Filter Summary Report: TIA simple Z3 ZL

Generated by MacAnalog-Symbolix

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Contents

1 Examined $H(z)$ for TIA simple Z3 ZL: $\frac{Z_3 Z_L g_m}{Z_3 g_m + Z_L g_m}$

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

2 HP

3 BP

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

$$H(s) = \frac{L_L R_3 s}{C_L L_L R_3 s^2 + L_L s + R_3}$$

Parameters:

Q: $C_L R_3 \sqrt{\frac{1}{C_L L_L}}$

wo: $\sqrt{\frac{1}{C_L L_L}}$

bandwidth: $\frac{1}{C_L R_3}$

K-LP: 0

K-HP: 0

K-BP: R_3

Qz: 0

Wz: None

3.2 BP-2 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_3 R_L s}{C_L L_L R_3 R_L s^2 + L_L R_3 s + L_L R_L s + R_3 R_L}$$

Parameters:

Q: $\dfrac{C_L R_3 R_L \sqrt{\frac{1}{C_L L_L}}}{R_3 + R_L}$

wo: $\sqrt{\dfrac{1}{C_L L_L}}$

bandwidth: $\dfrac{R_3 + R_L}{C_L R_3 R_L}$

K-LP: 0

K-HP: 0

K-BP: $\dfrac{R_3 R_L}{R_3 + R_L}$

Qz: 0

Wz: None

3.3 BP-3 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \infty, \ \infty, \ \dfrac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \dfrac{L_L R_L s}{C_3 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

Parameters:

Q: $R_L \sqrt{\dfrac{1}{L_L (C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\dfrac{1}{L_L (C_3 + C_L)}}$

bandwidth: $\dfrac{1}{R_L (C_3 + C_L)}$

K-LP: 0

K-HP: 0

K-BP: R_L

Qz: 0

Wz: None

3.4 BP-4 $Z(s) = \left(\dfrac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \dfrac{L_L s}{C_L L_L s^2 + 1} \right)$

$$H(s) = \dfrac{L_L R_3 s}{C_3 L_L R_3 s^2 + C_L L_L R_3 s^2 + L_L s + R_3}$$

Parameters:

Q: $R_3 \sqrt{\dfrac{1}{L_L (C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\frac{1}{L_L(C_3+C_L)}}$

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

K-LP: 0

K-HP: 0

K-BP: R_3

Qz: 0

Wz: None

3.5 BP-5 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_3 R_L s}{C_3 L_L R_3 R_L s^2 + C_L L_L R_3 R_L s^2 + L_L R_3 s + L_L R_L s + R_3 R_L}$$

Parameters:

Q: $\frac{R_3 R_L \sqrt{\frac{1}{L_L(C_3+C_L)}}(C_3+C_L)}{R_3+R_L}$

wo: $\sqrt{\frac{1}{L_L(C_3+C_L)}}$

bandwidth: $\frac{R_3+R_L}{R_3 R_L(C_3+C_L)}$

K-LP: 0

K-HP: 0

K-BP: $\frac{R_3 R_L}{R_3+R_L}$

Qz: 0

Wz: None

3.6 BP-6 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L \right)$

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

Parameters:

Q: $C_3 R_L \sqrt{\frac{1}{C_3 L_3}}$

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

bandwidth: $\frac{1}{C_3 R_L}$
K-LP: 0
K-HP: 0
K-BP: R_L
Qz: 0
Wz: None

3.7 BP-7 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_L R_L s + 1} \right)$

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

Parameters:

Q: $R_L \sqrt{\frac{1}{L_3 (C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\frac{1}{L_3 (C_3 + C_L)}}$

bandwidth: $\frac{1}{R_L (C_3 + C_L)}$

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

3.8 BP-8 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_3 L_L R_L s}{C_3 L_3 L_L R_L s^2 + C_L L_3 L_L R_L s^2 + L_3 L_L s + L_3 R_L + L_L R_L}$$

Parameters:

