frac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}}}{C_4 R_4 + 2 C_4 Z_L + L_1 g_m}$

wo: $\sqrt{\dfrac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}}$

bandwidth: $\dfrac{(C_4 R_4 + 2 C_4 Z_L + L_1 g_m) \sqrt{\frac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}}}{C_4 L_1 R_4 g_m \sqrt{\frac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}} + 2 C_4 L_1 Z_L g_m \sqrt{\frac{1}{C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m}}}$

K-LP: 0
K-HP: $\frac{R_4 Z_L}{R_4 + 2 Z_L}$
K-BP: $\frac{L_1 Z_L g_m}{C_4 R_4 + 2 C_4 Z_L + L_1 g_m}$
Qz: None
Wz: None

8.2 INVALID-NUMER-2 $Z(s) = \left(\frac{1}{C_1 s},\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 R_4 Z_L g_m s + Z_L g_m}{g_m + s^2 \left(C_1 C_4 R_4 + 2 C_1 C_4 Z_L\right) + s \left(C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{C_1 C_4 R_4 \sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}} + 2 C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}}}{C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m}$

wo: $\sqrt{\dfrac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}}$

bandwidth: $\dfrac{\sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}} (C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m)}{C_1 C_4 R_4 \sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}} + 2 C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L}}}$

K-LP: Z_L
K-HP: 0
K-BP: $\frac{C_4 R_4 Z_L g_m}{C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m}$
Qz: None
Wz: None

8.3 INVALID-NUMER-3 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1},\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m}{R_1 g_m + s^2 \left(C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L\right) + s \left(C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L\right) + 1}$$

Parameters:

Q: $\dfrac{C_1 C_4 R_1 R_4 \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + 2 C_1 C_4 R_1 Z_L \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}}}{C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L}$

wo: $\sqrt{\dfrac{R_1 g_m + 1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}}$

bandwidth: $\dfrac{\sqrt{\frac{R_1 g_m + 1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} (C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L)}{C_1 C_4 R_1 R_4 \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + 2 C_1 C_4 R_1 Z_L \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}}}$

K-LP: $\frac{R_1 Z_L g_m}{R_1 g_m + 1}$
K-HP: 0

K-BP: $\dfrac{C_4 R_1 R_4 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_4 + 2 C_1 C_4 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}}}{C_1 R_1 \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + C_4 R_1 R_4 g_m \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + 2 C_4 R_1 Z_L g_m \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + C_4 R_4 \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}} + 2 C_4 Z_L \sqrt{\frac{R_1 g_m}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L} + \frac{1}{C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L}}}$

Qz: None
Wz: None

8.4 INVALID-NUMER-4 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 R_1 Z_L g_m s + Z_L g_m}{g_m + s^2 \left(2C_1 C_4 R_1 Z_L g_m + 2C_1 C_4 Z_L\right) + s\left(C_1 R_1 g_m + C_1 + 2C_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{\sqrt{2}C_1 C_4 R_1 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 Z_L g_m + C_1 C_4 Z_L}} + \sqrt{2}C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_1 Z_L g_m + C_1 C_4 Z_L}}}{C_1 R_1 g_m + C_1 + 2C_4 Z_L g_m}$

wo: $\sqrt{\dfrac{g_m}{2C_1 C_4 R_1 Z_L g_m + 2C_1 C_4 Z_L}}$

bandwidth: $\dfrac{\sqrt{\frac{g_m}{2C_1 C_4 R_1 Z_L g_m + 2C_1 C_4 Z_L}}\left(C_1 R_1 g_m + C_1 + 2C_4 Z_L g_m\right)}{\sqrt{2}C_1 C_4 R_1 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 Z_L g_m + C_1 C_4 Z_L}} + \sqrt{2}C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_1 Z_L g_m + C_1 C_4 Z_L}}}$

K-LP: Z_L

K-HP: 0

K-BP: $\dfrac{C_1 R_1 Z_L g_m}{C_1 R_1 g_m + C_1 + 2C_4 Z_L g_m}$

Qz: None

Wz: None

8.5 INVALID-NUMER-5 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 R_1 R_4 Z_L g_m s + R_4 Z_L g_m}{R_4 g_m + 2Z_L g_m + s^2\left(2C_1 C_4 R_1 R_4 Z_L g_m + 2C_1 C_4 R_4 Z_L\right) + s\left(C_1 R_1 R_4 g_m + 2C_1 R_1 Z_L g_m + C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{\sqrt{2}C_1 C_4 R_1 R_4 Z_L g_m \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + \sqrt{2}C_1 C_4 R_4 Z_L \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}}}{C_1 R_1 R_4 g_m + 2C_1 R_1 Z_L g_m + C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m}$

wo: $\sqrt{\dfrac{R_4 g_m + 2Z_L g_m}{2C_1 C_4 R_1 R_4 Z_L g_m + 2C_1 C_4 R_4 Z_L}}$

bandwidth: $\dfrac{\sqrt{\frac{R_4 g_m + 2Z_L g_m}{2C_1 C_4 R_1 R_4 Z_L g_m + 2C_1 C_4 R_4 Z_L}}\left(C_1 R_1 R_4 g_m + 2C_1 R_1 Z_L g_m + C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m\right)}{\sqrt{2}C_1 C_4 R_1 R_4 Z_L g_m \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + \sqrt{2}C_1 C_4 R_4 Z_L \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}}}$

K-LP: $\dfrac{R_4 Z_L}{R_4 + 2Z_L}$

K-HP: 0

K-BP: $\dfrac{C_1 R_1 R_4 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 Z_L g_m + C_1 C_4 Z_L} + \frac{2g_m}{C_1 C_4 R_1 R_4 g_m + C_1 C_4 R_4}}}{C_1 R_1 R_4 g_m \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + 2C_1 R_1 Z_L g_m \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + C_1 R_4 \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + 2C_1 Z_L \sqrt{\frac{R_4 g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L} + \frac{2Z_L g_m}{C_1 C_4 R_1 R_4 Z_L g_m + C_1 C_4 R_4 Z_L}} + 2C_4 R_4 Z_L g_m \sqrt{\frac{R_4}{C_1 C_4 R_1 R_4 Z_L}}}$

Qz: None

Wz: None

9 INVALID-WZ

9.1 INVALID-WZ-1 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 R_1 R_4 Z_L g_m s^2 + Z_L g_m + s\left(C_1 R_1 Z_L g_m + C_4 R_4 Z_L g_m\right)}{g_m + s^2\left(C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L\right) + s\left(C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2C_4 Z_L g_m\right)}$$

Parameters:

Q: $\dfrac{C_1 C_4 R_1 R_4 g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + 2C_1 C_4 R_1 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + C_1 C_4 R_4 \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + 2C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}}}{C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2C_4 Z_L g_m}$

wo: $\sqrt{\dfrac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}}$

bandwidth: $\dfrac{\sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}}\left(C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2C_4 Z_L g_m\right)}{C_1 C_4 R_1 R_4 g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + 2C_1 C_4 R_1 Z_L g_m \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + C_1 C_4 R_4 \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}} + 2C_1 C_4 Z_L \sqrt{\frac{g_m}{C_1 C_4 R_1 R_4 g_m + 2C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2C_1 C_4 Z_L}}}$

K-LP: Z_L

K-HP: $\dfrac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L}$

K-BP: $\dfrac{C_1 R_1 Z_L g_m + C_4 R_4 Z_L g_m}{C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2C_4 Z_L g_m}$

Qz: None

Wz: $\sqrt{\dfrac{1}{C_1 C_4 R_1 R_4}}$

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (R_1,\ \infty,\ \infty,\ R_4,\ \infty)$

$$H(s) = \frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L}$$

10.2 INVALID-ORDER-2 $Z(s) = \left(R_1,\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{R_1 Z_L g_m}{R_1 g_m + s\left(2 C_4 R_1 Z_L g_m + 2 C_4 Z_L\right) + 1}$$

