

# Filter Summary Report: TIA,simple,Z2,Z5

Generated by MacAnalog-Symbolix

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10.48INVALID-ORDER-48	$Z(s) = \left( \infty, L_2 s + R_2 + \frac{1}{C_2 s}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$	12
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10.53INVALID-ORDER-53	$Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	13
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10.58INVALID-ORDER-58	$Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	13
10.59INVALID-ORDER-59	$Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$	13
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10.65INVALID-ORDER-65	$Z(s) = \left( \infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$	14
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10.67INVALID-ORDER-67	$Z(s) = \left( \infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	14
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10.70INVALID-ORDER-70	$Z(s) = \left( \infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	14
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## 11 PolynomialError

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# 1 Examined $H(z)$ for TIA simple Z2 Z5: $\frac{Z_2 Z_5 g_m - Z_2 + Z_5}{2Z_2 g_m + 4}$

$$H(z) = \frac{Z_2 Z_5 g_m - Z_2 + Z_5}{2Z_2 g_m + 4}$$

## 2 HP

## 3 BP

## 4 LP

## 5 BS

## 6 GE

### 6.1 GE-1

$$Z(s) = \left( \infty, R_2, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$$

$$H(s) = \frac{-C_5 L_5 R_2 R_5 s^2 - R_2 R_5 + s (L_5 R_2 R_5 g_m - L_5 R_2 + L_5 R_5)}{2R_2 R_5 g_m + 4R_5 + s^2 (2C_5 L_5 R_2 R_5 g_m + 4C_5 L_5 R_5) + s (2L_5 R_2 g_m + 4L_5)}$$

Parameters:

$$\begin{aligned} \text{Q: } & C_5 R_5 \sqrt{\frac{1}{C_5 L_5}} \\ \text{wo: } & \sqrt{\frac{1}{C_5 L_5}} \\ \text{bandwidth: } & \frac{1}{C_5 R_5} \\ \text{K-LP: } & -\frac{R_2}{2R_2 g_m + 4} \\ \text{K-HP: } & -\frac{R_2}{2R_2 g_m + 4} \\ \text{K-BP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{QZ: } & -\frac{C_5 R_2 R_5 \sqrt{\frac{1}{C_5 L_5}}}{R_2 R_5 g_m - R_2 + R_5} \\ \text{WZ: } & \sqrt{\frac{1}{C_5 L_5}} \end{aligned}$$

### 6.2 GE-2

$$Z(s) = \left( \infty, R_2, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = \frac{-C_5 R_2 R_5 s + R_2 R_5 g_m - R_2 + R_5 + s^2 (C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5)}{2R_2 g_m + s^2 (2C_5 L_5 R_2 g_m + 4C_5 L_5) + s (2C_5 R_2 R_5 g_m + 4C_5 R_5) + 4}$$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{L_5 \sqrt{\frac{1}{C_5 L_5}}}{R_5} \\ \text{wo: } & \sqrt{\frac{1}{C_5 L_5}} \\ \text{bandwidth: } & \frac{R_5}{L_5} \\ \text{K-LP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{K-HP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{K-BP: } & -\frac{R_2}{2R_2 g_m + 4} \\ \text{QZ: } & \frac{L_5 \sqrt{\frac{1}{C_5 L_5}} (-R_2 R_5 g_m + R_2 - R_5)}{R_2 R_5} \\ \text{WZ: } & \sqrt{\frac{1}{C_5 L_5}} \end{aligned}$$

**6.3 GE-3**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{C_2 R_5 s + R_5 g_m + s^2 (C_2 L_2 R_5 g_m - C_2 L_2) - 1}{2C_2 L_2 g_m s^2 + 4C_2 s + 2g_m}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{L_2 g_m \sqrt{\frac{1}{C_2 L_2}}}{2} \\ \text{wo: } & \sqrt{\frac{1}{C_2 L_2}} \\ \text{bandwidth: } & \frac{2}{L_2 g_m} \\ \text{K-LP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-HP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-BP: } & \frac{R_5}{4} \\ \text{QZ: } & \frac{L_2 \sqrt{\frac{1}{C_2 L_2}} (R_5 g_m - 1)}{R_5} \\ \text{WZ: } & \sqrt{\frac{1}{C_2 L_2}} \end{aligned}$$

**6.4 GE-4**  $Z(s) = \left( \infty, L_2 s + R_2 + \frac{1}{C_2 s}, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{R_5 g_m + s^2 (C_2 L_2 R_5 g_m - C_2 L_2) + s (C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5) - 1}{2C_2 L_2 g_m s^2 + 2g_m + s (2C_2 R_2 g_m + 4C_2)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{L_2 g_m \sqrt{\frac{1}{C_2 L_2}}}{R_2 g_m + 2} \\ \text{wo: } & \sqrt{\frac{1}{C_2 L_2}} \\ \text{bandwidth: } & \frac{R_2 g_m + 2}{L_2 g_m} \\ \text{K-LP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-HP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-BP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{QZ: } & \frac{L_2 \sqrt{\frac{1}{C_2 L_2}} (R_5 g_m - 1)}{R_2 R_5 g_m - R_2 + R_5} \\ \text{WZ: } & \sqrt{\frac{1}{C_2 L_2}} \end{aligned}$$

