Filter Summary Report: CG,TIA,simple,Z3,Z5

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Contents

1 Examined $H(z)$ for CG TIA simple Z3 Z5: $\frac{Z_3 Z_5 g_m - Z_3}{2Z_3 g_m + Z_5 g_m + 1}$

$$H(z) = \frac{Z_3 Z_5 g_m - Z_3}{2Z_3 g_m + Z_5 g_m + 1}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2 + 1},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{s\left(L_3 R_5 g_m - L_3\right)}{2L_3 g_m s + R_5 g_m + s^2\left(C_3 L_3 R_5 g_m + C_3 L_3\right) + 1}$$

Parameters:

Q: $\frac{C_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + C_3 \sqrt{\frac{1}{C_3 L_3}}}{2 g_m}$
wo: $\sqrt{\frac{1}{C_3 L_3}}$
bandwidth: $\frac{2 g_m \sqrt{\frac{1}{C_3 L_3}}}{C_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + C_3 \sqrt{\frac{1}{C_3 L_3}}}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_5 g_m - 1}{2 g_m}$
Qz: None
Wz: None

3.2 BP-2 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{s\left(L_3 R_3 R_5 g_m - L_3 R_3\right)}{R_3 R_5 g_m + R_3 + s^2\left(C_3 L_3 R_3 R_5 g_m + C_3 L_3 R_3\right) + s\left(2L_3 R_3 g_m + L_3 R_5 g_m + L_3\right)}$$

Parameters:

Q: $\frac{C_3 R_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + C_3 R_3 \sqrt{\frac{1}{C_3 L_3}}}{2 R_3 g_m + R_5 g_m + 1}$
wo: $\sqrt{\frac{1}{C_3 L_3}}$
bandwidth: $\frac{\sqrt{\frac{1}{C_3 L_3}}\left(2 R_3 g_m + R_5 g_m + 1\right)}{C_3 R_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + C_3 R_3 \sqrt{\frac{1}{C_3 L_3}}}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$
Qz: None
Wz: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_5 g_m + s^2 \left(C_3 L_3 R_5 g_m - C_3 L_3\right) - 1}{2 C_3 L_3 g_m s^2 + 2 g_m + s \left(C_3 R_5 g_m + C_3\right)}$$

Parameters:

Q: $\frac{2 L_3 g_m \sqrt{\frac{1}{C_3 L_3}}}{R_5 g_m + 1}$
wo: $\sqrt{\frac{1}{C_3 L_3}}$
bandwidth: $\frac{R_5 g_m + 1}{2 L_3 g_m}$
K-LP: $\frac{R_5 g_m - 1}{2 g_m}$
K-HP: $\frac{R_5 g_m - 1}{2 g_m}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_3 L_3}}$

5.2 BS-2 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3 L_3 s^2 + 1\right)}{C_3 L_3 s^2 + C_3 R_3 s + 1},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_3 R_5 g_m - R_3 + s^2 \left(C_3 L_3 R_3 R_5 g_m - C_3 L_3 R_3\right)}{2 R_3 g_m + R_5 g_m + s^2 \left(2 C_3 L_3 R_3 g_m + C_3 L_3 R_5 g_m + C_3 L_3\right) + s \left(C_3 R_3 R_5 g_m + C_3 R_3\right) + 1}$$

Parameters:

Q: $\frac{2 L_3 R_3 g_m \sqrt{\frac{1}{C_3 L_3}} + L_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3 R_5 g_m + R_3}$
wo: $\sqrt{\frac{1}{C_3 L_3}}$
bandwidth: $\frac{\sqrt{\frac{1}{C_3 L_3}} \left(R_3 R_5 g_m + R_3\right)}{2 L_3 R_3 g_m \sqrt{\frac{1}{C_3 L_3}} + L_3 R_5 g_m \sqrt{\frac{1}{C_3 L_3}} + L_3 \sqrt{\frac{1}{C_3 L_3}}}$
K-LP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$
K-HP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$
K-BP: 0
Qz: None
Wz: $\sqrt{\frac{1}{C_3 L_3}}$

6 GE

6.1 GE-1 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 R_3 g_m s^2 - C_5 R_3 s + R_3 g_m}{C_5 L_5 g_m s^2 + g_m + s \left(2 C_5 R_3 g_m + C_5\right)}$$

Parameters:

Q: $\frac{L_5 g_m \sqrt{\frac{1}{C_5 L_5}}}{2 R_3 g_m + 1}$
wo: $\sqrt{\frac{1}{C_5 L_5}}$
bandwidth: $\frac{2 R_3 g_m + 1}{L_5 g_m}$
K-LP: R_3
K-HP: R_3
K-BP: $-\frac{R_3}{2 R_3 g_m + 1}$
Qz: $-L_5 g_m \sqrt{\frac{1}{C_5 L_5}}$
Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.2 GE-2 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 R_3 s^2 + L_5 R_3 g_m s - R_3}{L_5 g_m s + 2R_3 g_m + s^2\left(2C_5 L_5 R_3 g_m + C_5 L_5\right) + 1}$$

Parameters:

Q: $\frac{2C_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 \sqrt{\frac{1}{C_5 L_5}}}{g_m}$
wo: $\sqrt{\frac{1}{C_5 L_5}}$
bandwidth: $\frac{g_m \sqrt{\frac{1}{C_5 L_5}}}{2C_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 \sqrt{\frac{1}{C_5 L_5}}}$
K-LP: $-\frac{R_3}{2R_3 g_m + 1}$
K-HP: $-\frac{R_3}{2R_3 g_m + 1}$
K-BP: R_3
Qz: $-\frac{C_5 \sqrt{\frac{1}{C_5 L_5}}}{g_m}$
Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.3 GE-3 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 R_3 g_m s^2 + R_3 g_m + s\left(C_5 R_3 R_5 g_m - C_5 R_3\right)}{C_5 L_5 g_m s^2 + g_m + s\left(2C_5 R_3 g_m + C_5 R_5 g_m + C_5\right)}$$

Parameters:

Q: $\frac{L_5 g_m \sqrt{\frac{1}{C_5 L_5}}}{2R_3 g_m + R_5 g_m + 1}$
wo: $\sqrt{\frac{1}{C_5 L_5}}$
bandwidth: $\frac{2R_3 g_m + R_5 g_m + 1}{L_5 g_m}$
K-LP: R_3
K-HP: R_3
K-BP: $\frac{R_3 R_5 g_m - R_3}{2R_3 g_m + R_5 g_m + 1}$
Qz: $\frac{L_5 g_m \sqrt{\frac{1}{C_5 L_5}}}{R_5 g_m - 1}$
Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.4 GE-4 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 R_3 R_5 s^2 - R_3 R_5 + s\left(L_5 R_3 R_5 g_m - L_5 R_3\right)}{2R_3 R_5 g_m + R_5 + s^2\left(2C_5 L_5 R_3 R_5 g_m + C_5 L_5 R_5\right) + s\left(2L_5 R_3 g_m + L_5 R_5 g_m + L_5\right)}$$

Parameters:

Q: $\frac{2C_5 R_3 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 R_5 \sqrt{\frac{1}{C_5 L_5}}}{2R_3 g_m + R_5 g_m + 1}$
wo: $\sqrt{\frac{1}{C_5 L_5}}$
bandwidth: $\frac{\sqrt{\frac{1}{C_5 L_5}}\left(2R_3 g_m + R_5 g_m + 1\right)}{2C_5 R_3 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 R_5 \sqrt{\frac{1}{C_5 L_5}}}$
K-LP: $-\frac{R_3}{2R_3 g_m + 1}$
K-HP: $-\frac{R_3}{2R_3 g_m + 1}$
K-BP: $\frac{R_3 R_5 g_m - R_3}{2R_3 g_m + R_5 g_m + 1}$
Qz: $-\frac{C_5 R_5 \sqrt{\frac{1}{C_5 L_5}}}{R_5 g_m - 1}$
Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.5 GE-5 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{C_5 L_5 R_5 s^2 + L_5 s + R_5}{C_5 L_5 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{L_5 R_3 g_m s + R_3 R_5 g_m - R_3 + s^2 \left(C_5 L_5 R_3 R_5 g_m - C_5 L_5 R_3\right)}{L_5 g_m s + 2 R_3 g_m + R_5 g_m + s^2 \left(2 C_5 L_5 R_3 g_m + C_5 L_5 R_5 g_m + C_5 L_5\right) + 1}$$

Parameters:

Q: $\frac{2 C_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 \sqrt{\frac{1}{C_5 L_5}}}{g_m}$

wo: $\sqrt{\frac{1}{C_5 L_5}}$

bandwidth: $\frac{g_m \sqrt{\frac{1}{C_5 L_5}}}{2 C_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + C_5 \sqrt{\frac{1}{C_5 L_5}}}$

K-LP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$

K-HP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$

K-BP: R_3

Qz: $\frac{C_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} - C_5 \sqrt{\frac{1}{C_5 L_5}}}{g_m}$

Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.6 GE-6 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{R_5\left(C_5 L_5 s^2 + 1\right)}{C_5 L_5 s^2 + C_5 R_5 s + 1},\ \infty\right)$

$$H(s) = \frac{-C_5 R_3 R_5 s + R_3 R_5 g_m - R_3 + s^2 \left(C_5 L_5 R_3 R_5 g_m - C_5 L_5 R_3\right)}{2 R_3 g_m + R_5 g_m + s^2 \left(2 C_5 L_5 R_3 g_m + C_5 L_5 R_5 g_m + C_5 L_5\right) + s \left(2 C_5 R_3 R_5 g_m + C_5 R_5\right) + 1}$$

Parameters:

Q: $\frac{2 L_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + L_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + L_5 \sqrt{\frac{1}{C_5 L_5}}}{2 R_3 R_5 g_m + R_5}$

wo: $\sqrt{\frac{1}{C_5 L_5}}$

bandwidth: $\frac{\sqrt{\frac{1}{C_5 L_5}} \left(2 R_3 R_5 g_m + R_5\right)}{2 L_5 R_3 g_m \sqrt{\frac{1}{C_5 L_5}} + L_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + L_5 \sqrt{\frac{1}{C_5 L_5}}}$

K-LP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$

K-HP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$

K-BP: $-\frac{R_3}{2 R_3 g_m + 1}$

Qz: $\frac{-L_5 R_5 g_m \sqrt{\frac{1}{C_5 L_5}} + L_5 \sqrt{\frac{1}{C_5 L_5}}}{R_5}$

Wz: $\sqrt{\frac{1}{C_5 L_5}}$

6.7 GE-7 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_5 g_m + s^2 \left(C_3 L_3 R_5 g_m - C_3 L_3\right) + s \left(C_3 R_3 R_5 g_m - C_3 R_3\right) - 1}{2 C_3 L_3 g_m s^2 + 2 g_m + s \left(2 C_3 R_3 g_m + C_3 R_5 g_m + C_3\right)}$$

Parameters:

Q: $\frac{2 L_3 g_m \sqrt{\frac{1}{C_3 L_3}}}{2 R_3 g_m + R_5 g_m + 1}$

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

bandwidth: $\frac{2 R_3 g_m + R_5 g_m + 1}{2 L_3 g_m}$

K-LP: $\frac{R_5 g_m - 1}{2 g_m}$

K-HP: $\frac{R_5 g_m - 1}{2 g_m}$

K-BP: $\frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + 1}$

Qz: $\frac{L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3}$

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

6.8 GE-8 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_3R_5g_m - R_3 + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3\right) + s\left(L_3R_5g_m - L_3\right)}{2L_3g_ms + 2R_3g_m + R_5g_m + s^2\left(2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3\right) + 1}$$

Parameters:

Q: $\frac{2C_3R_3g_m\sqrt{\frac{1}{C_3L_3}}+C_3R_5g_m\sqrt{\frac{1}{C_3L_3}}+C_3\sqrt{\frac{1}{C_3L_3}}}{2g_m}$
wo: $\sqrt{\frac{1}{C_3L_3}}$
bandwidth: $\frac{2g_m\sqrt{\frac{1}{C_3L_3}}}{2C_3R_3g_m\sqrt{\frac{1}{C_3L_3}}+C_3R_5g_m\sqrt{\frac{1}{C_3L_3}}+C_3\sqrt{\frac{1}{C_3L_3}}}$
K-LP: $\frac{R_3R_5g_m-R_3}{2R_3g_m+R_5g_m+1}$
K-HP: $\frac{R_3R_5g_m-R_3}{2R_3g_m+R_5g_m+1}$
K-BP: $\frac{R_5g_m-1}{2g_m}$
Qz: $C_3R_3\sqrt{\frac{1}{C_3L_3}}$
Wz: $\sqrt{\frac{1}{C_3L_3}}$

7 AP

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3s},\ \infty,\ \frac{R_5}{C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_5R_5s + R_5g_m - 1}{C_3C_5R_5s^2 + 2g_m + s\left(C_3R_5g_m + C_3 + 2C_5R_5g_m\right)}$$

Parameters:

Q: $\frac{\sqrt{2}C_3C_5R_5\sqrt{\frac{g_m}{C_3C_5R_5}}}{C_3R_5g_m+C_3+2C_5R_5g_m}$
wo: $\sqrt{2}\sqrt{\frac{g_m}{C_3C_5R_5}}$
bandwidth: $\frac{C_3R_5g_m+C_3+2C_5R_5g_m}{C_3C_5R_5}$
K-LP: $\frac{R_5g_m-1}{2g_m}$
K-HP: 0
K-BP: $-\frac{C_5R_5}{C_3R_5g_m+C_3+2C_5R_5g_m}$
Qz: None
Wz: None

8.2 INVALID-NUMER-2 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{-C_5R_3s + R_3g_m}{C_3C_5R_3s^2 + g_m + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5\right)}$$

Parameters:

Q: $\frac{C_3C_5R_3\sqrt{\frac{g_m}{C_3C_5R_3}}}{C_3R_3g_m+2C_5R_3g_m+C_5}$
wo: $\sqrt{\frac{g_m}{C_3C_5R_3}}$
bandwidth: $\frac{C_3R_3g_m+2C_5R_3g_m+C_5}{C_3C_5R_3}$
K-LP: R_3
K-HP: 0
K-BP: $-\frac{C_5R_3}{C_3R_3g_m+2C_5R_3g_m+C_5}$
Qz: None
Wz: None

8.3 INVALID-NUMER-3 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ \frac{R_5}{C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_5R_3R_5s + R_3R_5g_m - R_3}{C_3C_5R_3R_5s^2 + 2R_3g_m + R_5g_m + s\left(C_3R_3R_5g_m + C_3R_3 + 2C_5R_3R_5g_m + C_5R_5\right) + 1}$$

Parameters:

Q: $\frac{C_3C_5R_3R_5\sqrt{\frac{2g_m}{C_3C_5R_5}+\frac{g_m}{C_3C_5R_3}+\frac{1}{C_3C_5R_3R_5}}}{C_3R_3R_5g_m+C_3R_3+2C_5R_3R_5g_m+C_5R_5}$
wo: $\sqrt{\frac{2R_3g_m+R_5g_m+1}{C_3C_5R_3R_5}}$
bandwidth: $\frac{\sqrt{\frac{2R_3g_m+R_5g_m+1}{C_3C_5R_3R_5}}(C_3R_3R_5g_m+C_3R_3+2C_5R_3R_5g_m+C_5R_5)}{C_3C_5R_3R_5\sqrt{\frac{2g_m}{C_3C_5R_5}+\frac{g_m}{C_3C_5R_3}+\frac{1}{C_3C_5R_3R_5}}}$
K-LP: $\frac{R_3R_5g_m-R_3}{2R_3g_m+R_5g_m+1}$
K-HP: 0
K-BP: $-\frac{C_5R_3R_5}{C_3R_3R_5g_m+C_3R_3+2C_5R_3R_5g_m+C_5R_5}$
Qz: None
Wz: None

8.4 INVALID-NUMER-4 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ R_5+\frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{R_3g_m + s\left(C_5R_3R_5g_m - C_5R_3\right)}{g_m + s^2\left(C_3C_5R_3R_5g_m + C_3C_5R_3\right) + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5R_5g_m + C_5\right)}$$

Parameters:

Q: $\frac{C_3C_5R_3R_5g_m\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}+C_3C_5R_3\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}}{C_3R_3g_m+2C_5R_3g_m+C_5R_5g_m+C_5}$
wo: $\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}$
bandwidth: $\frac{\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}(C_3R_3g_m+2C_5R_3g_m+C_5R_5g_m+C_5)}{C_3C_5R_3R_5g_m\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}+C_3C_5R_3\sqrt{\frac{g_m}{C_3C_5R_3R_5g_m+C_3C_5R_3}}}$
K-LP: R_3
K-HP: 0
K-BP: $\frac{C_5R_3R_5g_m-C_5R_3}{C_3R_3g_m+2C_5R_3g_m+C_5R_5g_m+C_5}$
Qz: None
Wz: None