10.3 INVALID-ORDER-3 $Z(s) = \left(R_1,\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s + 1},\ \infty\right)$

$$H(s) = \frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s\left(2 C_4 R_1 R_4 Z_L g_m + 2 C_4 R_4 Z_L\right)}$$

10.4 INVALID-ORDER-4 $Z(s) = \left(R_1,\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m}{R_1 g_m + s\left(C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L\right) + 1}$$

10.5 INVALID-ORDER-5 $Z(s) = (L_1 s,\ \infty,\ \infty,\ R_4,\ \infty)$

$$H(s) = \frac{L_1 R_4 Z_L g_m s}{R_4 + 2 Z_L + s\left(L_1 R_4 g_m + 2 L_1 Z_L g_m\right)}$$

10.6 INVALID-ORDER-6 $Z(s) = \left(L_1 s,\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 Z_L g_m s^3 + L_1 Z_L g_m s}{C_4 L_1 L_4 g_m s^3 + s^2\left(2 C_4 L_1 Z_L g_m + C_4 L_4\right) + s\left(2 C_4 Z_L + L_1 g_m\right) + 1}$$

10.7 INVALID-ORDER-7 $Z(s) = \left(L_1 s,\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{L_1 L_4 Z_L g_m s^2}{2 C_4 L_1 L_4 Z_L g_m s^3 + 2 Z_L + s^2\left(2 C_4 L_4 Z_L + L_1 L_4 g_m\right) + s\left(2 L_1 Z_L g_m + L_4\right)}$$

10.8 INVALID-ORDER-8 $Z(s) = \left(L_1 s,\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 Z_L g_m s^3 + C_4 L_1 R_4 Z_L g_m s^2 + L_1 Z_L g_m s}{C_4 L_1 L_4 g_m s^3 + s^2\left(C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m + C_4 L_4\right) + s\left(C_4 R_4 + 2 C_4 Z_L + L_1 g_m\right) + 1}$$

10.9 INVALID-ORDER-9 $Z(s) = \left(L_1 s,\ \infty,\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty\right)$

$$H(s) = \frac{L_1 L_4 R_4 Z_L g_m s^2}{2 C_4 L_1 L_4 R_4 Z_L g_m s^3 + 2 R_4 Z_L + s^2\left(2 C_4 L_4 R_4 Z_L + L_1 L_4 R_4 g_m + 2 L_1 L_4 Z_L g_m\right) + s\left(2 L_1 R_4 Z_L g_m + L_4 R_4 + 2 L_4 Z_L\right)}$$

10.10 INVALID-ORDER-10 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_4 Z_L g_m s^3 + L_1 L_4 Z_L g_m s^2 + L_1 R_4 Z_L g_m s}{R_4 + 2Z_L + s^3 \left(C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_4 L_4 R_4 + 2 C_4 L_4 Z_L + L_1 L_4 g_m \right) + s \left(L_1 R_4 g_m + 2 L_1 Z_L g_m + L_4 \right)}$$

10.11 INVALID-ORDER-11 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_4 Z_L g_m s^3 + L_1 R_4 Z_L g_m s}{R_4 + 2Z_L + s^3 \left(C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(2 C_4 L_1 R_4 Z_L g_m + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m \right)}$$

10.12 INVALID-ORDER-12 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s \left(C_1 R_4 + 2 C_1 Z_L \right)}$$

10.13 INVALID-ORDER-13 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 Z_L g_m s^2 + Z_L g_m}{C_1 C_4 L_4 s^3 + g_m + s^2 \left(2 C_1 C_4 Z_L + C_4 L_4 g_m \right) + s \left(C_1 + 2 C_4 Z_L g_m \right)}$$

10.14 INVALID-ORDER-14 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{L_4 Z_L g_m s}{2 C_1 C_4 L_4 Z_L s^3 + 2 Z_L g_m + s^2 \left(C_1 L_4 + 2 C_4 L_4 Z_L g_m \right) + s \left(2 C_1 Z_L + L_4 g_m \right)}$$

10.15 INVALID-ORDER-15 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 Z_L g_m s^2 + C_4 R_4 Z_L g_m s + Z_L g_m}{C_1 C_4 L_4 s^3 + g_m + s^2 \left(C_1 C_4 R_4 + 2 C_1 C_4 Z_L + C_4 L_4 g_m \right) + s \left(C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m \right)}$$

10.16 INVALID-ORDER-16 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{L_4 R_4 Z_L g_m s}{2 C_1 C_4 L_4 R_4 Z_L s^3 + 2 R_4 Z_L g_m + s^2 \left(C_1 L_4 R_4 + 2 C_1 L_4 Z_L + 2 C_4 L_4 R_4 Z_L g_m \right) + s \left(2 C_1 R_4 Z_L + L_4 R_4 g_m + 2 L_4 Z_L g_m \right)}$$

10.17 INVALID-ORDER-17 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_4 Z_L g_m s^2 + L_4 Z_L g_m s + R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s^3 \left(C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L \right) + s^2 \left(C_1 L_4 + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m \right) + s \left(C_1 R_4 + 2 C_1 Z_L + L_4 g_m \right)}$$

10.18 INVALID-ORDER-18 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_4 Z_L g_m s^2 + R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s^3 \left(C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L \right) + s^2 \left(2 C_1 C_4 R_4 Z_L + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m \right) + s \left(C_1 R_4 + 2 C_1 Z_L + 2 C_4 R_4 Z_L g_m \right)}$$

10.19 **INVALID-ORDER-19** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s \left(C_1 R_1 R_4 + 2 C_1 R_1 Z_L \right)}$$

10.20 **INVALID-ORDER-20** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 Z_L g_m s^2 + R_1 Z_L g_m}{C_1 C_4 L_4 R_1 s^3 + R_1 g_m + s^2 \left(2 C_1 C_4 R_1 Z_L + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(C_1 R_1 + 2 C_4 R_1 Z_L g_m + 2 C_4 Z_L \right) + 1}$$

10.21 **INVALID-ORDER-21** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{L_4 R_1 Z_L g_m s}{2 C_1 C_4 L_4 R_1 Z_L s^3 + 2 R_1 Z_L g_m + 2 Z_L + s^2 \left(C_1 L_4 R_1 + 2 C_4 L_4 R_1 Z_L g_m + 2 C_4 L_4 Z_L \right) + s \left(2 C_1 R_1 Z_L + L_4 R_1 g_m + L_4 \right)}$$

10.22 **INVALID-ORDER-22** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 Z_L g_m s^2 + C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m}{C_1 C_4 L_4 R_1 s^3 + R_1 g_m + s^2 \left(C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L \right) + 1}$$

10.23 **INVALID-ORDER-23** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{L_4 R_1 R_4 Z_L g_m s}{2 C_1 C_4 L_4 R_1 R_4 Z_L s^3 + 2 R_1 R_4 Z_L g_m + 2 R_4 Z_L + s^2 \left(C_1 L_4 R_1 R_4 + 2 C_1 L_4 R_1 Z_L + 2 C_4 L_4 R_1 R_4 Z_L g_m + 2 C_4 L_4 R_4 Z_L \right) + s \left(2 C_1 R_1 R_4 Z_L + L_4 R_1 R_4 g_m + 2 L_4 R_1 Z_L g_m + L_4 R_4 + 2 L_4 Z_L \right)}$$