Q: $R_L \sqrt{\frac{L_3 + L_L}{L_3 L_L (C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\frac{L_3 + L_L}{L_3 L_L (C_3 + C_L)}}$

bandwidth: $\frac{1}{R_L (C_3 + C_L)}$

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

3.9   BP-9 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L \right)$

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

Parameters:

Q: $\frac{C_3 R_3 R_L \sqrt{\frac{1}{C_3 L_3}}}{R_3 + R_L}$

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

bandwidth: $\frac{R_3 + R_L}{C_3 R_3 R_L}$

K-LP: 0

K-HP: 0

K-BP: $\frac{R_3 R_L}{R_3 + R_L}$

Qz: 0

Wz: None

3.10   BP-10 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s} \right)$

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

Parameters:

Q: $R_3 \sqrt{\frac{1}{L_3 (C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\frac{1}{L_3 (C_3 + C_L)}}$

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

K-LP: 0

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

3.11 BP-11 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \;\; \infty, \;\; \infty, \;\; \infty, \;\; \infty, \;\; \frac{R_L}{C_L R_L s + 1}\right)$

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

Parameters:

Q: $\frac{R_3 R_L \sqrt{\frac{1}{L_3(C_3 + C_L)}}(C_3 + C_L)}{R_3 + R_L}$

wo: $\sqrt{\frac{1}{L_3(C_3 + C_L)}}$

bandwidth: $\frac{R_3 + R_L}{R_3 R_L(C_3 + C_L)}$

K-LP: 0
K-HP: 0
K-BP: $\frac{R_3 R_L}{R_3 + R_L}$
Qz: 0
Wz: None

3.12 BP-12 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \;\; \infty, \;\; \infty, \;\; \infty, \;\; \infty, \;\; \frac{L_L s}{C_L L_L s^2 + 1}\right)$

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

Parameters:

Q: $R_3 \sqrt{\frac{L_3 + L_L}{L_3 L_L(C_3 + C_L)}} (C_3 + C_L)$

wo: $\sqrt{\frac{L_3 + L_L}{L_3 L_L(C_3 + C_L)}}$

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

K-LP: 0
K-HP: 0

K-BP: R_3
Qz: 0
Wz: None

3.13 BP-13 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

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

Parameters:

Q: $\frac{R_3 R_L \sqrt{\frac{L_3 + L_L}{L_3 L_L (C_3 + C_L)}} (C_3 + C_L)}{R_3 + R_L}$

wo: $\sqrt{\frac{L_3 + L_L}{L_3 L_L (C_3 + C_L)}}$

bandwidth: $\frac{R_3 + R_L}{R_3 R_L (C_3 + C_L)}$

K-LP: 0

K-HP: 0

K-BP: $\frac{R_3 R_L}{R_3 + R_L}$

Qz: 0

Wz: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_3 \left(C_L L_L s^2 + 1 \right)}{C_L L_L s^2 + C_L R_3 s + 1}$$

Parameters:

Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}}{R_3}$

wo: $\sqrt{\frac{1}{C_L L_L}}$

bandwidth: $\frac{R_3}{L_L}$

K-LP: R_3

K-HP: R_3

K-BP: 0

Qz: None

Wz: $\sqrt{\frac{1}{C_L L_L}}$

5.2 BS-2 $Z(s) = \left(R_1,\ \infty,\ \infty,\ \infty,\ \infty,\ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_3 R_L \left(C_L L_L s^2 + 1\right)}{C_L L_L R_3 s^2 + C_L L_L R_L s^2 + C_L R_3 R_L s + R_3 + R_L}$$

Parameters:

Q: $\frac{L_L\sqrt{\frac{1}{C_L L_L}}(R_3 + R_L)}{R_3 R_L}$

wo: $\sqrt{\frac{1}{C_L L_L}}$

bandwidth: $\frac{R_3 R_L}{L_L(R_3 + R_L)}$

K-LP: $\frac{R_3 R_L}{R_3 + R_L}$

K-HP: $\frac{R_3 R_L}{R_3 + R_L}$

K-BP: 0

Qz: None

Wz: $\sqrt{\frac{1}{C_L L_L}}$

5.3 BS-3 $Z(s) = \left(R_1 + \frac{1}{C_1 s},\ \infty,\ \infty,\ \infty,\ \infty,\ R_L\right)$

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

Parameters:

Q: $\dfrac{L_3\sqrt{\frac{1}{C_3L_3}}}{R_L}$

wo: $\sqrt{\dfrac{1}{C_3L_3}}$

bandwidth: $\dfrac{R_L}{L_3}$

K-LP: R_L

K-HP: R_L

K-BP: 0

Qz: None

Wz: $\sqrt{\dfrac{1}{C_3L_3}}$

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

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

Parameters:

Q: $\dfrac{L_3\sqrt{\frac{1}{C_3L_3}}(R_3+R_L)}{R_3 R_L}$

wo: $\sqrt{\dfrac{1}{C_3L_3}}$

bandwidth: $\dfrac{R_3 R_L}{L_3(R_3+R_L)}$

K-LP: $\dfrac{R_3 R_L}{R_3+R_L}$

K-HP: $\dfrac{R_3 R_L}{R_3+R_L}$

K-BP: 0

Qz: None

Wz: $\sqrt{\dfrac{1}{C_3L_3}}$

6 GE

6.1 GE-1 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_3\left(C_L L_L s^2 + C_L R_L s + 1\right)}{C_L L_L s^2 + C_L R_3 s + C_L R_L s + 1}$$

Parameters:

Q: $\frac{L_L \sqrt{\frac{1}{C_L L_L}}}{R_3 + R_L}$

wo: $\sqrt{\frac{1}{C_L L_L}}$

bandwidth: $\frac{R_3 + R_L}{L_L}$

K-LP: R_3

K-HP: R_3

K-BP: $\frac{R_3 R_L}{R_3 + R_L}$

Qz: $\frac{L_L \sqrt{\frac{1}{C_L L_L}}}{R_L}$

Wz: $\sqrt{\frac{1}{C_L L_L}}$

6.2 GE-2 $Z(s) = \left(R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$$H(s) = \frac{R_3\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_L L_L R_3 s^2 + C_L L_L R_L s^2 + L_L s + R_3 + R_L}$$

Parameters:

Q: $C_L \sqrt{\frac{1}{C_L L_L}}\left(R_3 + R_L\right)$

wo: $\sqrt{\frac{1}{C_L L_L}}$

bandwidth: $\frac{1}{C_L(R_3 + R_L)}$

K-LP: $\frac{R_3 R_L}{R_3 + R_L}$

K-HP: $\frac{R_3 R_L}{R_3 + R_L}$

K-BP: R_3

Qz: $C_L R_L \sqrt{\frac{1}{C_L L_L}}$

Wz: $\sqrt{\frac{1}{C_L L_L}}$

6.3 GE-3 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L \right)$

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

Parameters:

Q: $\frac{L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3 + R_L}$

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

bandwidth: $\frac{R_3 + R_L}{L_3}$

K-LP: R_L

K-HP: R_L

K-BP: $\frac{R_3 R_L}{R_3 + R_L}$

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

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

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

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

Parameters:

Q: $C_3 \sqrt{\frac{1}{C_3 L_3}} (R_3 + R_L)$

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

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

K-LP: $\frac{R_3 R_L}{R_3 + R_L}$

K-HP: $\frac{R_3 R_L}{R_3 + R_L}$

K-BP: R_L

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

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

7 AP

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_3 \left(C_L R_L s + 1 \right)}{C_3 C_L R_3 R_L s^2 + C_3 R_3 s + C_L R_3 s + C_L R_L s + 1}$$

Parameters:

Q: $\frac{C_3 C_L R_3 R_L \sqrt{\frac{1}{C_3 C_L R_3 R_L}}}{C_3 R_3 + C_L R_3 + C_L R_L}$

wo: $\sqrt{\frac{1}{C_3 C_L R_3 R_L}}$

bandwidth: $\frac{C_3 R_3 + C_L R_3 + C_L R_L}{C_3 C_L R_3 R_L}$

K-LP: R_3

K-HP: 0

K-BP: $\frac{C_L R_3 R_L}{C_3 R_3 + C_L R_3 + C_L R_L}$

Qz: 0

Wz: None

8.2 INVALID-NUMER-2 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{R_L \left(C_3 R_3 s + 1 \right)}{C_3 C_L R_3 R_L s^2 + C_3 R_3 s + C_3 R_L s + C_L R_L s + 1}$$

Parameters:

Q: $\frac{C_3 C_L R_3 R_L \sqrt{\frac{1}{C_3 C_L R_3 R_L}}}{C_3 R_3 + C_3 R_L + C_L R_L}$

wo: $\sqrt{\frac{1}{C_3 C_L R_3 R_L}}$

bandwidth: $\frac{C_3 R_3 + C_3 R_L + C_L R_L}{C_3 C_L R_3 R_L}$

K-LP: R_L

K-HP: 0

K-BP: $\frac{C_3 R_3 R_L}{C_3 R_3 + C_3 R_L + C_L R_L}$
Qz: 0
Wz: None

9   INVALID-WZ

10   INVALID-ORDER

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

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

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

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

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

$$H(s) = \frac{R_3 R_L}{C_L R_3 R_L s + R_3 + R_L}$$

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

$$H(s) = \frac{R_3\left(C_L R_L s + 1\right)}{C_L R_3 s + C_L R_L s + 1}$$

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

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

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

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

10.7 INVALID-ORDER-7 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_L R_L s + 1}\right)$

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

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

$$H(s) = \frac{C_L R_L s + 1}{s\,(C_3 C_L R_L s + C_3 + C_L)}$$

10.9 INVALID-ORDER-9 $Z(s) = \left(L_1 s, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s}\right)$

$$H(s) = \frac{C_L L_L s^2 + 1}{s\,(C_3 C_L L_L s^2 + C_3 + C_L)}$$

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

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

10.11 **INVALID-ORDER-11** $Z(s) = \left(L_1 s, \; \infty, \; \infty, \; \infty, \; \infty, \; L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{C_L L_L s^2 + C_L R_L s + 1}{s\left(C_3 C_L L_L s^2 + C_3 C_L R_L s + C_3 + C_L\right)}$$

10.12 **INVALID-ORDER-12** $Z(s) = \left(L_1 s, \; \infty, \; \infty, \; \infty, \; \infty, \; \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$

$$H(s) = \frac{C_L L_L R_L s^2 + L_L s + R_L}{C_3 C_L L_L R_L s^3 + C_3 L_L s^2 + C_3 R_L s + C_L L_L s^2 + 1}$$

10.13 **INVALID-ORDER-13** $Z(s) = \left(L_1 s, \; \infty, \; \infty, \; \infty, \; \infty, \; \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$

$$H(s) = \frac{R_L\left(C_L L_L s^2 + 1\right)}{C_3 C_L L_L R_L s^3 + C_3 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.14 **INVALID-ORDER-14** $Z(s) = \left(\frac{1}{C_1 s}, \; \infty, \; \infty, \; \infty, \; \infty, \; R_L\right)$

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

10.15 **INVALID-ORDER-15** $Z(s) = \left(\frac{1}{C_1 s}, \; \infty, \; \infty, \; \infty, \; \infty, \; \frac{1}{C_L s}\right)$

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

10.16 **INVALID-ORDER-16** $Z(s) = \left(\frac{1}{C_1 s}, \; \infty, \; \infty, \; \infty, \; \infty, \; \frac{R_L}{C_L R_L s + 1}\right)$

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

10.17 INVALID-ORDER-17 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_3 \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_L R_3 s^3 + C_3 R_3 s + C_L L_L s^2 + C_L R_3 s + 1}$$