**6.5 GE-5**  $Z(s) = \left( \infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5 + s^2 (C_2 L_2 R_2 R_5 g_m - C_2 L_2 R_2 + C_2 L_2 R_5) + s (L_2 R_5 g_m - L_2)}{2L_2 g_m s + 2R_2 g_m + s^2 (2C_2 L_2 R_2 g_m + 4C_2 L_2) + 4}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_2 \sqrt{\frac{1}{C_2 L_2}} (R_2 g_m + 2)}{g_m} \\ \text{wo: } & \sqrt{\frac{1}{C_2 L_2}} \\ \text{bandwidth: } & \frac{g_m}{C_2 (R_2 g_m + 2)} \\ \text{K-LP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{K-HP: } & \frac{R_2 R_5 g_m - R_2 + R_5}{2(R_2 g_m + 2)} \\ \text{K-BP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{QZ: } & \frac{C_2 \sqrt{\frac{1}{C_2 L_2}} (R_2 R_5 g_m - R_2 + R_5)}{R_5 g_m - 1} \\ \text{WZ: } & \sqrt{\frac{1}{C_2 L_2}} \end{aligned}$$

**6.6 GE-6**  $Z(s) = \left( \infty, \frac{R_2(C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{C_2 R_2 R_5 s + R_2 R_5 g_m - R_2 + R_5 + s^2 (C_2 L_2 R_2 R_5 g_m - C_2 L_2 R_2 + C_2 L_2 R_5)}{4 C_2 R_2 s + 2 R_2 g_m + s^2 (2 C_2 L_2 R_2 g_m + 4 C_2 L_2) + 4}$$

**Parameters:**

Q:  $\frac{L_2 \sqrt{\frac{1}{C_2 L_2}} (R_2 g_m + 2)}{2 R_2}$   
 wo:  $\sqrt{\frac{1}{C_2 L_2}}$   
 bandwidth:  $\frac{2 R_2}{L_2 (R_2 g_m + 2)}$   
 K-LP:  $\frac{R_2 R_5 g_m - R_2 + R_5}{2 (R_2 g_m + 2)}$   
 K-HP:  $\frac{R_2 R_5 g_m - R_2 + R_5}{2 (R_2 g_m + 2)}$   
 K-BP:  $\frac{R_5}{4}$   
 QZ:  $\frac{L_2 \sqrt{\frac{1}{C_2 L_2}} (R_2 R_5 g_m - R_2 + R_5)}{R_2 R_5}$   
 Wz:  $\sqrt{\frac{1}{C_2 L_2}}$

## 7 AP

## 8 INVALID-NUMER

**8.1 INVALID-NUMER-1**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{R_5 g_m + s (C_2 R_5 - C_5 R_5) - 1}{4 C_2 C_5 R_5 s^2 + 2 g_m + s (4 C_2 + 2 C_5 R_5 g_m)}$$

**Parameters:**

Q:  $\frac{\sqrt{2} C_2 C_5 R_5 \sqrt{\frac{g_m}{C_2 C_5 R_5}}}{2 C_2 + C_5 R_5 g_m}$   
 wo:  $\frac{\sqrt{2} \sqrt{\frac{g_m}{C_2 C_5 R_5}}}{2}$   
 bandwidth:  $\frac{2 C_2 + C_5 R_5 g_m}{2 C_2 C_5 R_5}$   
 K-LP:  $\frac{R_5 g_m - 1}{2 g_m}$   
 K-HP: 0  
 K-BP:  $\frac{R_5 (C_2 - C_5)}{2 (2 C_2 + C_5 R_5 g_m)}$   
 QZ: 0  
 Wz: None

**8.2 INVALID-NUMER-2**  $Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5 + s (C_2 R_2 R_5 - C_5 R_2 R_5)}{4 C_2 C_5 R_2 R_5 s^2 + 2 R_2 g_m + s (4 C_2 R_2 + 2 C_5 R_2 R_5 g_m + 4 C_5 R_5) + 4}$$

**Parameters:**

Q:  $\frac{\sqrt{2} C_2 C_5 R_2 R_5 \sqrt{\frac{R_2 g_m + 2}{C_2 C_5 R_2 R_5}}}{2 C_2 R_2 + C_5 R_2 R_5 g_m + 2 C_5 R_5}$   
 wo:  $\frac{\sqrt{2} \sqrt{\frac{R_2 g_m + 2}{C_2 C_5 R_2 R_5}}}{2}$   
 bandwidth:  $\frac{2 C_2 R_2 + C_5 R_2 R_5 g_m + 2 C_5 R_5}{2 C_2 C_5 R_2 R_5}$   
 K-LP:  $\frac{R_2 R_5 g_m - R_2 + R_5}{2 (R_2 g_m + 2)}$   
 K-HP: 0  
 K-BP:  $\frac{R_2 R_5 (C_2 - C_5)}{2 (2 C_2 R_2 + C_5 R_2 R_5 g_m + 2 C_5 R_5)}$   
 QZ: 0  
 Wz: None