10.24 **INVALID-ORDER-24** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 R_4 Z_L g_m s^2 + L_4 R_1 Z_L g_m s + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^3 \left(C_1 C_4 L_4 R_1 R_4 + 2 C_1 C_4 L_4 R_1 Z_L \right) + s^2 \left(C_1 L_4 R_1 + C_4 L_4 R_1 R_4 g_m + 2 C_4 L_4 R_1 Z_L g_m + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(C_1 R_1 R_4 + 2 C_1 R_1 Z_L + L_4 R_1 g_m + L_4 \right)}$$

10.25 **INVALID-ORDER-25** $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_4 R_1 R_4 Z_L g_m s^2 + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^3 \left(C_1 C_4 L_4 R_1 R_4 + 2 C_1 C_4 L_4 R_1 Z_L \right) + s^2 \left(2 C_1 C_4 R_1 R_4 Z_L + C_4 L_4 R_1 R_4 g_m + 2 C_4 L_4 R_1 Z_L g_m + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(C_1 R_1 R_4 + 2 C_1 R_1 Z_L + 2 C_4 R_1 R_4 Z_L g_m + 2 C_4 R_4 Z_L \right)}$$

10.26 **INVALID-ORDER-26** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4, \ \infty \right)$

$$H(s) = \frac{C_1 R_1 R_4 Z_L g_m s + R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s \left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + C_1 R_4 + 2 C_1 Z_L \right)}$$

10.27 **INVALID-ORDER-27** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_4 R_1 Z_L g_m s^3 + C_1 R_1 Z_L g_m s + C_4 L_4 Z_L g_m s^2 + Z_L g_m}{g_m + s^3 \left(C_1 C_4 L_4 R_1 g_m + C_1 C_4 L_4 \right) + s^2 \left(2 C_1 C_4 R_1 Z_L g_m + 2 C_1 C_4 Z_L + C_4 L_4 g_m \right) + s \left(C_1 R_1 g_m + C_1 + 2 C_4 Z_L g_m \right)}$$

10.28 **INVALID-ORDER-28** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_4 R_1 Z_L g_m s^2 + L_4 Z_L g_m s}{2 Z_L g_m + s^3 \left(2 C_1 C_4 L_4 R_1 Z_L g_m + 2 C_1 C_4 L_4 Z_L \right) + s^2 \left(C_1 L_4 R_1 g_m + C_1 L_4 + 2 C_4 L_4 Z_L g_m \right) + s \left(2 C_1 R_1 Z_L g_m + 2 C_1 Z_L + L_4 g_m \right)}$$

10.29 **INVALID-ORDER-29** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_4 R_1 Z_L g_m s^3 + Z_L g_m + s^2\left(C_1 C_4 R_1 R_4 Z_L g_m + C_4 L_4 Z_L g_m\right) + s\left(C_1 R_1 Z_L g_m + C_4 R_4 Z_L g_m\right)}{g_m + s^3\left(C_1 C_4 L_4 R_1 g_m + C_1 C_4 L_4\right) + s^2\left(C_1 C_4 R_1 R_4 g_m + 2 C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2 C_1 C_4 Z_L + C_4 L_4 g_m\right) + s\left(C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m\right)}$$

10.30 **INVALID-ORDER-30** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty\right)$

$$H(s) = \frac{C_1 L_4 R_1 R_4 Z_L g_m s^2 + L_4 R_4 Z_L g_m s}{2 R_4 Z_L g_m + s^3\left(2 C_1 C_4 L_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_4 R_4 Z_L\right) + s^2\left(C_1 L_4 R_1 R_4 g_m + 2 C_1 L_4 R_1 Z_L g_m + C_1 L_4 R_4 + 2 C_1 L_4 Z_L + 2 C_4 L_4 R_4 Z_L g_m\right) + s\left(2 C_1 R_1 R_4 Z_L g_m + 2 C_1 R_4 Z_L + L_4 R_4 g_m + 2 L_4 Z_L g_m\right)}$$

10.31 **INVALID-ORDER-31** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_4 R_1 R_4 Z_L g_m s^3 + R_4 Z_L g_m + s^2\left(C_1 L_4 R_1 Z_L g_m + C_4 L_4 R_4 Z_L g_m\right) + s\left(C_1 R_1 R_4 Z_L g_m + L_4 Z_L g_m\right)}{R_4 g_m + 2 Z_L g_m + s^3\left(C_1 C_4 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_4 R_1 Z_L g_m + C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L\right) + s^2\left(C_1 L_4 R_1 g_m + C_1 L_4 + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m\right) + s\left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + C_1 R_4 + 2 C_1 Z_L + L_4 g_m\right)}$$

10.32 **INVALID-ORDER-32** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4\left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_4 R_1 R_4 Z_L g_m s^3 + C_1 R_1 R_4 Z_L g_m s + C_4 L_4 R_4 Z_L g_m s^2 + R_4 Z_L g_m}{R_4 g_m + 2 Z_L g_m + s^3\left(C_1 C_4 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_4 R_1 Z_L g_m + C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L\right) + s^2\left(2 C_1 C_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 R_4 Z_L + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m\right) + s\left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + C_1 R_4 + 2 C_1 Z_L + 2 C_4 R_4 Z_L g_m\right)}$$

10.33 **INVALID-ORDER-33** $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 L_1 Z_L g_m s^2 + Z_L g_m}{2 C_1 C_4 L_1 Z_L g_m s^3 + g_m + s^2\left(2 C_1 C_4 Z_L + C_1 L_1 g_m\right) + s\left(C_1 + 2 C_4 Z_L g_m\right)}$$

10.34 **INVALID-ORDER-34** $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 L_1 R_4 Z_L g_m s^2 + R_4 Z_L g_m}{2 C_1 C_4 L_1 R_4 Z_L g_m s^3 + R_4 g_m + 2 Z_L g_m + s^2\left(2 C_1 C_4 R_4 Z_L + C_1 L_1 R_4 g_m + 2 C_1 L_1 Z_L g_m\right) + s\left(C_1 R_4 + 2 C_1 Z_L + 2 C_4 R_4 Z_L g_m\right)}$$

10.35 **INVALID-ORDER-35** $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 R_4 Z_L g_m s^3 + C_1 L_1 Z_L g_m s^2 + C_4 R_4 Z_L g_m s + Z_L g_m}{g_m + s^3\left(C_1 C_4 L_1 R_4 g_m + 2 C_1 C_4 L_1 Z_L g_m\right) + s^2\left(C_1 C_4 R_4 + 2 C_1 C_4 Z_L + C_1 L_1 g_m\right) + s\left(C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m\right)}$$

10.36 **INVALID-ORDER-36** $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 Z_L g_m s^4 + Z_L g_m + s^2\left(C_1 L_1 Z_L g_m + C_4 L_4 Z_L g_m\right)}{C_1 C_4 L_1 L_4 g_m s^4 + g_m + s^3\left(2 C_1 C_4 L_1 L_4 Z_L g_m + C_1 C_4 L_4\right) + s^2\left(2 C_1 C_4 Z_L + C_1 L_1 g_m + C_4 L_4 g_m\right) + s\left(C_1 + 2 C_4 Z_L g_m\right)}$$

10.37 **INVALID-ORDER-37** $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 L_1 L_4 Z_L g_m s^3 + L_4 Z_L g_m s}{2 C_1 C_4 L_1 L_4 Z_L g_m s^4 + 2 Z_L g_m + s^3\left(2 C_1 C_4 L_4 Z_L + C_1 L_1 L_4 g_m\right) + s^2\left(2 C_1 L_1 Z_L g_m + C_1 L_4 + 2 C_4 L_4 Z_L g_m\right) + s\left(2 C_1 Z_L + L_4 g_m\right)}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 Z_L g_m s^4 + C_1 C_4 L_1 R_4 Z_L g_m s^3 + C_4 R_4 Z_L g_m s + Z_L g_m + s^2 \left(C_1 L_1 Z_L g_m + C_4 L_4 Z_L g_m\right)}{C_1 C_4 L_1 L_4 g_m s^4 + g_m + s^3 \left(C_1 C_4 L_1 R_4 g_m + 2C_1 C_4 L_1 Z_L g_m + C_1 C_4 L_4\right) + s^2 \left(C_1 C_4 R_4 + 2C_1 C_4 Z_L + C_1 L_1 g_m + C_4 L_4 g_m\right) + s \left(C_1 + C_4 R_4 g_m + 2C_4 Z_L g_m\right)}$$