9 INVALID-WZ

9.1 INVALID-WZ-1 $Z(s) = \left(\infty,\ \infty,\ R_3+\frac{1}{C_3s},\ \infty,\ \frac{R_5}{C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5R_3R_5s^2 + R_5g_m + s\left(C_3R_3R_5g_m - C_3R_3 - C_5R_5\right) - 1}{2g_m + s^2\left(2C_3C_5R_3R_5g_m + C_3C_5R_5\right) + s\left(2C_3R_3g_m + C_3R_5g_m + C_3 + 2C_5R_5g_m\right)}$$

Parameters:

Q: $\frac{2\sqrt{2}C_3C_5R_3R_5g_m\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}+\sqrt{2}C_3C_5R_5\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}}{2C_3R_3g_m+C_3R_5g_m+C_3+2C_5R_5g_m}$
wo: $\sqrt{2}\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}$
bandwidth: $\frac{\sqrt{2}\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}(2C_3R_3g_m+C_3R_5g_m+C_3+2C_5R_5g_m)}{2\sqrt{2}C_3C_5R_3R_5g_m\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}+\sqrt{2}C_3C_5R_5\sqrt{\frac{g_m}{2C_3C_5R_3R_5g_m+C_3C_5R_5}}}$
K-LP: $\frac{R_5g_m-1}{2g_m}$
K-HP: $-\frac{R_3}{2R_3g_m+1}$
K-BP: $\frac{C_3R_3R_5g_m-C_3R_3-C_5R_5}{2C_3R_3g_m+C_3R_5g_m+C_3+2C_5R_5g_m}$
Qz: None
Wz: $\sqrt{\frac{-R_5g_m+1}{C_3C_5R_3R_5}}$

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (\infty,\ \infty,\ R_3,\ \infty,\ R_5,\ \infty)$

$$H(s) = \frac{R_3 R_5 g_m - R_3}{2R_3 g_m + R_5 g_m + 1}$$

10.2 INVALID-ORDER-2 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_5 R_3 s + R_3 g_m}{g_m + s\left(2C_5 R_3 g_m + C_5\right)}$$

10.3 INVALID-ORDER-3 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ \frac{R_5}{C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_5 R_3 R_5 s + R_3 R_5 g_m - R_3}{2R_3 g_m + R_5 g_m + s\left(2C_5 R_3 R_5 g_m + C_5 R_5\right) + 1}$$

10.4 INVALID-ORDER-4 $Z(s) = \left(\infty,\ \infty,\ R_3,\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{R_3 g_m + s\left(C_5 R_3 R_5 g_m - C_5 R_3\right)}{g_m + s\left(2C_5 R_3 g_m + C_5 R_5 g_m + C_5\right)}$$

10.5 INVALID-ORDER-5 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_5 g_m - 1}{2g_m + s\left(C_3 R_5 g_m + C_3\right)}$$

10.6 INVALID-ORDER-6 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_5 s + g_m}{C_3 C_5 s^2 + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.7 INVALID-ORDER-7 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{g_m + s\left(C_5 R_5 g_m - C_5\right)}{s^2\left(C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.8 INVALID-ORDER-8 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 g_m s^2 - C_5 s + g_m}{C_3 C_5 L_5 g_m s^3 + C_3 C_5 s^2 + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.9 INVALID-ORDER-9 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 s^2 + L_5 g_m s - 1}{C_3 C_5 L_5 s^3 + C_3 s + 2g_m + s^2\left(C_3 L_5 g_m + 2C_5 L_5 g_m\right)}$$

10.10 INVALID-ORDER-10 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 g_m s^2 + g_m + s\left(C_5 R_5 g_m - C_5\right)}{C_3 C_5 L_5 g_m s^3 + s^2\left(C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2 C_5 g_m\right)}$$

10.11 INVALID-ORDER-11 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 R_5 s^2 - R_5 + s\left(L_5 R_5 g_m - L_5\right)}{C_3 C_5 L_5 R_5 s^3 + 2 R_5 g_m + s^2\left(C_3 L_5 R_5 g_m + C_3 L_5 + 2 C_5 L_5 R_5 g_m\right) + s\left(C_3 R_5 + 2 L_5 g_m\right)}$$

10.12 INVALID-ORDER-12 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{C_5 L_5 R_5 s^2 + L_5 s + R_5}{C_5 L_5 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{L_5 g_m s + R_5 g_m + s^2\left(C_5 L_5 R_5 g_m - C_5 L_5\right) - 1}{2 g_m + s^3\left(C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2\left(C_3 L_5 g_m + 2 C_5 L_5 g_m\right) + s\left(C_3 R_5 g_m + C_3\right)}$$

10.13 INVALID-ORDER-13 $Z(s) = \left(\infty,\ \infty,\ \frac{1}{C_3 s},\ \infty,\ \frac{R_5\left(C_5 L_5 s^2 + 1\right)}{C_5 L_5 s^2 + C_5 R_5 s + 1},\ \infty\right)$

$$H(s) = \frac{-C_5 R_5 s + R_5 g_m + s^2\left(C_5 L_5 R_5 g_m - C_5 L_5\right) - 1}{2 g_m + s^3\left(C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2\left(C_3 C_5 R_5 + 2 C_5 L_5 g_m\right) + s\left(C_3 R_5 g_m + C_3 + 2 C_5 R_5 g_m\right)}$$

10.14 INVALID-ORDER-14 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_3 R_5 g_m - R_3}{2 R_3 g_m + R_5 g_m + s\left(C_3 R_3 R_5 g_m + C_3 R_3\right) + 1}$$

10.15 INVALID-ORDER-15 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 R_3 g_m s^2 - C_5 R_3 s + R_3 g_m}{C_3 C_5 L_5 R_3 g_m s^3 + g_m + s^2\left(C_3 C_5 R_3 + C_5 L_5 g_m\right) + s\left(C_3 R_3 g_m + 2 C_5 R_3 g_m + C_5\right)}$$

10.16 INVALID-ORDER-16 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 R_3 s^2 + L_5 R_3 g_m s - R_3}{C_3 C_5 L_5 R_3 s^3 + 2 R_3 g_m + s^2\left(C_3 L_5 R_3 g_m + 2 C_5 L_5 R_3 g_m + C_5 L_5\right) + s\left(C_3 R_3 + L_5 g_m\right) + 1}$$

10.17 INVALID-ORDER-17 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_5 R_3 g_m s^2 + R_3 g_m + s\left(C_5 R_3 R_5 g_m - C_5 R_3\right)}{C_3 C_5 L_5 R_3 g_m s^3 + g_m + s^2\left(C_3 C_5 R_3 R_5 g_m + C_3 C_5 R_3 + C_5 L_5 g_m\right) + s\left(C_3 R_3 g_m + 2 C_5 R_3 g_m + C_5 R_5 g_m + C_5\right)}$$

10.18 INVALID-ORDER-18 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5},\ \infty\right)$

$$H(s) = \frac{-C_5 L_5 R_3 R_5 s^2 - R_3 R_5 + s\left(L_5 R_3 R_5 g_m - L_5 R_3\right)}{C_3 C_5 L_5 R_3 R_5 s^3 + 2 R_3 R_5 g_m + R_5 + s^2\left(C_3 L_5 R_3 R_5 g_m + C_3 L_5 R_3 + 2 C_5 L_5 R_3 R_5 g_m + C_5 L_5 R_5\right) + s\left(C_3 R_3 R_5 + 2 L_5 R_3 g_m + L_5 R_5 g_m + L_5\right)}$$

10.19 INVALID-ORDER-19 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3 R_3 s + 1},\ \infty,\ \frac{C_5 L_5 R_5 s^2 + L_5 s + R_5}{C_5 L_5 s^2 + 1},\ \infty\right)$

$$H(s) = \frac{L_5 R_3 g_m s + R_3 R_5 g_m - R_3 + s^2\left(C_5 L_5 R_3 R_5 g_m - C_5 L_5 R_3\right)}{2 R_3 g_m + R_5 g_m + s^3\left(C_3 C_5 L_5 R_3 R_5 g_m + C_3 C_5 L_5 R_3\right) + s^2\left(C_3 L_5 R_3 g_m + 2 C_5 L_5 R_3 g_m + C_5 L_5 R_5 g_m + C_5 L_5\right) + s\left(C_3 R_3 R_5 g_m + C_3 R_3 + L_5 g_m\right) + 1}$$