## 9 INVALID-WZ

**9.1 INVALID-WZ-1**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 R_2 R_5 s^2 + R_5 g_m + s (C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5 - C_5 R_5) - 1}{2g_m + s^2 (2C_2 C_5 R_2 R_5 g_m + 4C_2 C_5 R_5) + s (2C_2 R_2 g_m + 4C_2 + 2C_5 R_5 g_m)}$$

**Parameters:**

Q:  $\frac{C_2 C_5 R_5 \sqrt{\frac{g_m}{C_2 C_5 R_5 (R_2 g_m + 2)}} (R_2 g_m + 2)}{C_2 R_2 g_m + 2C_2 + C_5 R_5 g_m}$

wo:  $\sqrt{\frac{g_m}{C_2 C_5 R_5 (R_2 g_m + 2)}}$

bandwidth:  $\frac{C_2 R_2 g_m + 2C_2 + C_5 R_5 g_m}{C_2 C_5 R_5 (R_2 g_m + 2)}$

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

K-HP:  $-\frac{R_2}{2R_2 g_m + 4}$

K-BP:  $\frac{C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5 - C_5 R_5}{2(C_2 R_2 g_m + 2C_2 + C_5 R_5 g_m)}$

QZ:  $-\frac{C_2 C_5 R_2 R_5 \sqrt{\frac{g_m}{C_2 C_5 R_5 (R_2 g_m + 2)}}}{C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5 - C_5 R_5}$

WZ:  $\sqrt{\frac{-R_5 g_m + 1}{C_2 C_5 R_2 R_5}}$

## 10 INVALID-ORDER

**10.1 INVALID-ORDER-1**  $Z(s) = (\infty, R_2, \infty, \infty, R_5, \infty)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5}{2R_2 g_m + 4}$$

**10.2 INVALID-ORDER-2**  $Z(s) = \left( \infty, R_2, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{-C_5 R_2 s + R_2 g_m + 1}{s (2C_5 R_2 g_m + 4C_5)}$$

**10.3 INVALID-ORDER-3**  $Z(s) = \left( \infty, R_2, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{-C_5 R_2 R_5 s + R_2 R_5 g_m - R_2 + R_5}{2R_2 g_m + s (2C_5 R_2 R_5 g_m + 4C_5 R_5) + 4}$$

**10.4 INVALID-ORDER-4**  $Z(s) = \left( \infty, R_2, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{R_2 g_m + s (C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{s (2C_5 R_2 g_m + 4C_5)}$$

**10.5 INVALID-ORDER-5**  $Z(s) = \left( \infty, R_2, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{-C_5 R_2 s + R_2 g_m + s^2 (C_5 L_5 R_2 g_m + C_5 L_5) + 1}{s (2C_5 R_2 g_m + 4C_5)}$$

**10.6 INVALID-ORDER-6**  $Z(s) = \left( \infty, R_2, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$

$$H(s) = \frac{-C_5 L_5 R_2 s^2 - R_2 + s (L_5 R_2 g_m + L_5)}{2R_2 g_m + s^2 (2C_5 L_5 R_2 g_m + 4C_5 L_5) + 4}$$

**10.7 INVALID-ORDER-7**  $Z(s) = \left( \infty, R_2, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^2 (C_5 L_5 R_2 g_m + C_5 L_5) + s (C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{s (2C_5 R_2 g_m + 4C_5)}$$

**10.8 INVALID-ORDER-8**  $Z(s) = \left( \infty, R_2, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5 + s^2 (C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5) + s (L_5 R_2 g_m + L_5)}{2R_2 g_m + s^2 (2C_5 L_5 R_2 g_m + 4C_5 L_5) + 4}$$

**10.9 INVALID-ORDER-9**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{C_2 R_5 s + R_5 g_m - 1}{4C_2 s + 2g_m}$$

**10.10 INVALID-ORDER-10**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{g_m + s (C_2 - C_5)}{4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.11 INVALID-ORDER-11**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{C_2 C_5 R_5 s^2 + g_m + s (C_2 + C_5 R_5 g_m - C_5)}{4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.12 INVALID-ORDER-12**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_5 s^3 + C_5 L_5 g_m s^2 + g_m + s (C_2 - C_5)}{4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.13 INVALID-ORDER-13**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$

$$H(s) = \frac{L_5 g_m s + s^2 (C_2 L_5 - C_5 L_5) - 1}{4C_2 C_5 L_5 s^3 + 4C_2 s + 2C_5 L_5 g_m s^2 + 2g_m}$$

**10.14 INVALID-ORDER-14**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_5 s^3 + g_m + s^2 (C_2 C_5 R_5 + C_5 L_5 g_m) + s (C_2 + C_5 R_5 g_m - C_5)}{4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.15 INVALID-ORDER-15**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$

$$H(s) = \frac{-R_5 + s^2 (C_2 L_5 R_5 - C_5 L_5 R_5) + s (L_5 R_5 g_m - L_5)}{4C_2 C_5 L_5 R_5 s^3 + 2R_5 g_m + s^2 (4C_2 L_5 + 2C_5 L_5 R_5 g_m) + s (4C_2 R_5 + 2L_5 g_m)}$$