10.39 INVALID-ORDER-39 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty\right)$

$$H(s) = \frac{C_1 L_1 L_4 R_4 Z_L g_m s^3 + L_4 R_4 Z_L g_m s}{2C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + 2R_4 Z_L g_m + s^3 \left(2C_1 C_4 L_4 R_4 Z_L + C_1 L_1 L_4 R_4 g_m + 2C_1 L_1 L_4 Z_L g_m\right) + s^2 \left(2C_1 L_1 R_4 Z_L g_m + C_1 L_4 R_4 + 2C_1 L_4 Z_L + 2C_4 L_4 R_4 Z_L g_m\right) + s \left(2C_1 R_4 Z_L + L_4 R_4 g_m + 2L_4 Z_L g_m\right)}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + C_1 L_1 L_4 Z_L g_m s^3 + L_4 Z_L g_m s + R_4 Z_L g_m + s^2 \left(C_1 L_1 R_4 Z_L g_m + C_4 L_4 R_4 Z_L g_m\right)}{R_4 g_m + 2Z_L g_m + s^4 \left(C_1 C_4 L_1 L_4 R_4 g_m + 2C_1 C_4 L_1 L_4 Z_L g_m\right) + s^3 \left(C_1 C_4 L_4 R_4 + 2C_1 C_4 L_4 Z_L + C_1 L_1 L_4 g_m\right) + s^2 \left(C_1 L_1 R_4 g_m + 2C_1 L_1 Z_L g_m + C_1 L_4 + C_4 L_4 R_4 g_m + 2C_4 L_4 Z_L g_m\right) + s \left(C_1 R_4 + 2C_1 Z_L + L_4 g_m\right)}$$

10.41 INVALID-ORDER-41 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4\left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + R_4 Z_L g_m + s^2 \left(C_1 L_1 R_4 Z_L g_m + C_4 L_4 R_4 Z_L g_m\right)}{R_4 g_m + 2Z_L g_m + s^4 \left(C_1 C_4 L_1 L_4 R_4 g_m + 2C_1 C_4 L_1 L_4 Z_L g_m\right) + s^3 \left(2C_1 C_4 L_1 R_4 Z_L g_m + C_1 C_4 L_4 R_4 + 2C_1 C_4 L_4 Z_L\right) + s^2 \left(2C_1 C_4 R_4 Z_L + C_1 L_1 R_4 g_m + 2C_1 L_1 Z_L g_m + C_4 L_4 R_4 g_m + 2C_4 L_4 Z_L g_m\right) + s \left(C_1 R_4 + 2C_1 Z_L + 2C_4 R_4 Z_L g_m\right)}$$

10.42 INVALID-ORDER-42 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{L_1 Z_L g_m s}{2C_1 C_4 L_1 Z_L s^3 + s^2 \left(C_1 L_1 + 2C_4 L_1 Z_L g_m\right) + s \left(2C_4 Z_L + L_1 g_m\right) + 1}$$

10.43 INVALID-ORDER-43 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty\right)$

$$H(s) = \frac{L_1 R_4 Z_L g_m s}{2C_1 C_4 L_1 R_4 Z_L s^3 + R_4 + 2Z_L + s^2 \left(C_1 L_1 R_4 + 2C_1 L_1 Z_L + 2C_4 L_1 R_4 Z_L g_m\right) + s \left(2C_4 R_4 Z_L + L_1 R_4 g_m + 2L_1 Z_L g_m\right)}$$

10.44 INVALID-ORDER-44 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_4 L_1 R_4 Z_L g_m s^2 + L_1 Z_L g_m s}{s^3 \left(C_1 C_4 L_1 R_4 + 2C_1 C_4 L_1 Z_L\right) + s^2 \left(C_1 L_1 + C_4 L_1 R_4 g_m + 2C_4 L_1 Z_L g_m\right) + s \left(C_4 R_4 + 2C_4 Z_L + L_1 g_m\right) + 1}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 Z_L g_m s^3 + L_1 Z_L g_m s}{C_1 C_4 L_1 L_4 s^4 + s^3 \left(2C_1 C_4 L_1 Z_L + C_4 L_1 L_4 g_m\right) + s^2 \left(C_1 L_1 + 2C_4 L_1 Z_L g_m + C_4 L_4\right) + s \left(2C_4 Z_L + L_1 g_m\right) + 1}$$

10.46 INVALID-ORDER-46 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty\right)$

$$H(s) = \frac{L_1 L_4 Z_L g_m s^2}{2C_1 C_4 L_1 L_4 Z_L s^4 + 2Z_L + s^3 \left(C_1 L_1 L_4 + 2C_4 L_1 L_4 Z_L g_m\right) + s^2 \left(2C_1 L_1 Z_L + 2C_4 L_4 Z_L + L_1 L_4 g_m\right) + s \left(2L_1 Z_L g_m + L_4\right)}$$

10.47 INVALID-ORDER-47 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 Z_L g_m s^3 + C_4 L_1 R_4 Z_L g_m s^2 + L_1 Z_L g_m s}{C_1 C_4 L_1 L_4 s^4 + s^3 \left(C_1 C_4 L_1 R_4 + 2C_1 C_4 L_1 Z_L + C_4 L_1 L_4 g_m\right) + s^2 \left(C_1 L_1 + C_4 L_1 R_4 g_m + 2C_4 L_1 Z_L g_m + C_4 L_4\right) + s \left(C_4 R_4 + 2C_4 Z_L + L_1 g_m\right) + 1}$$

10.48 **INVALID-ORDER-48** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{L_1 L_4 R_4 Z_L g_m s^2}{2 C_1 C_4 L_1 L_4 R_4 Z_L s^4 + 2 R_4 Z_L + s^3 \left(C_1 L_1 L_4 R_4 + 2 C_1 L_1 L_4 Z_L + 2 C_4 L_1 L_4 R_4 Z_L g_m \right) + s^2 \left(2 C_1 L_1 R_4 Z_L + 2 C_4 L_4 R_4 Z_L + L_1 L_4 R_4 g_m + 2 L_1 L_4 Z_L g_m \right) + s \left(2 L_1 R_4 Z_L g_m + L_4 R_4 + 2 L_4 Z_L \right)}$$

10.49 **INVALID-ORDER-49** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_4 Z_L g_m s^3 + L_1 L_4 Z_L g_m s^2 + L_1 R_4 Z_L g_m s}{R_4 + 2 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_4 + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(C_1 L_1 L_4 + C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_4 + 2 C_1 L_1 Z_L + C_4 L_4 R_4 + 2 C_4 L_4 Z_L + L_1 L_4 g_m \right) + s \left(L_1 R_4 g_m + 2 L_1 Z_L g_m + L_4 \right)}$$

10.50 **INVALID-ORDER-50** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_4 Z_L g_m s^3 + L_1 R_4 Z_L g_m s}{R_4 + 2 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_4 + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(2 C_1 C_4 L_1 R_4 Z_L + C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_4 + 2 C_1 L_1 Z_L + 2 C_1 L_1 R_4 Z_L g_m + C_4 L_4 R_4 + 2 C_4 L_4 Z_L \right) + s \left(2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m \right)}$$