10.18 INVALID-ORDER-18 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_3 \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{C_3 C_L L_L R_3 s^3 + C_3 C_L R_3 R_L s^2 + C_3 R_3 s + C_L L_L s^2 + C_L R_3 s + C_L R_L s + 1}$$

10.19 INVALID-ORDER-19 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{R_3 \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_L R_3 R_L s^3 + C_3 L_L R_3 s^2 + C_3 R_3 R_L s + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + L_L s + R_3 + R_L}$$

10.20 INVALID-ORDER-20 $Z(s) = \left(\frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_3 R_L \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_L R_3 R_L s^3 + C_3 R_3 R_L s + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + C_L R_3 R_L s + R_3 + R_L}$$

10.21 INVALID-ORDER-21 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L \right)$

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

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

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

10.23 INVALID-ORDER-23 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_3 R_3 s + 1 \right) \left(C_L R_L s + 1 \right)}{s \left(C_3 C_L R_3 s + C_3 C_L R_L s + C_3 + C_L \right)}$$

10.24 INVALID-ORDER-24 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_3 R_3 s + 1 \right) \left(C_L L_L s^2 + 1 \right)}{s \left(C_3 C_L L_L s^2 + C_3 C_L R_3 s + C_3 + C_L \right)}$$

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

$$H(s) = \frac{L_L s \left(C_3 R_3 s + 1 \right)}{C_3 C_L L_L R_3 s^3 + C_3 L_L s^2 + C_3 R_3 s + C_L L_L s^2 + 1}$$

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

$$H(s) = \frac{\left(C_3 R_3 s + 1 \right) \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{s \left(C_3 C_L L_L s^2 + C_3 C_L R_3 s + C_3 C_L R_L s + C_3 + C_L \right)}$$

10.27 INVALID-ORDER-27 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_L s \left(C_3 R_3 s + 1 \right)}{C_3 C_L L_L R_3 R_L s^3 + C_3 L_L R_3 s^2 + C_3 L_L R_L s^2 + C_3 R_3 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

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

$$H(s) = \frac{(C_3 R_3 s + 1)\left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_3 C_L L_L R_3 s^3 + C_3 C_L L_L R_L s^3 + C_3 L_L s^2 + C_3 R_3 s + C_3 R_L s + C_L L_L s^2 + 1}$$

10.29   INVALID-ORDER-29 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_L\left(C_3 R_3 s + 1\right)\left(C_L L_L s^2 + 1\right)}{C_3 C_L L_L R_3 s^3 + C_3 C_L L_L R_L s^3 + C_3 C_L R_3 R_L s^2 + C_3 R_3 s + C_3 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.30   INVALID-ORDER-30 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s} \right)$

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

10.31   INVALID-ORDER-31 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{R_L\left(C_3 L_3 s^2 + 1\right)}{C_3 C_L L_3 R_L s^3 + C_3 L_3 s^2 + C_3 R_L s + C_L R_L s + 1}$$

10.32   INVALID-ORDER-32 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

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

10.33 **INVALID-ORDER-33** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

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

10.34 **INVALID-ORDER-34** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} \right)$

$$H(s) = \frac{L_L s \left(C_3 L_3 s^2 + 1 \right)}{C_3 C_L L_3 L_L s^4 + C_3 L_3 s^2 + C_3 L_L s^2 + C_L L_L s^2 + 1}$$

10.35 **INVALID-ORDER-35** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{s \left(C_3 C_L L_3 s^2 + C_3 C_L L_L s^2 + C_3 C_L R_L s + C_3 + C_L \right)}$$

10.36 **INVALID-ORDER-36** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_L s \left(C_3 L_3 s^2 + 1 \right)}{C_3 C_L L_3 L_L R_L s^4 + C_3 L_3 L_L s^3 + C_3 L_3 R_L s^2 + C_3 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