10.20 INVALID-ORDER-20 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3}{C_3R_3s+1},\ \infty,\ \frac{R_5\left(C_5L_5s^2+1\right)}{C_5L_5s^2+C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_5R_3R_5s + R_3R_5g_m - R_3 + s^2\left(C_5L_5R_3R_5g_m - C_5L_5R_3\right)}{2R_3g_m + R_5g_m + s^3\left(C_3C_5L_5R_3R_5g_m + C_3C_5L_5R_3\right) + s^2\left(C_3C_5R_3R_5 + 2C_5L_5R_3g_m + C_5L_5R_5g_m + C_5L_5\right) + s\left(C_3R_3R_5g_m + C_3R_3 + 2C_5R_3R_5g_m + C_5R_5\right) + 1}$$

10.21 INVALID-ORDER-21 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ R_5,\ \infty\right)$

$$H(s) = \frac{R_5g_m + s\left(C_3R_3R_5g_m - C_3R_3\right) - 1}{2g_m + s\left(2C_3R_3g_m + C_3R_5g_m + C_3\right)}$$

10.22 INVALID-ORDER-22 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{-C_3C_5R_3s^2 + g_m + s\left(C_3R_3g_m - C_5\right)}{s^2\left(2C_3C_5R_3g_m + C_3C_5\right) + s\left(C_3g_m + 2C_5g_m\right)}$$

10.23 INVALID-ORDER-23 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{g_m + s^2\left(C_3C_5R_3R_5g_m - C_3C_5R_3\right) + s\left(C_3R_3g_m + C_5R_5g_m - C_5\right)}{s^2\left(2C_3C_5R_3g_m + C_3C_5R_5g_m + C_3C_5\right) + s\left(C_3g_m + 2C_5g_m\right)}$$

10.24 INVALID-ORDER-24 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ L_5s + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_5R_3g_ms^3 + g_m + s^2\left(-C_3C_5R_3 + C_5L_5g_m\right) + s\left(C_3R_3g_m - C_5\right)}{C_3C_5L_5g_ms^3 + s^2\left(2C_3C_5R_3g_m + C_3C_5\right) + s\left(C_3g_m + 2C_5g_m\right)}$$

10.25 INVALID-ORDER-25 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ \frac{L_5s}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_5R_3s^3 + s^2\left(C_3L_5R_3g_m - C_5L_5\right) + s\left(-C_3R_3 + L_5g_m\right) - 1}{2g_m + s^3\left(2C_3C_5L_5R_3g_m + C_3C_5L_5\right) + s^2\left(C_3L_5g_m + 2C_5L_5g_m\right) + s\left(2C_3R_3g_m + C_3\right)}$$

10.26 INVALID-ORDER-26 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ L_5s + R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_5R_3g_ms^3 + g_m + s^2\left(C_3C_5R_3R_5g_m - C_3C_5R_3 + C_5L_5g_m\right) + s\left(C_3R_3g_m + C_5R_5g_m - C_5\right)}{C_3C_5L_5g_ms^3 + s^2\left(2C_3C_5R_3g_m + C_3C_5R_5g_m + C_3C_5\right) + s\left(C_3g_m + 2C_5g_m\right)}$$

10.27 INVALID-ORDER-27 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_5R_3R_5s^3 - R_5 + s^2\left(C_3L_5R_3R_5g_m - C_3L_5R_3 - C_5L_5R_5\right) + s\left(-C_3R_3R_5 + L_5R_5g_m - L_5\right)}{2R_5g_m + s^3\left(2C_3C_5L_5R_3R_5g_m + C_3C_5L_5R_5\right) + s^2\left(2C_3L_5R_3g_m + C_3L_5R_5g_m + C_3L_5 + 2C_5L_5R_5g_m\right) + s\left(2C_3R_3R_5g_m + C_3R_5 + 2L_5g_m\right)}$$

10.28 INVALID-ORDER-28 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3s},\ \infty,\ \frac{C_5L_5R_5s^2+L_5s+R_5}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{R_5g_m + s^3\left(C_3C_5L_5R_3R_5g_m - C_3C_5L_5R_3\right) + s^2\left(C_3L_5R_3g_m + C_5L_5R_5g_m - C_5L_5\right) + s\left(C_3R_3R_5g_m - C_3R_3 + L_5g_m\right) - 1}{2g_m + s^3\left(2C_3C_5L_5R_3g_m + C_3C_5L_5R_5g_m + C_3C_5L_5\right) + s^2\left(C_3L_5g_m + 2C_5L_5g_m\right) + s\left(2C_3R_3g_m + C_3R_5g_m + C_3\right)}$$

10.29 INVALID-ORDER-29 $Z(s) = \left(\infty,\ \infty,\ R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{R_5\left(C_5 L_5 s^2+1\right)}{C_5 L_5 s^2+C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{R_5 g_m + s^3\left(C_3 C_5 L_5 R_3 R_5 g_m - C_3 C_5 L_5 R_3\right) + s^2\left(-C_3 C_5 R_3 R_5 + C_5 L_5 R_5 g_m - C_5 L_5\right) + s\left(C_3 R_3 R_5 g_m - C_3 R_3 - C_5 R_5\right) - 1}{2g_m + s^3\left(2C_3 C_5 L_5 R_3 g_m + C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2\left(2C_3 C_5 R_3 R_5 g_m + C_3 C_5 R_5 + 2C_5 L_5 g_m\right) + s\left(2C_3 R_3 g_m + C_3 R_5 g_m + C_3 + 2C_5 R_5 g_m\right)}$$

10.30 INVALID-ORDER-30 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 s^3 + C_3 L_3 g_m s^2 - C_5 s + g_m}{2C_3 C_5 L_3 g_m s^3 + C_3 C_5 s^2 + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.31 INVALID-ORDER-31 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{R_5}{C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 R_5 s^3 - C_5 R_5 s + R_5 g_m + s^2\left(C_3 L_3 R_5 g_m - C_3 L_3\right) - 1}{2C_3 C_5 L_3 R_5 g_m s^3 + 2g_m + s^2\left(C_3 C_5 R_5 + 2C_3 L_3 g_m\right) + s\left(C_3 R_5 g_m + C_3 + 2C_5 R_5 g_m\right)}$$

10.32 INVALID-ORDER-32 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_3 L_3 g_m s^2 + g_m + s^3\left(C_3 C_5 L_3 R_5 g_m - C_3 C_5 L_3\right) + s\left(C_5 R_5 g_m - C_5\right)}{2C_3 C_5 L_3 g_m s^3 + s^2\left(C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.33 INVALID-ORDER-33 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_3 C_5 L_3 L_5 g_m s^4 - C_3 C_5 L_3 s^3 - C_5 s + g_m + s^2\left(C_3 L_3 g_m + C_5 L_5 g_m\right)}{C_3 C_5 s^2 + s^3\left(2C_3 C_5 L_3 g_m + C_3 C_5 L_5 g_m\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.34 INVALID-ORDER-34 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 L_5 s^4 + C_3 L_3 L_5 g_m s^3 + L_5 g_m s + s^2\left(-C_3 L_3 - C_5 L_5\right) - 1}{2C_3 C_5 L_3 L_5 g_m s^4 + C_3 C_5 L_5 s^3 + C_3 s + 2g_m + s^2\left(2C_3 L_3 g_m + C_3 L_5 g_m + 2C_5 L_5 g_m\right)}$$

10.35 INVALID-ORDER-35 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_3 C_5 L_3 L_5 g_m s^4 + g_m + s^3\left(C_3 C_5 L_3 R_5 g_m - C_3 C_5 L_3\right) + s^2\left(C_3 L_3 g_m + C_5 L_5 g_m\right) + s\left(C_5 R_5 g_m - C_5\right)}{s^3\left(2C_3 C_5 L_3 g_m + C_3 C_5 L_5 g_m\right) + s^2\left(C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.36 INVALID-ORDER-36 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2+L_5 s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 L_5 R_5 s^4 - R_5 + s^3\left(C_3 L_3 L_5 R_5 g_m - C_3 L_3 L_5\right) + s^2\left(-C_3 L_3 R_5 - C_5 L_5 R_5\right) + s\left(L_5 R_5 g_m - L_5\right)}{2C_3 C_5 L_3 L_5 R_5 g_m s^4 + 2R_5 g_m + s^3\left(C_3 C_5 L_5 R_5 + 2C_3 L_3 L_5 g_m\right) + s^2\left(2C_3 L_3 R_5 g_m + C_3 L_5 R_5 g_m + C_3 L_5 + 2C_5 L_5 R_5 g_m\right) + s\left(C_3 R_5 + 2L_5 g_m\right)}$$