10.51 **INVALID-ORDER-51** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 Z_L g_m s^2 + C_1 R_1 Z_L g_m s + Z_L g_m}{2 C_1 C_4 L_1 Z_L g_m s^3 + g_m + s^2 \left(2 C_1 C_4 R_1 Z_L g_m + 2 C_1 C_4 Z_L + C_1 L_1 g_m \right) + s \left(C_1 R_1 g_m + C_1 + 2 C_4 Z_L g_m \right)}$$

10.52 **INVALID-ORDER-52** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_4 Z_L g_m s^2 + C_1 R_1 R_4 Z_L g_m s + R_4 Z_L g_m}{2 C_1 C_4 L_1 R_4 Z_L g_m s^3 + R_4 g_m + 2 Z_L g_m + s^2 \left(2 C_1 C_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 R_4 Z_L + C_1 L_1 R_4 g_m + 2 C_1 L_1 Z_L g_m \right) + s \left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + C_1 R_4 + 2 C_1 Z_L + 2 C_4 R_4 Z_L g_m \right)}$$

10.53 **INVALID-ORDER-53** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 R_4 Z_L g_m s^3 + Z_L g_m + s^2 \left(C_1 C_4 R_1 R_4 Z_L g_m + C_1 L_1 Z_L g_m \right) + s \left(C_1 R_1 Z_L g_m + C_4 R_4 Z_L g_m \right)}{g_m + s^3 \left(C_1 C_4 L_1 R_4 g_m + 2 C_1 C_4 L_1 Z_L g_m \right) + s^2 \left(C_1 C_4 R_1 R_4 g_m + 2 C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2 C_1 C_4 Z_L + C_1 L_1 g_m \right) + s \left(C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m \right)}$$

10.54 **INVALID-ORDER-54** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 Z_L g_m s^4 + C_1 C_4 L_4 R_1 Z_L g_m s^3 + C_1 R_1 Z_L g_m s + Z_L g_m + s^2 \left(C_1 L_1 Z_L g_m + C_4 L_4 Z_L g_m \right)}{C_1 C_4 L_1 L_4 g_m s^4 + g_m + s^3 \left(2 C_1 C_4 L_1 Z_L g_m + C_1 C_4 L_4 R_1 g_m + C_1 C_4 L_4 \right) + s^2 \left(2 C_1 C_4 R_1 Z_L g_m + 2 C_1 C_4 Z_L + C_1 L_1 g_m + C_4 L_4 g_m \right) + s \left(C_1 R_1 g_m + C_1 + 2 C_4 Z_L g_m \right)}$$

10.55 **INVALID-ORDER-55** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 L_4 Z_L g_m s^3 + C_1 L_4 R_1 Z_L g_m s^2 + L_4 Z_L g_m s}{2 C_1 C_4 L_1 L_4 Z_L g_m s^4 + 2 Z_L g_m + s^3 \left(2 C_1 C_4 L_4 R_1 Z_L g_m + 2 C_1 C_4 L_4 Z_L + C_1 L_1 L_4 g_m \right) + s^2 \left(2 C_1 L_1 Z_L g_m + C_1 L_4 R_1 g_m + C_1 L_4 + 2 C_4 L_4 Z_L g_m \right) + s \left(2 C_1 R_1 Z_L g_m + 2 C_1 Z_L + L_4 g_m \right)}$$

10.56 **INVALID-ORDER-56** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 Z_L g_m s^4 + Z_L g_m + s^3 \left(C_1 C_4 L_1 R_4 Z_L g_m + C_1 C_4 L_4 R_1 Z_L g_m \right) + s^2 \left(C_1 C_4 R_1 R_4 Z_L g_m + C_1 L_1 Z_L g_m + C_4 L_4 Z_L g_m \right) + s \left(C_1 R_1 Z_L g_m + C_4 R_4 Z_L g_m \right)}{C_1 C_4 L_1 L_4 g_m s^4 + g_m + s^3 \left(C_1 C_4 L_1 R_4 g_m + 2 C_1 C_4 L_1 Z_L g_m + C_1 C_4 L_4 R_1 g_m + C_1 C_4 L_4 \right) + s^2 \left(C_1 C_4 R_1 R_4 g_m + 2 C_1 C_4 R_1 Z_L g_m + C_1 C_4 R_4 + 2 C_1 C_4 Z_L + C_1 L_1 g_m + C_4 L_4 g_m \right) + s \left(C_1 R_1 g_m + C_1 + C_4 R_4 g_m + 2 C_4 Z_L g_m \right)}$$

10.57 INVALID-ORDER-57 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty\right)$

$$H(s) = \frac{C_1 L_1 L_4 R_4 Z_L g_m s^3 + C_1 L_4 R_1 R_4 Z_L g_m s^2 + L_4 R_4 Z_L g_m s}{2 C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + 2 R_4 Z_L g_m + s^3 \left(2 C_1 C_4 L_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_4 R_4 Z_L + C_1 L_1 L_4 R_4 g_m + 2 C_1 L_1 L_4 Z_L g_m\right) + s^2 \left(2 C_1 L_1 R_4 Z_L g_m + C_1 L_4 R_1 R_4 g_m + 2 C_1 L_4 R_1 Z_L g_m + C_1 L_4 R_4 + 2 C_1 L_4 Z_L + 2 C_4 L_4 R_4 Z_L g_m\right) + s \left(2 C_1 R_1 R_4 Z_L g_m + 2 C_1 R_4 Z_L + L_4 R_4 g_m + 2\cdots\right)}$$

10.58 INVALID-ORDER-58 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + R_4 Z_L g_m + s^3 \left(C_1 C_4 L_4 R_1 R_4 Z_L g_m + C_1 L_1 L_4 Z_L g_m\right) + s^2 \left(C_1 L_1 R_4 Z_L g_m + C_1 L_4 R_1 Z_L g_m + C_4 L_4 R_4 Z_L g_m\right) + s \left(C_1 R_1 R_4 Z_L g_m + L_4 Z_L g_m\right)}{R_4 g_m + 2 Z_L g_m + s^4 \left(C_1 C_4 L_1 L_4 R_4 g_m + 2 C_1 C_4 L_1 L_4 Z_L g_m\right) + s^3 \left(C_1 C_4 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_4 R_1 Z_L g_m + C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L + C_1 L_1 L_4 g_m\right) + s^2 \left(C_1 L_1 R_4 g_m + 2 C_1 L_1 Z_L g_m + C_1 L_4 R_1 g_m + C_1 L_4 + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m\right) + s \left(C_1 R_1 R_4 g_m + 2 C_1 R_1 Z_L g_m + \cdots\right)}$$

10.59 INVALID-ORDER-59 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \frac{R_4\left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1},\ \infty\right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_4 Z_L g_m s^4 + C_1 C_4 L_4 R_1 R_4 Z_L g_m s^3 + C_1 R_1 R_4 Z_L g_m s + R_4 Z_L g_m + s^2 \left(C_1 L_1 R_4 Z_L g_m + C_4 L_4 R_4 Z_L g_m\right)}{R_4 g_m + 2 Z_L g_m + s^4 \left(C_1 C_4 L_1 L_4 R_4 g_m + 2 C_1 C_4 L_1 L_4 Z_L g_m\right) + s^3 \left(2 C_1 C_4 L_1 R_4 Z_L g_m + C_1 C_4 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_4 R_1 Z_L g_m + C_1 C_4 L_4 R_4 + 2 C_1 C_4 L_4 Z_L\right) + s^2 \left(2 C_1 C_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 R_4 Z_L + C_1 L_1 R_4 g_m + 2 C_1 L_1 Z_L g_m + C_4 L_4 R_4 g_m + 2 C_4 L_4 Z_L g_m\right) + s \left(C_1 R_1\cdots\right)}$$