**10.16 INVALID-ORDER-16**  $Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_5 R_5 s^3 + R_5 g_m + s^2 (C_2 L_5 + C_5 L_5 R_5 g_m - C_5 L_5) + s (C_2 R_5 + L_5 g_m) - 1}{4C_2 C_5 L_5 s^3 + 4C_2 s + 2C_5 L_5 g_m s^2 + 2g_m}$$



$$10.17 \quad \text{INVALID-ORDER-17} \quad Z(s) = \left( \infty, \frac{1}{C_2 s}, \infty, \infty, \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = \frac{C_2 C_5 L_5 R_5 s^3 + R_5 g_m + s^2 (C_5 L_5 R_5 g_m - C_5 L_5) + s (C_2 R_5 - C_5 R_5) - 1}{4 C_2 C_5 L_5 s^3 + 2 g_m + s^2 (4 C_2 C_5 R_5 + 2 C_5 L_5 g_m) + s (4 C_2 + 2 C_5 R_5 g_m)}$$

$$10.18 \quad \text{INVALID-ORDER-18} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_5, \infty \right)$$

$$H(s) = \frac{C_2 R_2 R_5 s + R_2 R_5 g_m - R_2 + R_5}{4 C_2 R_2 s + 2 R_2 g_m + 4}$$

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_2 g_m + s (C_2 R_2 - C_5 R_2) + 1}{4 C_2 C_5 R_2 s^2 + s (2 C_5 R_2 g_m + 4 C_5)}$$

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{C_2 C_5 R_2 R_5 s^2 + R_2 g_m + s (C_2 R_2 + C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{4 C_2 C_5 R_2 s^2 + s (2 C_5 R_2 g_m + 4 C_5)}$$

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{C_2 C_5 L_5 R_2 s^3 + R_2 g_m + s^2 (C_5 L_5 R_2 g_m + C_5 L_5) + s (C_2 R_2 - C_5 R_2) + 1}{4 C_2 C_5 R_2 s^2 + s (2 C_5 R_2 g_m + 4 C_5)}$$

$$10.22 \quad \text{INVALID-ORDER-22} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$$

$$H(s) = \frac{-R_2 + s^2 (C_2 L_5 R_2 - C_5 L_5 R_2) + s (L_5 R_2 g_m + L_5)}{4 C_2 C_5 L_5 R_2 s^3 + 4 C_2 R_2 s + 2 R_2 g_m + s^2 (2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + 4}$$

$$10.23 \quad \text{INVALID-ORDER-23} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{C_2 C_5 L_5 R_2 s^3 + R_2 g_m + s^2 (C_2 C_5 R_2 R_5 + C_5 L_5 R_2 g_m + C_5 L_5) + s (C_2 R_2 + C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{4 C_2 C_5 R_2 s^2 + s (2 C_5 R_2 g_m + 4 C_5)}$$

$$10.24 \quad \text{INVALID-ORDER-24} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$$

$$H(s) = \frac{-R_2 R_5 + s^2 (C_2 L_5 R_2 R_5 - C_5 L_5 R_2 R_5) + s (L_5 R_2 R_5 g_m - L_5 R_2 + L_5 R_5)}{4 C_2 C_5 L_5 R_2 R_5 s^3 + 2 R_2 R_5 g_m + 4 R_5 + s^2 (4 C_2 L_5 R_2 + 2 C_5 L_5 R_2 R_5 g_m + 4 C_5 L_5 R_5) + s (4 C_2 R_2 R_5 + 2 L_5 R_2 g_m + 4 L_5)}$$

$$10.25 \quad \text{INVALID-ORDER-25} \quad Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$$

$$H(s) = \frac{C_2 C_5 L_5 R_2 R_5 s^3 + R_2 R_5 g_m - R_2 + R_5 + s^2 (C_2 L_5 R_2 + C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5) + s (C_2 R_2 R_5 + L_5 R_2 g_m + L_5)}{4 C_2 C_5 L_5 R_2 s^3 + 4 C_2 R_2 s + 2 R_2 g_m + s^2 (2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + 4}$$

**10.26 INVALID-ORDER-26**  $Z(s) = \left( \infty, \frac{R_2}{C_2 R_2 s + 1}, \infty, \infty, \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_5 R_2 R_5 s^3 + R_2 R_5 g_m - R_2 + R_5 + s^2 (C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5) + s (C_2 R_2 R_5 - C_5 R_2 R_5)}{4 C_2 C_5 L_5 R_2 s^3 + 2 R_2 g_m + s^2 (4 C_2 C_5 R_2 R_5 + 2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + s (4 C_2 R_2 + 2 C_5 R_2 R_5 g_m + 4 C_5 R_5) + 4}$$

**10.27 INVALID-ORDER-27**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{R_5 g_m + s (C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5) - 1}{2 g_m + s (2 C_2 R_2 g_m + 4 C_2)}$$

**10.28 INVALID-ORDER-28**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 R_2 s^2 + g_m + s (C_2 R_2 g_m + C_2 - C_5)}{2 C_5 g_m s + s^2 (2 C_2 C_5 R_2 g_m + 4 C_2 C_5)}$$