10.37 **INVALID-ORDER-37** $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{\left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_L R_L s^3 + C_3 L_3 s^2 + C_3 L_L s^2 + C_3 R_L s + C_L L_L s^2 + 1}$$

10.38 INVALID-ORDER-38 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_L \left(C_3 L_3 s^2 + 1\right)\left(C_L L_L s^2 + 1\right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_L s^3 + C_3 C_L L_L R_L s^3 + C_3 L_3 s^2 + C_3 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.39 INVALID-ORDER-39 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s} \right)$

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

10.40 INVALID-ORDER-40 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_3 s \left(C_L R_L s + 1\right)}{C_3 C_L L_3 R_L s^3 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L R_L s + 1}$$

10.41 INVALID-ORDER-41 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_3 s \left(C_L L_L s^2 + 1\right)}{C_3 C_L L_3 L_L s^4 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L L_L s^2 + 1}$$

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

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

10.43 INVALID-ORDER-43 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_3 s \left(C_L L_L s^2 + C_L R_L s + 1\right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_L s^3 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L L_L s^2 + C_L R_L s + 1}$$

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

$$H(s) = \frac{L_3 s \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L R_L s^4 + C_3 L_3 L_L s^3 + C_3 L_3 R_L s^2 + C_L L_3 L_L s^3 + C_L L_L R_L s^2 + L_3 s + L_L s + R_L}$$

10.45 INVALID-ORDER-45 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{L_3 R_L s \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_3 L_L R_L s^4 + C_3 L_3 R_L s^2 + C_L L_3 L_L s^3 + C_L L_3 R_L s^2 + C_L L_L R_L s^2 + L_3 s + R_L}$$

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

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

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

$$H(s) = \frac{R_L \left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right)}{C_3 C_L L_3 R_L s^3 + C_3 C_L R_3 R_L s^2 + C_3 L_3 s^2 + C_3 R_3 s + C_3 R_L s + C_L R_L s + 1}$$

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

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

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

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

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

$$H(s) = \frac{L_L s \left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_L R_3 s^3 + C_3 L_3 s^2 + C_3 L_L s^2 + C_3 R_3 s + C_L L_L s^2 + 1}$$

10.51 INVALID-ORDER-51 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right) \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{s \left(C_3 C_L L_3 s^2 + C_3 C_L L_L s^2 + C_3 C_L R_3 s + C_3 C_L R_L s + C_3 + C_L \right)}$$

10.52 INVALID-ORDER-52 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_L s \left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right)}{C_3 C_L L_3 L_L R_L s^4 + C_3 C_L L_L R_3 R_L s^3 + C_3 L_3 L_L s^3 + C_3 L_3 R_L s^2 + C_3 L_L R_3 s^2 + C_3 L_L R_L s^2 + C_3 R_3 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

10.53 INVALID-ORDER-53 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{\left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right) \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_L R_3 s^3 + C_3 C_L L_L R_L s^3 + C_3 L_3 s^2 + C_3 L_L s^2 + C_3 R_3 s + C_3 R_L s + C_L L_L s^2 + 1}$$

10.54 INVALID-ORDER-54 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_3 L_3 s^2 + C_3 R_3 s + 1 \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_L s^3 + C_3 C_L L_L R_3 s^3 + C_3 C_L L_L R_L s^3 + C_3 C_L R_3 R_L s^2 + C_3 L_3 s^2 + C_3 R_3 s + C_3 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

10.55 INVALID-ORDER-55 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_3 R_3 s \left(C_L R_L s + 1 \right)}{C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_L L_3 R_3 s^2 + C_L L_3 R_L s^2 + C_L R_3 R_L s + L_3 s + R_3}$$

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

$$H(s) = \frac{L_3 R_3 s \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 L_3 R_3 s^2 + C_L L_3 L_L s^3 + C_L L_3 R_3 s^2 + C_L L_L R_3 s^2 + L_3 s + R_3}$$