10.60 INVALID-ORDER-60 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{L_1 R_1 Z_L g_m s}{2 C_1 C_4 L_1 R_1 Z_L s^3 + R_1 + s^2 \left(C_1 L_1 R_1 + 2 C_4 L_1 R_1 Z_L g_m + 2 C_4 L_1 Z_L\right) + s \left(2 C_4 R_1 Z_L + L_1 R_1 g_m + L_1\right)}$$

10.61 INVALID-ORDER-61 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ \frac{R_4}{C_4 R_4 s + 1},\ \infty\right)$

$$H(s) = \frac{L_1 R_1 R_4 Z_L g_m s}{2 C_1 C_4 L_1 R_1 R_4 Z_L s^3 + R_1 R_4 + 2 R_1 Z_L + s^2 \left(C_1 L_1 R_1 R_4 + 2 C_1 L_1 R_1 Z_L + 2 C_4 L_1 R_1 R_4 Z_L g_m + 2 C_4 L_1 R_1 Z_L\right) + s \left(2 C_4 R_1 R_4 Z_L + L_1 R_1 R_4 g_m + 2 L_1 R_1 Z_L g_m + L_1 R_4 + 2 L_1 Z_L\right)}$$

10.62 INVALID-ORDER-62 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 R_1 R_4 Z_L g_m s^2 + L_1 R_1 Z_L g_m s}{R_1 + s^3 \left(C_1 C_4 L_1 R_1 R_4 + 2 C_1 C_4 L_1 R_1 Z_L\right) + s^2 \left(C_1 L_1 R_1 + C_4 L_1 R_1 R_4 g_m + 2 C_4 L_1 R_1 Z_L g_m + C_4 L_1 R_4 + 2 C_4 L_1 Z_L\right) + s \left(C_4 R_1 R_4 + 2 C_4 R_1 Z_L + L_1 R_1 g_m + L_1\right)}$$

10.63 INVALID-ORDER-63 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ L_4 s + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 R_1 Z_L g_m s^3 + L_1 R_1 Z_L g_m s}{C_1 C_4 L_1 L_4 R_1 s^4 + R_1 + s^3 \left(2 C_1 C_4 L_1 R_1 Z_L + C_4 L_1 L_4 R_1 g_m + C_4 L_1 L_4\right) + s^2 \left(C_1 L_1 R_1 + 2 C_4 L_1 R_1 Z_L g_m + 2 C_4 L_1 Z_L + C_4 L_4 R_1\right) + s \left(2 C_4 R_1 Z_L + L_1 R_1 g_m + L_1\right)}$$

10.64 INVALID-ORDER-64 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ \frac{L_4 s}{C_4 L_4 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{L_1 L_4 R_1 Z_L g_m s^2}{2 C_1 C_4 L_1 L_4 R_1 Z_L s^4 + 2 R_1 Z_L + s^3 \left(C_1 L_1 L_4 R_1 + 2 C_4 L_1 L_4 R_1 Z_L g_m + 2 C_4 L_1 L_4 Z_L\right) + s^2 \left(2 C_1 L_1 R_1 Z_L + 2 C_4 L_4 R_1 Z_L + L_1 L_4 R_1 g_m + L_1 L_4\right) + s \left(2 L_1 R_1 Z_L g_m + 2 L_1 Z_L + L_4 R_1\right)}$$

10.65 INVALID-ORDER-65 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ L_4 s + R_4 + \frac{1}{C_4 s},\ \infty\right)$

$$H(s) = \frac{C_4 L_1 L_4 R_1 Z_L g_m s^3 + C_4 L_1 R_1 R_4 Z_L g_m s^2 + L_1 R_1 Z_L g_m s}{C_1 C_4 L_1 L_4 R_1 s^4 + R_1 + s^3 \left(C_1 C_4 L_1 R_1 R_4 + 2 C_1 C_4 L_1 R_1 Z_L + C_4 L_1 L_4 R_1 g_m + C_4 L_1 L_4\right) + s^2 \left(C_1 L_1 R_1 + C_4 L_1 R_1 R_4 g_m + 2 C_4 L_1 R_1 Z_L g_m + C_4 L_1 R_4 + 2 C_4 L_1 Z_L + C_4 L_4 R_1\right) + s \left(C_4 R_1 R_4 + 2 C_4 R_1 Z_L + L_1 R_1 g_m + L_1\right)}$$

10.66 INVALID-ORDER-66 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1},\ \infty,\ \infty,\ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4},\ \infty\right)$

$$H(s) = \frac{L_1 L_4 R_1 R_4 Z_L g_m s^2}{2 C_1 C_4 L_1 L_4 R_1 R_4 Z_L s^4 + 2 R_1 R_4 Z_L + s^3 \left(C_1 L_1 L_4 R_1 R_4 + 2 C_1 L_1 L_4 R_1 Z_L + 2 C_4 L_1 L_4 R_1 R_4 Z_L g_m + 2 C_4 L_1 L_4 R_4 Z_L\right) + s^2 \left(2 C_1 L_1 R_1 R_4 Z_L + 2 C_4 L_4 R_1 R_4 Z_L + L_1 L_4 R_1 R_4 g_m + 2 L_1 L_4 R_1 Z_L g_m + L_1 L_4 R_4 + 2 L_1 L_4 Z_L\right) + s \left(2 L_1 R_1 R_4 Z_L g_m + 2 L_1 R_4 Z_L + L_4 R_1 R_4 + 2\cdots\right)}$$

10.67 INVALID-ORDER-67 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_1 R_4 Z_L g_m s^3 + L_1 L_4 R_1 Z_L g_m s^2 + L_1 R_1 R_4 Z_L g_m s}{R_1 R_4 + 2 R_1 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 + 2 C_1 C_4 L_1 L_4 R_1 Z_L \right) + s^3 \left(C_1 L_1 L_4 R_1 + C_4 L_1 L_4 R_1 R_4 g_m + 2 C_4 L_1 L_4 R_1 Z_L g_m + C_4 L_1 L_4 R_4 + 2 C_4 L_1 L_4 Z_L \right) + s^2 \left(C_1 L_1 R_1 R_4 + 2 C_1 L_1 R_1 Z_L + C_4 L_4 R_1 R_4 + 2 C_4 L_4 R_1 Z_L + L_1 L_4 R_1 g_m + L_1 L_4 \right) + s \left(L_1 R_1 R_4 g_m + 2 L_1 R_1 Z_L g_m \right.}$$

10.68 INVALID-ORDER-68 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_4 L_1 L_4 R_1 R_4 Z_L g_m s^3 + L_1 R_1 R_4 Z_L g_m s}{R_1 R_4 + 2 R_1 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 + 2 C_1 C_4 L_1 L_4 R_1 Z_L \right) + s^3 \left(2 C_1 C_4 L_1 R_1 R_4 Z_L + C_4 L_1 L_4 R_1 R_4 g_m + 2 C_4 L_1 L_4 R_1 Z_L g_m + C_4 L_1 L_4 R_4 + 2 C_4 L_1 L_4 Z_L \right) + s^2 \left(C_1 L_1 R_1 R_4 + 2 C_1 L_1 R_1 Z_L + 2 C_4 L_1 R_1 R_4 Z_L g_m + 2 C_4 L_1 R_4 Z_L + C_4 L_4 R_1 R_4 + 2 C_4 L_4 R_1 Z_L \right) + s \left(2 C_4 R \right.}$$

10.69 INVALID-ORDER-69 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 Z_L g_m s^2 + L_1 Z_L g_m s + R_1 Z_L g_m}{R_1 g_m + s^3 \left(2 C_1 C_4 L_1 R_1 Z_L g_m + 2 C_1 C_4 L_1 Z_L \right) + s^2 \left(C_1 L_1 R_1 g_m + C_1 L_1 + 2 C_4 L_1 Z_L g_m \right) + s \left(2 C_4 R_1 Z_L g_m + 2 C_4 Z_L + L_1 g_m \right) + 1}$$