10.37 INVALID-ORDER-37 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{C_5 L_5 R_5 s^2+L_5 s+R_5}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{C_3 L_3 L_5 g_m s^3 + L_5 g_m s + R_5 g_m + s^4\left(C_3 C_5 L_3 L_5 R_5 g_m - C_3 C_5 L_3 L_5\right) + s^2\left(C_3 L_3 R_5 g_m - C_3 L_3 + C_5 L_5 R_5 g_m - C_5 L_5\right) - 1}{2C_3 C_5 L_3 L_5 g_m s^4 + 2g_m + s^3\left(C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2\left(2C_3 L_3 g_m + C_3 L_5 g_m + 2C_5 L_5 g_m\right) + s\left(C_3 R_5 g_m + C_3\right)}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(\infty,\ \infty,\ L_3 s + \frac{1}{C_3 s},\ \infty,\ \frac{R_5\left(C_5 L_5 s^2+1\right)}{C_5 L_5 s^2+C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 R_5 s^3 - C_5 R_5 s + R_5 g_m + s^4 \left(C_3 C_5 L_3 L_5 R_5 g_m - C_3 C_5 L_3 L_5\right) + s^2 \left(C_3 L_3 R_5 g_m - C_3 L_3 + C_5 L_5 R_5 g_m - C_5 L_5\right) - 1}{2 C_3 C_5 L_3 L_5 g_m s^4 + 2 g_m + s^3 \left(2 C_3 C_5 L_3 R_5 g_m + C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2 \left(C_3 C_5 R_5 + 2 C_3 L_3 g_m + 2 C_5 L_5 g_m\right) + s \left(C_3 R_5 g_m + C_3 + 2 C_5 R_5 g_m\right)}$$

10.39 INVALID-ORDER-39 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 s^2 + L_3 g_m s}{C_3 C_5 L_3 s^3 + C_5 s + g_m + s^2 \left(C_3 L_3 g_m + 2 C_5 L_3 g_m\right)}$$

10.40 INVALID-ORDER-40 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{R_5}{C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 R_5 s^2 + s \left(L_3 R_5 g_m - L_3\right)}{C_3 C_5 L_3 R_5 s^3 + R_5 g_m + s^2 \left(C_3 L_3 R_5 g_m + C_3 L_3 + 2 C_5 L_3 R_5 g_m\right) + s \left(C_5 R_5 + 2 L_3 g_m\right) + 1}$$

10.41 INVALID-ORDER-41 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{L_3 g_m s + s^2 \left(C_5 L_3 R_5 g_m - C_5 L_3\right)}{g_m + s^3 \left(C_3 C_5 L_3 R_5 g_m + C_3 C_5 L_3\right) + s^2 \left(C_3 L_3 g_m + 2 C_5 L_3 g_m\right) + s \left(C_5 R_5 g_m + C_5\right)}$$

10.42 INVALID-ORDER-42 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_3 L_5 g_m s^3 - C_5 L_3 s^2 + L_3 g_m s}{C_3 C_5 L_3 L_5 g_m s^4 + C_3 C_5 L_3 s^3 + C_5 s + g_m + s^2 \left(C_3 L_3 g_m + 2 C_5 L_3 g_m + C_5 L_5 g_m\right)}$$

10.43 INVALID-ORDER-43 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 L_5 s^3 + L_3 L_5 g_m s^2 - L_3 s}{C_3 C_5 L_3 L_5 s^4 + s^3 \left(C_3 L_3 L_5 g_m + 2 C_5 L_3 L_5 g_m\right) + s^2 \left(C_3 L_3 + C_5 L_5\right) + s \left(2 L_3 g_m + L_5 g_m\right) + 1}$$

10.44 INVALID-ORDER-44 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_3 L_5 g_m s^3 + L_3 g_m s + s^2 \left(C_5 L_3 R_5 g_m - C_5 L_3\right)}{C_3 C_5 L_3 L_5 g_m s^4 + g_m + s^3 \left(C_3 C_5 L_3 R_5 g_m + C_3 C_5 L_3\right) + s^2 \left(C_3 L_3 g_m + 2 C_5 L_3 g_m + C_5 L_5 g_m\right) + s \left(C_5 R_5 g_m + C_5\right)}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2+L_5 s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 L_5 R_5 s^3 - L_3 R_5 s + s^2 \left(L_3 L_5 R_5 g_m - L_3 L_5\right)}{C_3 C_5 L_3 L_5 R_5 s^4 + R_5 + s^3 \left(C_3 L_3 L_5 R_5 g_m + C_3 L_3 L_5 + 2 C_5 L_3 L_5 R_5 g_m\right) + s^2 \left(C_3 L_3 R_5 + C_5 L_5 R_5 + 2 L_3 L_5 g_m\right) + s \left(2 L_3 R_5 g_m + L_5 R_5 g_m + L_5\right)}$$

10.46 INVALID-ORDER-46 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{C_5 L_5 R_5 s^2+L_5 s+R_5}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{L_3 L_5 g_m s^2 + s^3 \left(C_5 L_3 L_5 R_5 g_m - C_5 L_3 L_5\right) + s \left(L_3 R_5 g_m - L_3\right)}{R_5 g_m + s^4 \left(C_3 C_5 L_3 L_5 R_5 g_m + C_3 C_5 L_3 L_5\right) + s^3 \left(C_3 L_3 L_5 g_m + 2 C_5 L_3 L_5 g_m\right) + s^2 \left(C_3 L_3 R_5 g_m + C_3 L_3 + C_5 L_5 R_5 g_m + C_5 L_5\right) + s \left(2 L_3 g_m + L_5 g_m\right) + 1}$$

10.47 INVALID-ORDER-47 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 s}{C_3 L_3 s^2+1},\ \infty,\ \frac{R_5\left(C_5 L_5 s^2+1\right)}{C_5 L_5 s^2+C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 R_5 s^2 + s^3\left(C_5 L_3 L_5 R_5 g_m - C_5 L_3 L_5\right) + s\left(L_3 R_5 g_m - L_3\right)}{R_5 g_m + s^4\left(C_3 C_5 L_3 L_5 R_5 g_m + C_3 C_5 L_3 L_5\right) + s^3\left(C_3 C_5 L_3 R_5 + 2C_5 L_3 L_5 g_m\right) + s^2\left(C_3 L_3 R_5 g_m + C_3 L_3 + 2C_5 L_3 R_5 g_m + C_5 L_5 R_5 g_m + C_5 L_5\right) + s\left(C_5 R_5 + 2L_3 g_m\right) + 1}$$

10.48 INVALID-ORDER-48 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 s^3 + g_m + s^2\left(-C_3 C_5 R_3 + C_3 L_3 g_m\right) + s\left(C_3 R_3 g_m - C_5\right)}{2C_3 C_5 L_3 g_m s^3 + s^2\left(2C_3 C_5 R_3 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.49 INVALID-ORDER-49 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{R_5}{C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 R_5 s^3 + R_5 g_m + s^2\left(-C_3 C_5 R_3 R_5 + C_3 L_3 R_5 g_m - C_3 L_3\right) + s\left(C_3 R_3 R_5 g_m - C_3 R_3 - C_5 R_5\right) - 1}{2C_3 C_5 L_3 R_5 g_m s^3 + 2g_m + s^2\left(2C_3 C_5 R_3 R_5 g_m + C_3 C_5 R_5 + 2C_3 L_3 g_m\right) + s\left(2C_3 R_3 g_m + C_3 R_5 g_m + C_3 + 2C_5 R_5 g_m\right)}$$

10.50 INVALID-ORDER-50 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{g_m + s^3\left(C_3 C_5 L_3 R_5 g_m - C_3 C_5 L_3\right) + s^2\left(C_3 C_5 R_3 R_5 g_m - C_3 C_5 R_3 + C_3 L_3 g_m\right) + s\left(C_3 R_3 g_m + C_5 R_5 g_m - C_5\right)}{2C_3 C_5 L_3 g_m s^3 + s^2\left(2C_3 C_5 R_3 g_m + C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.51 INVALID-ORDER-51 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_3 C_5 L_3 L_5 g_m s^4 + g_m + s^3\left(-C_3 C_5 L_3 + C_3 C_5 L_5 R_3 g_m\right) + s^2\left(-C_3 C_5 R_3 + C_3 L_3 g_m + C_5 L_5 g_m\right) + s\left(C_3 R_3 g_m - C_5\right)}{s^3\left(2C_3 C_5 L_3 g_m + C_3 C_5 L_5 g_m\right) + s^2\left(2C_3 C_5 R_3 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.52 INVALID-ORDER-52 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 L_5 s^4 + s^3\left(-C_3 C_5 L_5 R_3 + C_3 L_3 L_5 g_m\right) + s^2\left(-C_3 L_3 + C_3 L_5 R_3 g_m - C_5 L_5\right) + s\left(-C_3 R_3 + L_5 g_m\right) - 1}{2C_3 C_5 L_3 L_5 g_m s^4 + 2g_m + s^3\left(2C_3 C_5 L_5 R_3 g_m + C_3 C_5 L_5\right) + s^2\left(2C_3 L_3 g_m + C_3 L_5 g_m + 2C_5 L_5 g_m\right) + s\left(2C_3 R_3 g_m + C_3\right)}$$