10.57 INVALID-ORDER-57 $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_3 R_3 s \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_L L_3 L_L s^3 + C_L L_3 R_3 s^2 + C_L L_3 R_L s^2 + C_L L_L R_3 s^2 + C_L R_3 R_L s + L_3 s + R_3}$$

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

$$H(s) = \frac{L_3 R_3 s \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L R_3 R_L s^4 + C_3 L_3 L_L R_3 s^3 + C_3 L_3 R_3 R_L s^2 + C_L L_3 L_L R_3 s^3 + C_L L_3 L_L R_L s^3 + C_L L_L R_3 R_L s^2 + L_3 L_L s^2 + L_3 R_3 s + L_3 R_L s + L_L R_3 s + R_3 R_L}$$

10.59 **INVALID-ORDER-59** $Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{L_3 R_3 R_L s \left(C_L L_L s^2 + 1\right)}{C_3 C_L L_3 L_L R_3 R_L s^4 + C_3 L_3 R_3 R_L s^2 + C_L L_3 L_L R_3 s^3 + C_L L_3 L_L R_L s^3 + C_L L_3 R_3 R_L s^2 + C_L L_L R_3 R_L s^2 + L_3 R_3 s + L_3 R_L s + R_3 R_L}$$

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

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

10.61 **INVALID-ORDER-61** $Z(s) = \left(\frac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{R_L \left(C_3 L_3 R_3 s^2 + L_3 s + R_3\right)}{C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_L L_3 R_L s^2 + C_L R_3 R_L s + L_3 s + R_3 + R_L}$$

10.62 **INVALID-ORDER-62** $Z(s) = \left(\frac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{(C_L R_L s + 1)\left(C_3 L_3 R_3 s^2 + L_3 s + R_3\right)}{C_3 C_L L_3 R_3 s^3 + C_3 C_L L_3 R_L s^3 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L R_3 s + C_L R_L s + 1}$$

10.63 **INVALID-ORDER-63** $Z(s) = \left(\frac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right)\left(C_3 L_3 R_3 s^2 + L_3 s + R_3\right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_3 s^3 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L L_L s^2 + C_L R_3 s + 1}$$

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

$$H(s) = \frac{L_L s \left(C_3 L_3 R_3 s^2 + L_3 s + R_3 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 L_3 L_L s^3 + C_3 L_3 R_3 s^2 + C_L L_3 L_L s^3 + C_L L_L R_3 s^2 + L_3 s + L_L s + R_3}$$

10.65 **INVALID-ORDER-65** $Z(s) = \left(\dfrac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ L_L s + R_L + \dfrac{1}{C_L s} \right)$

$$H(s) = \frac{\left(C_L L_L s^2 + C_L R_L s + 1 \right) \left(C_3 L_3 R_3 s^2 + L_3 s + R_3 \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_3 s^3 + C_3 C_L L_3 R_L s^3 + C_3 L_3 s^2 + C_L L_3 s^2 + C_L L_L s^2 + C_L R_3 s + C_L R_L s + 1}$$

10.66 **INVALID-ORDER-66** $Z(s) = \left(\dfrac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ \dfrac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_L s \left(C_3 L_3 R_3 s^2 + L_3 s + R_3 \right)}{C_3 C_L L_3 L_L R_3 R_L s^4 + C_3 L_3 L_L R_3 s^3 + C_3 L_3 L_L R_L s^3 + C_3 L_3 R_3 R_L s^2 + C_L L_3 L_L R_L s^3 + C_L L_L R_3 R_L s^2 + L_3 L_L s^2 + L_3 R_L s + L_L R_3 s + L_L R_L s + R_3 R_L}$$

10.67 **INVALID-ORDER-67** $Z(s) = \left(\dfrac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ \dfrac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{\left(C_3 L_3 R_3 s^2 + L_3 s + R_3 \right) \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 C_L L_3 L_L R_L s^4 + C_3 L_3 L_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_L L_3 L_L s^3 + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + L_3 s + L_L s + R_3 + R_L}$$