10.70 INVALID-ORDER-70 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_4 Z_L g_m s^2 + L_1 R_4 Z_L g_m s + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^3 \left(2 C_1 C_4 L_1 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_1 R_4 Z_L \right) + s^2 \left(C_1 L_1 R_1 R_4 g_m + 2 C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2 C_1 L_1 Z_L + 2 C_4 L_1 R_4 Z_L g_m \right) + s \left(2 C_4 R_1 R_4 Z_L g_m + 2 C_4 R_4 Z_L + L_1 R_4 g_m + 2 L_1 Z_L g_m \right)}$$

10.71 INVALID-ORDER-71 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 R_1 R_4 Z_L g_m s^3 + R_1 Z_L g_m + s^2 \left(C_1 L_1 R_1 Z_L g_m + C_4 L_1 R_4 Z_L g_m \right) + s \left(C_4 R_1 R_4 Z_L g_m + L_1 Z_L g_m \right)}{R_1 g_m + s^3 \left(C_1 C_4 L_1 R_1 R_4 g_m + 2 C_1 C_4 L_1 R_1 Z_L g_m + C_1 C_4 L_1 R_4 + 2 C_1 C_4 L_1 Z_L \right) + s^2 \left(C_1 L_1 R_1 g_m + C_1 L_1 + C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m \right) + s \left(C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L + L_1 g_m \right) + 1}$$

10.72 INVALID-ORDER-72 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 Z_L g_m s^4 + C_4 L_1 L_4 Z_L g_m s^3 + L_1 Z_L g_m s + R_1 Z_L g_m + s^2 \left(C_1 L_1 R_1 Z_L g_m + C_4 L_4 R_1 Z_L g_m \right)}{R_1 g_m + s^4 \left(C_1 C_4 L_1 L_4 R_1 g_m + C_1 C_4 L_1 L_4 \right) + s^3 \left(2 C_1 C_4 L_1 R_1 Z_L g_m + 2 C_1 C_4 L_1 Z_L + C_4 L_1 L_4 g_m \right) + s^2 \left(C_1 L_1 R_1 g_m + C_1 L_1 + 2 C_4 L_1 Z_L g_m + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(2 C_4 R_1 Z_L g_m + 2 C_4 Z_L + L_1 g_m \right) + 1}$$

10.73 INVALID-ORDER-73 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 L_4 R_1 Z_L g_m s^3 + L_1 L_4 Z_L g_m s^2 + L_4 R_1 Z_L g_m s}{2 R_1 Z_L g_m + 2 Z_L + s^4 \left(2 C_1 C_4 L_1 L_4 R_1 Z_L g_m + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(C_1 L_1 L_4 R_1 g_m + C_1 L_1 L_4 + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(2 C_1 L_1 R_1 Z_L g_m + 2 C_1 L_1 Z_L + 2 C_4 L_4 R_1 Z_L g_m + 2 C_4 L_4 Z_L + L_1 L_4 g_m \right) + s \left(2 L_1 Z_L g_m + L_4 R_1 g_m + L_4 \right)}$$

10.74 INVALID-ORDER-74 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 Z_L g_m s^4 + R_1 Z_L g_m + s^3 \left(C_1 C_4 L_1 R_1 R_4 Z_L g_m + C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_1 Z_L g_m + C_4 L_1 R_4 Z_L g_m + C_4 L_4 R_1 Z_L g_m \right) + s \left(C_4 R_1 R_4 Z_L g_m + L_1 Z_L g_m \right)}{R_1 g_m + s^4 \left(C_1 C_4 L_1 L_4 R_1 g_m + C_1 C_4 L_1 L_4 \right) + s^3 \left(C_1 C_4 L_1 R_1 R_4 g_m + 2 C_1 C_4 L_1 R_1 Z_L g_m + C_1 C_4 L_1 R_4 + 2 C_1 C_4 L_1 Z_L + C_4 L_1 L_4 g_m \right) + s^2 \left(C_1 L_1 R_1 g_m + C_1 L_1 + C_4 L_1 R_4 g_m + 2 C_4 L_1 Z_L g_m + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L + L \right.}$$

10.75 INVALID-ORDER-75 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 L_4 R_1 R_4 Z_L g_m s^3 + L_1 L_4 R_4 Z_L g_m s^2 + L_4 R_1 R_4 Z_L g_m s}{2 R_1 R_4 Z_L g_m + 2 R_4 Z_L + s^4 \left(2 C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_1 L_4 R_4 Z_L \right) + s^3 \left(C_1 L_1 L_4 R_1 R_4 g_m + 2 C_1 L_1 L_4 R_1 Z_L g_m + C_1 L_1 L_4 R_4 + 2 C_1 L_1 L_4 Z_L + 2 C_4 L_1 L_4 R_4 Z_L g_m \right) + s^2 \left(2 C_1 L_1 R_1 R_4 Z_L g_m + 2 C_1 L_1 R_4 Z_L + 2 C_4 L_4 R_1 R_4 Z_L g_m + 2 C_4 L_4 R_4 Z_L + L_1 L_4 R_4 g_m + 2 L \right.}$$

10.76   INVALID-ORDER-76 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m s^4 + R_1 R_4 Z_L g_m + s^3 \left(C_1 L_1 L_4 R_1 Z_L g_m + C_4 L_1 L_4 R_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_1 R_4 Z_L g_m + C_4 L_1 R_4 Z_L g_m + L_1 L_4 Z_L g_m \right) + s \left(L_1 R_4 Z_L g_m + L_4 R_1 Z_L \right)}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_1 L_4 R_1 Z_L g_m + C_1 C_4 L_1 L_4 R_4 + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(C_1 L_1 L_4 R_1 g_m + C_1 L_1 L_4 + C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_1 R_4 g_m + 2 C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2 C_1 L_1 Z_L + C_4 L_4 R_1 R_4 g_m \cdots \right)}$$

10.77   INVALID-ORDER-77 $Z(s) = \left(\frac{C_1 L_1 R_1 s^2 + L_1 s + R_1}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \frac{R_4 \left(C_4 L_4 s^2 + 1 \right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m s^4 + C_4 L_1 L_4 R_4 Z_L g_m s^3 + L_1 R_4 Z_L g_m s + R_1 R_4 Z_L g_m + s^2 \left(C_1 L_1 R_1 R_4 Z_L g_m + C_4 L_4 R_1 R_4 Z_L g_m \right)}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 g_m + 2 C_1 C_4 L_1 L_4 R_1 Z_L g_m + C_1 C_4 L_1 L_4 R_4 + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(2 C_1 C_4 L_1 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_1 R_4 Z_L + C_4 L_1 L_4 R_4 g_m + 2 C_4 L_1 L_4 Z_L g_m \right) + s^2 \left(C_1 L_1 R_1 R_4 g_m + 2 C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2 C_1 L_1 Z_L + \cdots \right)}$$

10.78   INVALID-ORDER-78 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 Z_L g_m s^2 + R_1 Z_L g_m}{R_1 g_m + s^3 \left(2 C_1 C_4 L_1 R_1 Z_L g_m + 2 C_1 C_4 L_1 Z_L \right) + s^2 \left(2 C_1 C_4 R_1 Z_L + C_1 L_1 R_1 g_m + C_1 L_1 \right) + s \left(C_1 R_1 + 2 C_4 R_1 Z_L g_m + 2 C_4 Z_L \right) + 1}$$