10.53 INVALID-ORDER-53 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_3 C_5 L_3 L_5 g_m s^4 + g_m + s^3\left(C_3 C_5 L_3 R_5 g_m - C_3 C_5 L_3 + C_3 C_5 L_5 R_3 g_m\right) + s^2\left(C_3 C_5 R_3 R_5 g_m - C_3 C_5 R_3 + C_3 L_3 g_m + C_5 L_5 g_m\right) + s\left(C_3 R_3 g_m + C_5 R_5 g_m - C_5\right)}{s^3\left(2C_3 C_5 L_3 g_m + C_3 C_5 L_5 g_m\right) + s^2\left(2C_3 C_5 R_3 g_m + C_3 C_5 R_5 g_m + C_3 C_5\right) + s\left(C_3 g_m + 2C_5 g_m\right)}$$

10.54 INVALID-ORDER-54 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2+L_5 s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_3 C_5 L_3 L_5 R_5 s^4 - R_5 + s^3\left(-C_3 C_5 L_5 R_3 R_5 + C_3 L_3 L_5 R_5 g_m - C_3 L_3 L_5\right) + s^2\left(-C_3 L_3 R_5 + C_3 L_5 R_3 R_5 g_m - C_3 L_5 R_3 - C_5 L_5 R_5\right) + s\left(-C_3 R_3 R_5 + L_5 R_5 g_m - L_5\right)}{2C_3 C_5 L_3 L_5 R_5 g_m s^4 + 2R_5 g_m + s^3\left(2C_3 C_5 L_5 R_3 R_5 g_m + C_3 C_5 L_5 R_5 + 2C_3 L_3 L_5 g_m\right) + s^2\left(2C_3 L_3 R_5 g_m + 2C_3 L_5 R_3 g_m + C_3 L_5 R_5 g_m + C_3 L_5 + 2C_5 L_5 R_5 g_m\right) + s\left(2C_3 R_3 R_5 g_m + C_3 R_5 + 2L_5 g_m\right)}$$

10.55 INVALID-ORDER-55 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{C_5 L_5 R_5 s^2+L_5 s+R_5}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{R_5 g_m + s^4\left(C_3 C_5 L_3 L_5 R_5 g_m - C_3 C_5 L_3 L_5\right) + s^3\left(C_3 C_5 L_5 R_3 R_5 g_m - C_3 C_5 L_5 R_3 + C_3 L_3 L_5 g_m\right) + s^2\left(C_3 L_3 R_5 g_m - C_3 L_3 + C_3 L_5 R_3 g_m + C_5 L_5 R_5 g_m - C_5 L_5\right) + s\left(C_3 R_3 R_5 g_m - C_3 R_3 + L_5 g_m\right) - 1}{2C_3 C_5 L_3 L_5 g_m s^4 + 2g_m + s^3\left(2C_3 C_5 L_5 R_3 g_m + C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2\left(2C_3 L_3 g_m + C_3 L_5 g_m + 2C_5 L_5 g_m\right) + s\left(2C_3 R_3 g_m + C_3 R_5 g_m + C_3\right)}$$

10.56 INVALID-ORDER-56 $Z(s) = \left(\infty,\ \infty,\ L_3 s + R_3 + \frac{1}{C_3 s},\ \infty,\ \frac{R_5\left(C_5 L_5 s^2+1\right)}{C_5 L_5 s^2+C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{R_5 g_m + s^4 \left(C_3 C_5 L_3 L_5 R_5 g_m - C_3 C_5 L_3 L_5\right) + s^3 \left(-C_3 C_5 L_3 R_5 + C_3 C_5 L_5 R_3 R_5 g_m - C_3 C_5 L_5 R_3\right) + s^2 \left(-C_3 C_5 R_3 R_5 + C_3 L_3 R_5 g_m - C_3 L_3 + C_5 L_5 R_5 g_m - C_5 L_5\right) + s \left(C_3 R_3 R_5 g_m - C_3 R_3 - C_5 R_5\right) - 1}{2 C_3 C_5 L_3 L_5 g_m s^4 + 2 g_m + s^3 \left(2 C_3 C_5 L_3 R_5 g_m + 2 C_3 C_5 L_5 R_3 g_m + C_3 C_5 L_5 R_5 g_m + C_3 C_5 L_5\right) + s^2 \left(2 C_3 C_5 R_3 R_5 g_m + C_3 C_5 R_5 + 2 C_3 L_3 g_m + 2 C_5 L_5 g_m\right) + s \left(2 C_3 R_3 g_m + C_3 R_5 g_m + C_3 + 2 C_5 R_5 g_m\right)}$$

10.57 INVALID-ORDER-57 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 R_3 s^2 + L_3 R_3 g_m s}{C_3 C_5 L_3 R_3 s^3 + R_3 g_m + s^2 \left(C_3 L_3 R_3 g_m + 2 C_5 L_3 R_3 g_m + C_5 L_3\right) + s \left(C_5 R_3 + L_3 g_m\right)}$$

10.58 INVALID-ORDER-58 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ \frac{R_5}{C_5 R_5 s+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 R_3 R_5 s^2 + s \left(L_3 R_3 R_5 g_m - L_3 R_3\right)}{C_3 C_5 L_3 R_3 R_5 s^3 + R_3 R_5 g_m + R_3 + s^2 \left(C_3 L_3 R_3 R_5 g_m + C_3 L_3 R_3 + 2 C_5 L_3 R_3 R_5 g_m + C_5 L_3 R_5\right) + s \left(C_5 R_3 R_5 + 2 L_3 R_3 g_m + L_3 R_5 g_m + L_3\right)}$$

10.59 INVALID-ORDER-59 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{L_3 R_3 g_m s + s^2 \left(C_5 L_3 R_3 R_5 g_m - C_5 L_3 R_3\right)}{R_3 g_m + s^3 \left(C_3 C_5 L_3 R_3 R_5 g_m + C_3 C_5 L_3 R_3\right) + s^2 \left(C_3 L_3 R_3 g_m + 2 C_5 L_3 R_3 g_m + C_5 L_3 R_5 g_m + C_5 L_3\right) + s \left(C_5 R_3 R_5 g_m + C_5 R_3 + L_3 g_m\right)}$$

10.60 INVALID-ORDER-60 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ L_5 s + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_3 L_5 R_3 g_m s^3 - C_5 L_3 R_3 s^2 + L_3 R_3 g_m s}{C_3 C_5 L_3 L_5 R_3 g_m s^4 + R_3 g_m + s^3 \left(C_3 C_5 L_3 R_3 + C_5 L_3 L_5 g_m\right) + s^2 \left(C_3 L_3 R_3 g_m + 2 C_5 L_3 R_3 g_m + C_5 L_3 + C_5 L_5 R_3 g_m\right) + s \left(C_5 R_3 + L_3 g_m\right)}$$

10.61 INVALID-ORDER-61 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ \frac{L_5 s}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 L_5 R_3 s^3 + L_3 L_5 R_3 g_m s^2 - L_3 R_3 s}{C_3 C_5 L_3 L_5 R_3 s^4 + R_3 + s^3 \left(C_3 L_3 L_5 R_3 g_m + 2 C_5 L_3 L_5 R_3 g_m + C_5 L_3 L_5\right) + s^2 \left(C_3 L_3 R_3 + C_5 L_5 R_3 + L_3 L_5 g_m\right) + s \left(2 L_3 R_3 g_m + L_3 + L_5 R_3 g_m\right)}$$

10.62 INVALID-ORDER-62 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ L_5 s + R_5 + \frac{1}{C_5 s},\ \infty\right)$

$$H(s) = \frac{C_5 L_3 L_5 R_3 g_m s^3 + L_3 R_3 g_m s + s^2 \left(C_5 L_3 R_3 R_5 g_m - C_5 L_3 R_3\right)}{C_3 C_5 L_3 L_5 R_3 g_m s^4 + R_3 g_m + s^3 \left(C_3 C_5 L_3 R_3 R_5 g_m + C_3 C_5 L_3 R_3 + C_5 L_3 L_5 g_m\right) + s^2 \left(C_3 L_3 R_3 g_m + 2 C_5 L_3 R_3 g_m + C_5 L_3 R_5 g_m + C_5 L_3 + C_5 L_5 R_3 g_m\right) + s \left(C_5 R_3 R_5 g_m + C_5 R_3 + L_3 g_m\right)}$$