**10.29 INVALID-ORDER-29**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{g_m + s^2 (C_2 C_5 R_2 R_5 g_m - C_2 C_5 R_2 + C_2 C_5 R_5) + s (C_2 R_2 g_m + C_2 + C_5 R_5 g_m - C_5)}{2 C_5 g_m s + s^2 (2 C_2 C_5 R_2 g_m + 4 C_2 C_5)}$$

**10.30 INVALID-ORDER-30**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{g_m + s^3 (C_2 C_5 L_5 R_2 g_m + C_2 C_5 L_5) + s^2 (-C_2 C_5 R_2 + C_5 L_5 g_m) + s (C_2 R_2 g_m + C_2 - C_5)}{2 C_5 g_m s + s^2 (2 C_2 C_5 R_2 g_m + 4 C_2 C_5)}$$

**10.31 INVALID-ORDER-31**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_5 R_2 s^3 + s^2 (C_2 L_5 R_2 g_m + C_2 L_5 - C_5 L_5) + s (-C_2 R_2 + L_5 g_m) - 1}{2 C_5 L_5 g_m s^2 + 2 g_m + s^3 (2 C_2 C_5 L_5 R_2 g_m + 4 C_2 C_5 L_5) + s (2 C_2 R_2 g_m + 4 C_2)}$$

**10.32 INVALID-ORDER-32**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{g_m + s^3 (C_2 C_5 L_5 R_2 g_m + C_2 C_5 L_5) + s^2 (C_2 C_5 R_2 R_5 g_m - C_2 C_5 R_2 + C_2 C_5 R_5 + C_5 L_5 g_m) + s (C_2 R_2 g_m + C_2 + C_5 R_5 g_m - C_5)}{2 C_5 g_m s + s^2 (2 C_2 C_5 R_2 g_m + 4 C_2 C_5)}$$

**10.33 INVALID-ORDER-33**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_5 R_2 R_5 s^3 - R_5 + s^2 (C_2 L_5 R_2 R_5 g_m - C_2 L_5 R_2 + C_2 L_5 R_5 - C_5 L_5 R_5) + s (-C_2 R_2 R_5 + L_5 R_5 g_m - L_5)}{2 R_5 g_m + s^3 (2 C_2 C_5 L_5 R_2 R_5 g_m + 4 C_2 C_5 L_5 R_5) + s^2 (2 C_2 L_5 R_2 g_m + 4 C_2 L_5 + 2 C_5 L_5 R_5 g_m) + s (2 C_2 R_2 R_5 g_m + 4 C_2 R_5 + 2 L_5 g_m)}$$

**10.34 INVALID-ORDER-34**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$

$$H(s) = \frac{R_5 g_m + s^3 (C_2 C_5 L_5 R_2 R_5 g_m - C_2 C_5 L_5 R_2 + C_2 C_5 L_5 R_5) + s^2 (C_2 L_5 R_2 g_m + C_2 L_5 + C_5 L_5 R_5 g_m - C_5 L_5) + s (C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5 + L_5 g_m) - 1}{2 C_5 L_5 g_m s^2 + 2 g_m + s^3 (2 C_2 C_5 L_5 R_2 g_m + 4 C_2 C_5 L_5) + s (2 C_2 R_2 g_m + 4 C_2)}$$

**10.35 INVALID-ORDER-35**  $Z(s) = \left( \infty, R_2 + \frac{1}{C_2 s}, \infty, \infty, \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{R_5 g_m + s^3 (C_2 C_5 L_5 R_2 R_5 g_m - C_2 C_5 L_5 R_2 + C_2 C_5 L_5 R_5) + s^2 (-C_2 C_5 R_2 R_5 + C_5 L_5 R_5 g_m - C_5 L_5) + s (C_2 R_2 R_5 g_m - C_2 R_2 + C_2 R_5 - C_5 R_5) - 1}{2g_m + s^3 (2C_2 C_5 L_5 R_2 g_m + 4C_2 C_5 L_5) + s^2 (2C_2 C_5 R_2 R_5 g_m + 4C_2 C_5 R_5 + 2C_5 L_5 g_m) + s (2C_2 R_2 g_m + 4C_2 + 2C_5 R_5 g_m)}$$

**10.36 INVALID-ORDER-36**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 s^3 + C_2 L_2 g_m s^2 + g_m + s (C_2 - C_5)}{2C_2 C_5 L_2 g_m s^3 + 4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.37 INVALID-ORDER-37**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 R_5 s^3 + R_5 g_m + s^2 (C_2 L_2 R_5 g_m - C_2 L_2) + s (C_2 R_5 - C_5 R_5) - 1}{2C_2 C_5 L_2 R_5 g_m s^3 + 2g_m + s^2 (4C_2 C_5 R_5 + 2C_2 L_2 g_m) + s (4C_2 + 2C_5 R_5 g_m)}$$