10.79   INVALID-ORDER-79 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{R_4}{C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_4 Z_L g_m s^2 + R_1 R_4 Z_L g_m}{R_1 R_4 g_m + 2 R_1 Z_L g_m + R_4 + 2 Z_L + s^3 \left(2 C_1 C_4 L_1 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_1 R_4 Z_L \right) + s^2 \left(2 C_1 C_4 R_1 R_4 Z_L + C_1 L_1 R_1 R_4 g_m + 2 C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2 C_1 L_1 Z_L \right) + s \left(C_1 R_1 R_4 + 2 C_1 R_1 Z_L + 2 C_4 R_1 R_4 Z_L g_m + 2 C_4 R_4 Z_L \right)}$$

10.80   INVALID-ORDER-80 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 R_1 R_4 Z_L g_m s^3 + C_1 L_1 R_1 Z_L g_m s^2 + C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m}{R_1 g_m + s^3 \left(C_1 C_4 L_1 R_1 R_4 g_m + 2 C_1 C_4 L_1 R_1 Z_L g_m + C_1 C_4 L_1 R_4 + 2 C_1 C_4 L_1 Z_L \right) + s^2 \left(C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L + C_1 L_1 R_1 g_m + C_1 L_1 \right) + s \left(C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 Z_L \right) + 1}$$

10.81   INVALID-ORDER-81 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ L_4 s + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 Z_L g_m s^4 + R_1 Z_L g_m + s^2 \left(C_1 L_1 R_1 Z_L g_m + C_4 L_4 R_1 Z_L g_m \right)}{R_1 g_m + s^4 \left(C_1 C_4 L_1 L_4 R_1 g_m + C_1 C_4 L_1 L_4 \right) + s^3 \left(2 C_1 C_4 L_1 R_1 Z_L g_m + 2 C_1 C_4 L_1 Z_L + C_1 C_4 L_4 R_1 \right) + s^2 \left(2 C_1 C_4 R_1 Z_L + C_1 L_1 R_1 g_m + C_1 L_1 + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(C_1 R_1 + 2 C_4 R_1 Z_L g_m + 2 C_4 Z_L \right) + 1}$$

10.82   INVALID-ORDER-82 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{L_4 s}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 L_4 R_1 Z_L g_m s^3 + L_4 R_1 Z_L g_m s}{2 R_1 Z_L g_m + 2 Z_L + s^4 \left(2 C_1 C_4 L_1 L_4 R_1 Z_L g_m + 2 C_1 C_4 L_1 L_4 Z_L \right) + s^3 \left(2 C_1 C_4 L_4 R_1 Z_L + C_1 L_1 L_4 R_1 g_m + C_1 L_1 L_4 \right) + s^2 \left(2 C_1 L_1 R_1 Z_L g_m + 2 C_1 L_1 Z_L + C_1 L_4 R_1 + 2 C_4 L_4 R_1 Z_L g_m + 2 C_4 L_4 Z_L \right) + s \left(2 C_1 R_1 Z_L + L_4 R_1 g_m + L_4 \right)}$$

10.83   INVALID-ORDER-83 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ L_4 s + R_4 + \frac{1}{C_4 s}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 Z_L g_m s^4 + C_1 C_4 L_1 R_1 R_4 Z_L g_m s^3 + C_4 R_1 R_4 Z_L g_m s + R_1 Z_L g_m + s^2 \left(C_1 L_1 R_1 Z_L g_m + C_4 L_4 R_1 Z_L g_m \right)}{R_1 g_m + s^4 \left(C_1 C_4 L_1 L_4 R_1 g_m + C_1 C_4 L_1 L_4 \right) + s^3 \left(C_1 C_4 L_1 R_1 R_4 g_m + 2 C_1 C_4 L_1 R_1 Z_L g_m + C_1 C_4 L_1 R_4 + 2 C_1 C_4 L_1 Z_L + C_1 C_4 L_4 R_1 \right) + s^2 \left(C_1 C_4 R_1 R_4 + 2 C_1 C_4 R_1 Z_L + C_1 L_1 R_1 g_m + C_1 L_1 + C_4 L_4 R_1 g_m + C_4 L_4 \right) + s \left(C_1 R_1 + C_4 R_1 R_4 g_m + 2 C_4 R_1 Z_L g_m + C_4 R_4 + 2 C_4 \cdots \right)}$$

10.84   INVALID-ORDER-84 $Z(s) = \left(\frac{R_1 \left(C_1 L_1 s^2 + 1 \right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \ \infty \right)$

$$H(s) = \frac{C_1 L_1 L_4 R_1 R_4 Z_L g_m s^3 + L_4 R_1 R_4 Z_L g_m s}{2 R_1 R_4 Z_L g_m + 2 R_4 Z_L + s^4 \left(2 C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m + 2 C_1 C_4 L_1 L_4 R_4 Z_L \right) + s^3 \left(2 C_1 C_4 L_4 R_1 R_4 Z_L + C_1 L_1 L_4 R_1 R_4 g_m + 2 C_1 L_1 L_4 R_1 Z_L g_m + C_1 L_1 L_4 R_4 + 2 C_1 L_1 L_4 Z_L \right) + s^2 \left(2 C_1 L_1 R_1 R_4 Z_L g_m + 2 C_1 L_1 R_4 Z_L + C_1 L_4 R_1 R_4 + 2 C_1 L_4 R_1 Z_L + 2 C_4 L_4 R_1 R_4 Z_L g_m + 2 C \cdots \right)}$$

10.85 INVALID-ORDER-85 $Z(s) = \left(\frac{R_1\left(C_1 L_1 s^2 + 1\right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{C_4 L_4 R_4 s^2 + L_4 s + R_4}{C_4 L_4 s^2 + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m s^4 + C_1 L_1 L_4 R_1 Z_L g_m s^3 + L_4 R_1 Z_L g_m s + R_1 R_4 Z_L g_m + s^2 \left(C_1 L_1 R_1 R_4 Z_L g_m + C_4 L_4 R_1 R_4 Z_L g_m\right)}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 g_m + 2C_1 C_4 L_1 L_4 R_1 Z_L g_m + C_1 C_4 L_1 L_4 R_4 + 2C_1 C_4 L_1 L_4 Z_L\right) + s^3 \left(C_1 C_4 L_4 R_1 R_4 + 2C_1 C_4 L_4 R_1 Z_L + C_1 L_1 L_4 R_1 g_m + C_1 L_1 L_4\right) + s^2 \left(C_1 L_1 R_1 R_4 g_m + 2C_1 L_1 R_1 Z_L g_m + C_1 L_1 R_4 + 2C_1 L_1 Z_L + C_1 L_4 R_1 + C_4}$$

10.86 INVALID-ORDER-86 $Z(s) = \left(\frac{R_1\left(C_1 L_1 s^2 + 1\right)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \ \infty, \ \infty, \ \frac{R_4\left(C_4 L_4 s^2 + 1\right)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \ \infty \right)$

$$H(s) = \frac{C_1 C_4 L_1 L_4 R_1 R_4 Z_L g_m s^4 + R_1 R_4 Z_L g_m + s^2 \left(C_1 L_1 R_1 R_4 Z_L g_m + C_4 L_4 R_1 R_4 Z_L g_m\right)}{R_1 R_4 g_m + 2R_1 Z_L g_m + R_4 + 2Z_L + s^4 \left(C_1 C_4 L_1 L_4 R_1 R_4 g_m + 2C_1 C_4 L_1 L_4 R_1 Z_L g_m + C_1 C_4 L_1 L_4 R_4 + 2C_1 C_4 L_1 L_4 Z_L\right) + s^3 \left(2C_1 C_4 L_1 R_1 R_4 Z_L g_m + 2C_1 C_4 L_1 R_4 Z_L + C_1 C_4 L_4 R_1 R_4 + 2C_1 C_4 L_4 R_1 Z_L\right) + s^2 \left(2C_1 C_4 R_1 R_4 Z_L + C_1 L_1 R_1 R_4 g_m + 2C_1 L_1 R_1 Z_L g_m + C_1 L}$$

11 PolynomialError