10.63 INVALID-ORDER-63 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2+L_5 s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_5 L_3 L_5 R_3 R_5 s^3 - L_3 R_3 R_5 s + s^2 \left(L_3 L_5 R_3 R_5 g_m - L_3 L_5 R_3\right)}{C_3 C_5 L_3 L_5 R_3 R_5 s^4 + R_3 R_5 + s^3 \left(C_3 L_3 L_5 R_3 R_5 g_m + C_3 L_3 L_5 R_3 + 2 C_5 L_3 L_5 R_3 R_5 g_m + C_5 L_3 L_5 R_5\right) + s^2 \left(C_3 L_3 R_3 R_5 + C_5 L_5 R_3 R_5 + 2 L_3 L_5 R_3 g_m + L_3 L_5 R_5 g_m + L_3 L_5\right) + s \left(2 L_3 R_3 R_5 g_m + L_3 R_5 + L_5 R_3 R_5 g_m + L_5 R_3\right)}$$

10.64 INVALID-ORDER-64 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2+L_3 s+R_3},\ \infty,\ \frac{C_5 L_5 R_5 s^2+L_5 s+R_5}{C_5 L_5 s^2+1},\ \infty\right)$

$$H(s) = \frac{L_3 L_5 R_3 g_m s^2 + s^3 \left(C_5 L_3 L_5 R_3 R_5 g_m - C_5 L_3 L_5 R_3\right) + s \left(L_3 R_3 R_5 g_m - L_3 R_3\right)}{R_3 R_5 g_m + R_3 + s^4 \left(C_3 C_5 L_3 L_5 R_3 R_5 g_m + C_3 C_5 L_3 L_5 R_3\right) + s^3 \left(C_3 L_3 L_5 R_3 g_m + 2 C_5 L_3 L_5 R_3 g_m + C_5 L_3 L_5 R_5 g_m + C_5 L_3 L_5\right) + s^2 \left(C_3 L_3 R_3 R_5 g_m + C_3 L_3 R_3 + C_5 L_5 R_3 R_5 g_m + C_5 L_5 R_3 + L_3 L_5 g_m\right) + s \left(2 L_3 R_3 g_m + L_3 R_5 g_m + L_3 + L_5 R_3 g_m\right)}$$

10.65 INVALID-ORDER-65 $Z(s) = \left(\infty,\ \infty,\ \frac{L_3R_3s}{C_3L_3R_3s^2+L_3s+R_3},\ \infty,\ \frac{R_5\left(C_5L_5s^2+1\right)}{C_5L_5s^2+C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_5L_3R_3R_5s^2 + s^3\left(C_5L_3L_5R_3R_5g_m - C_5L_3L_5R_3\right) + s\left(L_3R_3R_5g_m - L_3R_3\right)}{R_3R_5g_m + R_3 + s^4\left(C_3C_5L_3L_5R_3R_5g_m + C_3C_5L_3L_5R_3\right) + s^3\left(C_3C_5L_3R_3R_5 + 2C_5L_3L_5R_3g_m + C_5L_3L_5R_5g_m + C_5L_3L_5\right) + s^2\left(C_3L_3R_3R_5g_m + C_3L_3R_3 + 2C_5L_3R_3R_5g_m + C_5L_3R_5 + C_5L_5R_3R_5g_m + C_5L_5R_3\right) + s\left(C_5R_3R_5 + 2L_3R_3g_m + L_3R_5g_m + L_3\right)}$$

10.66 INVALID-ORDER-66 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3R_3s^3 + R_3g_m + s^2\left(C_3L_3R_3g_m - C_5L_3\right) + s\left(-C_5R_3 + L_3g_m\right)}{g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3\right) + s^2\left(C_3L_3g_m + 2C_5L_3g_m\right) + s\left(2C_5R_3g_m + C_5\right)}$$

10.67 INVALID-ORDER-67 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{R_5}{C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3R_3R_5s^3 + R_3R_5g_m - R_3 + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3 - C_5L_3R_5\right) + s\left(-C_5R_3R_5 + L_3R_5g_m - L_3\right)}{2R_3g_m + R_5g_m + s^3\left(2C_3C_5L_3R_3R_5g_m + C_3C_5L_3R_5\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3 + 2C_5L_3R_5g_m\right) + s\left(2C_5R_3R_5g_m + C_5R_5 + 2L_3g_m\right) + 1}$$

10.68 INVALID-ORDER-68 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{R_3g_m + s^3\left(C_3C_5L_3R_3R_5g_m - C_3C_5L_3R_3\right) + s^2\left(C_3L_3R_3g_m + C_5L_3R_5g_m - C_5L_3\right) + s\left(C_5R_3R_5g_m - C_5R_3 + L_3g_m\right)}{g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3R_5g_m + C_3C_5L_3\right) + s^2\left(C_3L_3g_m + 2C_5L_3g_m\right) + s\left(2C_5R_3g_m + C_5R_5g_m + C_5\right)}$$

10.69 INVALID-ORDER-69 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ L_5s + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_3L_5R_3g_ms^4 + R_3g_m + s^3\left(-C_3C_5L_3R_3 + C_5L_3L_5g_m\right) + s^2\left(C_3L_3R_3g_m - C_5L_3 + C_5L_5R_3g_m\right) + s\left(-C_5R_3 + L_3g_m\right)}{C_3C_5L_3L_5g_ms^4 + g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3\right) + s^2\left(C_3L_3g_m + 2C_5L_3g_m + C_5L_5g_m\right) + s\left(2C_5R_3g_m + C_5\right)}$$

10.70 INVALID-ORDER-70 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{L_5s}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3L_5R_3s^4 - R_3 + s^3\left(C_3L_3L_5R_3g_m - C_5L_3L_5\right) + s^2\left(-C_3L_3R_3 - C_5L_5R_3 + L_3L_5g_m\right) + s\left(-L_3 + L_5R_3g_m\right)}{2R_3g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5\right) + s^3\left(C_3L_3L_5g_m + 2C_5L_3L_5g_m\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3 + 2C_5L_5R_3g_m + C_5L_5\right) + s\left(2L_3g_m + L_5g_m\right) + 1}$$

10.71 INVALID-ORDER-71 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ L_5s + R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_3L_5R_3g_ms^4 + R_3g_m + s^3\left(C_3C_5L_3R_3R_5g_m - C_3C_5L_3R_3 + C_5L_3L_5g_m\right) + s^2\left(C_3L_3R_3g_m + C_5L_3R_5g_m - C_5L_3 + C_5L_5R_3g_m\right) + s\left(C_5R_3R_5g_m - C_5R_3 + L_3g_m\right)}{C_3C_5L_3L_5g_ms^4 + g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3R_5g_m + C_3C_5L_3\right) + s^2\left(C_3L_3g_m + 2C_5L_3g_m + C_5L_5g_m\right) + s\left(2C_5R_3g_m + C_5R_5g_m + C_5\right)}$$

10.72 INVALID-ORDER-72 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3L_5R_3R_5s^4 - R_3R_5 + s^3\left(C_3L_3L_5R_3R_5g_m - C_3L_3L_5R_3 - C_5L_3L_5R_5\right) + s^2\left(-C_3L_3R_3R_5 - C_5L_5R_3R_5 + L_3L_5R_5g_m - L_3L_5\right) + s\left(-L_3R_5 + L_5R_3R_5g_m - L_5R_3\right)}{2R_3R_5g_m + R_5 + s^4\left(2C_3C_5L_3L_5R_3R_5g_m + C_3C_5L_3L_5R_5\right) + s^3\left(2C_3L_3L_5R_3g_m + C_3L_3L_5R_5g_m + C_3L_3L_5 + 2C_5L_3L_5R_5g_m\right) + s^2\left(2C_3L_3R_3R_5g_m + C_3L_3R_5 + 2C_5L_5R_3R_5g_m + C_5L_5R_5 + 2L_3L_5g_m\right) + s\left(2L_3R_5g_m + 2L_5R_3g_m + L_5R_5g_m + L_5\right)}$$