**10.38 INVALID-ORDER-38**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{g_m + s^3 (C_2 C_5 L_2 R_5 g_m - C_2 C_5 L_2) + s^2 (C_2 C_5 R_5 + C_2 L_2 g_m) + s (C_2 + C_5 R_5 g_m - C_5)}{2C_2 C_5 L_2 g_m s^3 + 4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.39 INVALID-ORDER-39**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_2 L_5 g_m s^4 + g_m + s^3 (-C_2 C_5 L_2 + C_2 C_5 L_5) + s^2 (C_2 L_2 g_m + C_5 L_5 g_m) + s (C_2 - C_5)}{2C_2 C_5 L_2 g_m s^3 + 4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.40 INVALID-ORDER-40**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 L_5 s^4 + C_2 L_2 L_5 g_m s^3 + L_5 g_m s + s^2 (-C_2 L_2 + C_2 L_5 - C_5 L_5) - 1}{2C_2 C_5 L_2 L_5 g_m s^4 + 4C_2 C_5 L_5 s^3 + 4C_2 s + 2g_m + s^2 (2C_2 L_2 g_m + 2C_5 L_5 g_m)}$$

**10.41 INVALID-ORDER-41**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{C_2 C_5 L_2 L_5 g_m s^4 + g_m + s^3 (C_2 C_5 L_2 R_5 g_m - C_2 C_5 L_2 + C_2 C_5 L_5) + s^2 (C_2 C_5 R_5 + C_2 L_2 g_m + C_5 L_5 g_m) + s (C_2 + C_5 R_5 g_m - C_5)}{2C_2 C_5 L_2 g_m s^3 + 4C_2 C_5 s^2 + 2C_5 g_m s}$$

**10.42 INVALID-ORDER-42**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 L_5 R_5 s^4 - R_5 + s^3 (C_2 L_2 L_5 R_5 g_m - C_2 L_2 L_5) + s^2 (-C_2 L_2 R_5 + C_2 L_5 R_5 - C_5 L_5 R_5) + s (L_5 R_5 g_m - L_5)}{2C_2 C_5 L_2 L_5 R_5 g_m s^4 + 2R_5 g_m + s^3 (4C_2 C_5 L_5 R_5 + 2C_2 L_2 L_5 g_m) + s^2 (2C_2 L_2 R_5 g_m + 4C_2 L_5 + 2C_5 L_5 R_5 g_m) + s (4C_2 R_5 + 2L_5 g_m)}$$

**10.43 INVALID-ORDER-43**  $Z(s) = \left( \infty, L_2 s + \frac{1}{C_2 s}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$

$$H(s) = \frac{R_5 g_m + s^4 (C_2 C_5 L_2 L_5 R_5 g_m - C_2 C_5 L_2 L_5) + s^3 (C_2 C_5 L_5 R_5 + C_2 L_2 L_5 g_m) + s^2 (C_2 L_2 R_5 g_m - C_2 L_2 + C_2 L_5 + C_5 L_5 R_5 g_m - C_5 L_5) + s (C_2 R_5 + L_5 g_m) - 1}{2C_2 C_5 L_2 L_5 g_m s^4 + 4C_2 C_5 L_5 s^3 + 4C_2 s + 2g_m + s^2 (2C_2 L_2 g_m + 2C_5 L_5 g_m)}$$

**10.44 INVALID-ORDER-44**  $Z(s) = \left( \infty, L_2s + \frac{1}{C_2s}, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$

$$H(s) = \frac{R_5g_m + s^4(C_2C_5L_2L_5R_5g_m - C_2C_5L_2L_5) + s^3(-C_2C_5L_2R_5 + C_2C_5L_5R_5) + s^2(C_2L_2R_5g_m - C_2L_2 + C_5L_5R_5g_m - C_5L_5) + s(C_2R_5 - C_5R_5) - 1}{2C_2C_5L_2L_5g_ms^4 + 2g_m + s^3(2C_2C_5L_2R_5g_m + 4C_2C_5L_5) + s^2(4C_2C_5R_5 + 2C_2L_2g_m + 2C_5L_5g_m) + s(4C_2 + 2C_5R_5g_m)}$$

**10.45 INVALID-ORDER-45**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2s^3 + g_m + s^2(-C_2C_5R_2 + C_2L_2g_m) + s(C_2R_2g_m + C_2 - C_5)}{2C_2C_5L_2g_ms^3 + 2C_5g_ms + s^2(2C_2C_5R_2g_m + 4C_2C_5)}$$

**10.46 INVALID-ORDER-46**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2R_5s^3 + R_5g_m + s^2(-C_2C_5R_2R_5 + C_2L_2R_5g_m - C_2L_2) + s(C_2R_2R_5g_m - C_2R_2 + C_2R_5 - C_5R_5) - 1}{2C_2C_5L_2R_5g_ms^3 + 2g_m + s^2(2C_2C_5R_2R_5g_m + 4C_2C_5R_5 + 2C_2L_2g_m) + s(2C_2R_2g_m + 4C_2 + 2C_5R_5g_m)}$$

**10.47 INVALID-ORDER-47**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{g_m + s^3(C_2C_5L_2R_5g_m - C_2C_5L_2) + s^2(C_2C_5R_2R_5g_m - C_2C_5R_2 + C_2C_5R_5 + C_2L_2g_m) + s(C_2R_2g_m + C_2 + C_5R_5g_m - C_5)}{2C_2C_5L_2g_ms^3 + 2C_5g_ms + s^2(2C_2C_5R_2g_m + 4C_2C_5)}$$