10.68 **INVALID-ORDER-68** $Z(s) = \left(\dfrac{1}{C_1 s + \frac{1}{R_1} + \frac{1}{L_1 s}}, \ \infty, \ \infty, \ \infty, \ \infty, \ \dfrac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_3 L_3 R_3 s^2 + L_3 s + R_3 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 C_L L_3 L_L R_L s^4 + C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_L L_3 L_L s^3 + C_L L_3 R_L s^2 + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + C_L R_3 R_L s + L_3 s + R_3 + R_L}$$

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

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

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

$$H(s) = \frac{R_3 R_L \left(C_3 L_3 s^2 + 1 \right)}{C_3 C_L L_3 R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_3 R_3 R_L s + C_L R_3 R_L s + R_3 + R_L}$$

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

$$H(s) = \frac{R_3 \left(C_3 L_3 s^2 + 1 \right) \left(C_L R_L s + 1 \right)}{C_3 C_L L_3 R_3 s^3 + C_3 C_L L_3 R_L s^3 + C_3 C_L R_3 R_L s^2 + C_3 L_3 s^2 + C_3 R_3 s + C_L R_3 s + C_L R_L s + 1}$$

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

$$H(s) = \frac{R_3 \left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_3 s^3 + C_3 C_L L_L R_3 s^3 + C_3 L_3 s^2 + C_3 R_3 s + C_L L_L s^2 + C_L R_3 s + 1}$$

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

$$H(s) = \frac{L_L R_3 s \left(C_3 L_3 s^2 + 1 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 L_3 L_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_L R_3 s^2 + C_L L_L R_3 s^2 + L_L s + R_3}$$

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

$$H(s) = \frac{R_3 \left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L s^2 + C_L R_L s + 1 \right)}{C_3 C_L L_3 L_L s^4 + C_3 C_L L_3 R_3 s^3 + C_3 C_L L_3 R_L s^3 + C_3 C_L L_L R_3 s^3 + C_3 C_L R_3 R_L s^2 + C_3 L_3 s^2 + C_3 R_3 s + C_L L_L s^2 + C_L R_3 s + C_L R_L s + 1}$$

10.75 **INVALID-ORDER-75** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}} \right)$

$$H(s) = \frac{L_L R_3 R_L s \left(C_3 L_3 s^2 + 1 \right)}{C_3 C_L L_3 L_L R_3 R_L s^4 + C_3 L_3 L_L R_3 s^3 + C_3 L_3 L_L R_L s^3 + C_3 L_3 R_3 R_L s^2 + C_3 L_L R_3 R_L s^2 + C_L L_L R_3 R_L s^2 + L_L R_3 s + L_L R_L s + R_3 R_L}$$

10.76 **INVALID-ORDER-76** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{R_3 \left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L R_L s^2 + L_L s + R_L \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 C_L L_3 L_L R_L s^4 + C_3 C_L L_L R_3 R_L s^3 + C_3 L_3 L_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_3 L_L R_3 s^2 + C_3 R_3 R_L s + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + L_L s + R_3 + R_L}$$

10.77 **INVALID-ORDER-77** $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \ \infty, \ \infty, \ \infty, \ \infty, \ \frac{R_L \left(L_L s + \frac{1}{C_L s} \right)}{L_L s + R_L + \frac{1}{C_L s}} \right)$

$$H(s) = \frac{R_3 R_L \left(C_3 L_3 s^2 + 1 \right) \left(C_L L_L s^2 + 1 \right)}{C_3 C_L L_3 L_L R_3 s^4 + C_3 C_L L_3 L_L R_L s^4 + C_3 C_L L_3 R_3 R_L s^3 + C_3 C_L L_L R_3 R_L s^3 + C_3 L_3 R_3 s^2 + C_3 L_3 R_L s^2 + C_3 R_3 R_L s + C_L L_L R_3 s^2 + C_L L_L R_L s^2 + C_L R_3 R_L s + R_3 + R_L}$$