10.73 INVALID-ORDER-73 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{C_5L_5R_5s^2+L_5s+R_5}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{R_3R_5g_m - R_3 + s^4\left(C_3C_5L_3L_5R_3R_5g_m - C_3C_5L_3L_5R_3\right) + s^3\left(C_3L_3L_5R_3g_m + C_5L_3L_5R_5g_m - C_5L_3L_5\right) + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3 + C_5L_5R_3R_5g_m - C_5L_5R_3 + L_3L_5g_m\right) + s\left(L_3R_5g_m - L_3 + L_5R_3g_m\right)}{2R_3g_m + R_5g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5R_5g_m + C_3C_5L_3L_5\right) + s^3\left(C_3L_3L_5g_m + 2C_5L_3L_5g_m\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3 + 2C_5L_5R_3g_m + C_5L_5R_5g_m + C_5L_5\right) + s\left(2L_3g_m + L_5g_m\right) + 1}$$

10.74 INVALID-ORDER-74 $Z(s) = \left(\infty,\ \infty,\ \frac{C_3L_3R_3s^2+L_3s+R_3}{C_3L_3s^2+1},\ \infty,\ \frac{R_5\left(C_5L_5s^2+1\right)}{C_5L_5s^2+C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{R_3R_5g_m - R_3 + s^4\left(C_3C_5L_3L_5R_3R_5g_m - C_3C_5L_3L_5R_3\right) + s^3\left(-C_3C_5L_3R_3R_5 + C_5L_3L_5R_5g_m - C_5L_3L_5\right) + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3 - C_5L_3R_5 + C_5L_5R_3R_5g_m - C_5L_5R_3\right) + s\left(-C_5R_3R_5 + L_3R_5g_m - L_3\right)}{2R_3g_m + R_5g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5R_5g_m + C_3C_5L_3L_5\right) + s^3\left(2C_3C_5L_3R_3R_5g_m + C_3C_5L_3R_5 + 2C_5L_3L_5g_m\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3 + 2C_5L_3R_5g_m + 2C_5L_5R_3g_m + C_5L_5R_5g_m + C_5L_5\right) + s\left(2C_5R_3R_5g_m + C_5R_5 + 2L_3g_m\right) + 1}$$

10.75 INVALID-ORDER-75 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3R_3s^3 + C_3L_3R_3g_ms^2 - C_5R_3s + R_3g_m}{g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3\right) + s^2\left(C_3C_5R_3 + C_3L_3g_m\right) + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5\right)}$$

10.76 INVALID-ORDER-76 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{R_5}{C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3R_3R_5s^3 - C_5R_3R_5s + R_3R_5g_m - R_3 + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3\right)}{2R_3g_m + R_5g_m + s^3\left(2C_3C_5L_3R_3R_5g_m + C_3C_5L_3R_5\right) + s^2\left(C_3C_5R_3R_5 + 2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3\right) + s\left(C_3R_3R_5g_m + C_3R_3 + 2C_5R_3R_5g_m + C_5R_5\right) + 1}$$

10.77 INVALID-ORDER-77 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3L_3R_3g_ms^2 + R_3g_m + s^3\left(C_3C_5L_3R_3R_5g_m - C_3C_5L_3R_3\right) + s\left(C_5R_3R_5g_m - C_5R_3\right)}{g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3R_5g_m + C_3C_5L_3\right) + s^2\left(C_3C_5R_3R_5g_m + C_3C_5R_3 + C_3L_3g_m\right) + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5R_5g_m + C_5\right)}$$

10.78 INVALID-ORDER-78 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ L_5s + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_3L_5R_3g_ms^4 - C_3C_5L_3R_3s^3 - C_5R_3s + R_3g_m + s^2\left(C_3L_3R_3g_m + C_5L_5R_3g_m\right)}{C_3C_5L_3L_5g_ms^4 + g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3 + C_3C_5L_5R_3g_m\right) + s^2\left(C_3C_5R_3 + C_3L_3g_m + C_5L_5g_m\right) + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5\right)}$$

10.79 INVALID-ORDER-79 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{L_5s}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3L_5R_3s^4 + C_3L_3L_5R_3g_ms^3 + L_5R_3g_ms - R_3 + s^2\left(-C_3L_3R_3 - C_5L_5R_3\right)}{2R_3g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5\right) + s^3\left(C_3C_5L_5R_3 + C_3L_3L_5g_m\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3 + C_3L_5R_3g_m + 2C_5L_5R_3g_m + C_5L_5\right) + s\left(C_3R_3 + L_5g_m\right) + 1}$$

10.80 INVALID-ORDER-80 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ L_5s + R_5 + \frac{1}{C_5s},\ \infty\right)$

$$H(s) = \frac{C_3C_5L_3L_5R_3g_ms^4 + R_3g_m + s^3\left(C_3C_5L_3R_3R_5g_m - C_3C_5L_3R_3\right) + s^2\left(C_3L_3R_3g_m + C_5L_5R_3g_m\right) + s\left(C_5R_3R_5g_m - C_5R_3\right)}{C_3C_5L_3L_5g_ms^4 + g_m + s^3\left(2C_3C_5L_3R_3g_m + C_3C_5L_3R_5g_m + C_3C_5L_3 + C_3C_5L_5R_3g_m\right) + s^2\left(C_3C_5R_3R_5g_m + C_3C_5R_3 + C_3L_3g_m + C_5L_5g_m\right) + s\left(C_3R_3g_m + 2C_5R_3g_m + C_5R_5g_m + C_5\right)}$$

10.81 INVALID-ORDER-81 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3L_5R_3R_5s^4 - R_3R_5 + s^3\left(C_3L_3L_5R_3R_5g_m - C_3L_3L_5R_3\right) + s^2\left(-C_3L_3R_3R_5 - C_5L_5R_3R_5\right) + s\left(L_5R_3R_5g_m - L_5R_3\right)}{2R_3R_5g_m + R_5 + s^4\left(2C_3C_5L_3L_5R_3R_5g_m + C_3C_5L_3L_5R_5\right) + s^3\left(C_3C_5L_5R_3R_5 + 2C_3L_3L_5R_3g_m + C_3L_3L_5R_5g_m + C_3L_3L_5\right) + s^2\left(2C_3L_3R_3R_5g_m + C_3L_3R_5 + C_3L_5R_3R_5g_m + C_3L_5R_3 + 2C_5L_5R_3R_5g_m + C_5L_5R_5\right) + s\left(C_3R_3R_5 + 2L_5R_3g_m + L_5R_5g_m + L_5\right)}$$

10.82 INVALID-ORDER-82 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{C_5L_5R_5s^2+L_5s+R_5}{C_5L_5s^2+1},\ \infty\right)$

$$H(s) = \frac{C_3L_3L_5R_3g_ms^3 + L_5R_3g_ms + R_3R_5g_m - R_3 + s^4\left(C_3C_5L_3L_5R_3R_5g_m - C_3C_5L_3L_5R_3\right) + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3 + C_5L_5R_3R_5g_m - C_5L_5R_3\right)}{2R_3g_m + R_5g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5R_5g_m + C_3C_5L_3L_5\right) + s^3\left(C_3C_5L_5R_3R_5g_m + C_3C_5L_5R_3 + C_3L_3L_5g_m\right) + s^2\left(2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3 + C_3L_5R_3g_m + 2C_5L_5R_3g_m + C_5L_5R_5g_m + C_5L_5\right) + s\left(C_3R_3R_5g_m + C_3R_3 + L_5g_m\right) + 1}$$

10.83 INVALID-ORDER-83 $Z(s) = \left(\infty,\ \infty,\ \frac{R_3\left(C_3L_3s^2+1\right)}{C_3L_3s^2+C_3R_3s+1},\ \infty,\ \frac{R_5\left(C_5L_5s^2+1\right)}{C_5L_5s^2+C_5R_5s+1},\ \infty\right)$

$$H(s) = \frac{-C_3C_5L_3R_3R_5s^3 - C_5R_3R_5s + R_3R_5g_m - R_3 + s^4\left(C_3C_5L_3L_5R_3R_5g_m - C_3C_5L_3L_5R_3\right) + s^2\left(C_3L_3R_3R_5g_m - C_3L_3R_3 + C_5L_5R_3R_5g_m - C_5L_5R_3\right)}{2R_3g_m + R_5g_m + s^4\left(2C_3C_5L_3L_5R_3g_m + C_3C_5L_3L_5R_5g_m + C_3C_5L_3L_5\right) + s^3\left(2C_3C_5L_3R_3R_5g_m + C_3C_5L_3R_5 + C_3C_5L_5R_3R_5g_m + C_3C_5L_5R_3\right) + s^2\left(C_3C_5R_3R_5 + 2C_3L_3R_3g_m + C_3L_3R_5g_m + C_3L_3 + 2C_5L_5R_3g_m + C_5L_5R_5g_m + C_5L_5\right) + s\left(C_3R_3R_5g_m + C_3R_3\right.}$$

11 PolynomialError