**10.48 INVALID-ORDER-48**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{C_2C_5L_2L_5g_ms^4 + g_m + s^3(-C_2C_5L_2 + C_2C_5L_5R_2g_m + C_2C_5L_5) + s^2(-C_2C_5R_2 + C_2L_2g_m + C_5L_5g_m) + s(C_2R_2g_m + C_2 - C_5)}{2C_2C_5L_2g_ms^3 + 2C_5g_ms + s^2(2C_2C_5R_2g_m + 4C_2C_5)}$$

**10.49 INVALID-ORDER-49**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2L_5s^4 + s^3(-C_2C_5L_5R_2 + C_2L_2L_5g_m) + s^2(-C_2L_2 + C_2L_5R_2g_m + C_2L_5 - C_5L_5) + s(-C_2R_2 + L_5g_m) - 1}{2C_2C_5L_2L_5g_ms^4 + 2g_m + s^3(2C_2C_5L_5R_2g_m + 4C_2C_5L_5) + s^2(2C_2L_2g_m + 2C_5L_5g_m) + s(2C_2R_2g_m + 4C_2)}$$

**10.50 INVALID-ORDER-50**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{C_2C_5L_2L_5g_ms^4 + g_m + s^3(C_2C_5L_2R_5g_m - C_2C_5L_2 + C_2C_5L_5R_2g_m + C_2C_5L_5) + s^2(C_2C_5R_2R_5g_m - C_2C_5R_2 + C_2C_5R_5 + C_2L_2g_m + C_5L_5g_m) + s(C_2R_2g_m + C_2 + C_5R_5g_m - C_5)}{2C_2C_5L_2g_ms^3 + 2C_5g_ms + s^2(2C_2C_5R_2g_m + 4C_2C_5)}$$

**10.51 INVALID-ORDER-51**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2L_5R_5s^4 - R_5 + s^3(-C_2C_5L_5R_2R_5 + C_2L_2L_5R_5g_m - C_2L_2L_5) + s^2(-C_2L_2R_5 + C_2L_5R_2R_5g_m - C_2L_5R_2 + C_2L_5R_5 - C_5L_5R_5) + s(-C_2R_2R_5 + L_5R_5g_m - L_5)}{2C_2C_5L_2L_5R_5g_ms^4 + 2R_5g_m + s^3(2C_2C_5L_5R_2R_5g_m + 4C_2C_5L_5R_5 + 2C_2L_2L_5g_m) + s^2(2C_2L_2R_5g_m + 2C_2L_5R_2g_m + 4C_2L_5 + 2C_5L_5R_5g_m) + s(2C_2R_2R_5g_m + 4C_2R_5 + 2L_5g_m)}$$

**10.52 INVALID-ORDER-52**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$

$$H(s) = \frac{R_5g_m + s^4(C_2C_5L_2L_5R_5g_m - C_2C_5L_2L_5) + s^3(C_2C_5L_5R_2R_5g_m - C_2C_5L_5R_2 + C_2C_5L_5R_5 + C_2L_2L_5g_m) + s^2(C_2L_2R_5g_m - C_2L_2 + C_2L_5R_2g_m + C_2L_5 + C_5L_5R_5g_m - C_5L_5) + s(C_2R_2R_5g_m - C_2R_2 + C_2R_5 + L_5g_m) - 1}{2C_2C_5L_2L_5g_ms^4 + 2g_m + s^3(2C_2C_5L_5R_2g_m + 4C_2C_5L_5) + s^2(2C_2L_2g_m + 2C_5L_5g_m) + s(2C_2R_2g_m + 4C_2)}$$

**10.53 INVALID-ORDER-53**  $Z(s) = \left( \infty, L_2s + R_2 + \frac{1}{C_2s}, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$

$$H(s) = \frac{R_5g_m + s^4(C_2C_5L_2L_5R_5g_m - C_2C_5L_2L_5) + s^3(-C_2C_5L_2R_5 + C_2C_5L_5R_2R_5g_m - C_2C_5L_5R_2 + C_2C_5L_5R_5) + s^2(-C_2C_5R_2R_5 + C_2L_2R_5g_m - C_2L_2 + C_5L_5R_5g_m - C_5L_5) + s(C_2R_2R_5g_m - C_2R_2 + C_2R_5 - C_5R_5) - 1}{2C_2C_5L_2L_5g_ms^4 + 2g_m + s^3(2C_2C_5L_2R_5g_m + 2C_2C_5L_5R_2g_m + 4C_2C_5L_5) + s^2(2C_2C_5R_2R_5g_m + 4C_2C_5R_5 + 2C_2L_2g_m + 2C_5L_5g_m) + s(2C_2R_2g_m + 4C_2 + 2C_5R_5g_m)}$$

**10.54 INVALID-ORDER-54**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2R_2s^3 + R_2g_m + s^2(C_2L_2R_2g_m + C_2L_2 - C_5L_2) + s(-C_5R_2 + L_2g_m) + 1}{2C_5L_2g_ms^2 + s^3(2C_2C_5L_2R_2g_m + 4C_2C_5L_2) + s(2C_5R_2g_m + 4C_5)}$$

**10.55 INVALID-ORDER-55**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2R_2R_5s^3 + R_2R_5g_m - R_2 + R_5 + s^2(C_2L_2R_2R_5g_m - C_2L_2R_2 + C_2L_2R_5 - C_5L_2R_5) + s(-C_5R_2R_5 + L_2R_5g_m - L_2)}{2R_2g_m + s^3(2C_2C_5L_2R_2R_5g_m + 4C_2C_5L_2R_5) + s^2(2C_2L_2R_2g_m + 4C_2L_2 + 2C_5L_2R_5g_m) + s(2C_5R_2R_5g_m + 4C_5R_5 + 2L_2g_m) + 4}$$

**10.56 INVALID-ORDER-56**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{R_2g_m + s^3(C_2C_5L_2R_2R_5g_m - C_2C_5L_2R_2 + C_2C_5L_2R_5) + s^2(C_2L_2R_2g_m + C_2L_2 + C_5L_2R_5g_m - C_5L_2) + s(C_5R_2R_5g_m - C_5R_2 + C_5R_5 + L_2g_m) + 1}{2C_5L_2g_ms^2 + s^3(2C_2C_5L_2R_2g_m + 4C_2C_5L_2) + s(2C_5R_2g_m + 4C_5)}$$

**10.57 INVALID-ORDER-57**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{R_2g_m + s^4(C_2C_5L_2L_5R_2g_m + C_2C_5L_2L_5) + s^3(-C_2C_5L_2R_2 + C_5L_2L_5g_m) + s^2(C_2L_2R_2g_m + C_2L_2 - C_5L_2 + C_5L_5R_2g_m + C_5L_5) + s(-C_5R_2 + L_2g_m) + 1}{2C_5L_2g_ms^2 + s^3(2C_2C_5L_2R_2g_m + 4C_2C_5L_2) + s(2C_5R_2g_m + 4C_5)}$$

**10.58 INVALID-ORDER-58**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2L_5R_2s^4 - R_2 + s^3(C_2L_2L_5R_2g_m + C_2L_2L_5 - C_5L_2L_5) + s^2(-C_2L_2R_2 - C_5L_5R_2 + L_2L_5g_m) + s(-L_2 + L_5R_2g_m + L_5)}{2C_5L_2L_5g_ms^3 + 2L_2g_ms + 2R_2g_m + s^4(2C_2C_5L_2L_5R_2g_m + 4C_2C_5L_2L_5) + s^2(2C_2L_2R_2g_m + 4C_2L_2 + 2C_5L_5R_2g_m + 4C_5L_5) + 4}$$

**10.59 INVALID-ORDER-59**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{R_2g_m + s^4(C_2C_5L_2L_5R_2g_m + C_2C_5L_2L_5) + s^3(C_2C_5L_2R_2R_5g_m - C_2C_5L_2R_2 + C_2C_5L_2R_5 + C_5L_2L_5g_m) + s^2(C_2L_2R_2g_m + C_2L_2 + C_5L_2R_5g_m - C_5L_2 + C_5L_5R_2g_m + C_5L_5) + s(C_5R_2R_5g_m - C_5R_2 + C_5R_5 + L_2g_m) + 1}{2C_5L_2g_ms^2 + s^3(2C_2C_5L_2R_2g_m + 4C_2C_5L_2) + s(2C_5R_2g_m + 4C_5)}$$

**10.60 INVALID-ORDER-60**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$

$$H(s) = \frac{-C_2C_5L_2L_5R_2R_5s^4 - R_2R_5 + s^3(C_2L_2L_5R_2R_5g_m - C_2L_2L_5R_2 + C_2L_2L_5R_5 - C_5L_2L_5R_5) + s^2(-C_2L_2R_2R_5 - C_5L_5R_2R_5 + L_2L_5R_5g_m - L_2L_5) + s(-L_2R_5 + L_5R_2R_5g_m - L_5R_2 + L_5R_5)}{2R_2R_5g_m + 4R_5 + s^4(2C_2C_5L_2L_5R_2R_5g_m + 4C_2C_5L_2L_5R_5) + s^3(2C_2L_2L_5R_2g_m + 4C_2L_2L_5 + 2C_5L_2L_5R_5g_m) + s^2(2C_2L_2R_2R_5g_m + 4C_2L_2R_5 + 2C_5L_5R_2R_5g_m + 4C_5L_5R_5 + 2L_2L_5g_m) + s(2L_2R_5g_m + 2L_5R_2g_m + 4L_5)}$$

**10.61 INVALID-ORDER-61**  $Z(s) = \left( \infty, \frac{L_2s}{C_2L_2s^2+1} + R_2, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$

$$H(s) = \frac{R_2R_5g_m - R_2 + R_5 + s^4(C_2C_5L_2L_5R_2R_5g_m - C_2C_5L_2L_5R_2 + C_2C_5L_2L_5R_5) + s^3(C_2L_2L_5R_2g_m + C_2L_2L_5 + C_5L_2L_5R_5g_m - C_5L_2L_5) + s^2(C_2L_2R_2R_5g_m - C_2L_2R_2 + C_2L_2R_5 + C_5L_5R_2R_5g_m - C_5L_5R_2 + C_5L_5R_5 + L_2L_5g_m) + s(L_2R_5g_m - L_2 + L_5R_2g_m)}{2C_5L_2L_5g_ms^3 + 2L_2g_ms + 2R_2g_m + s^4(2C_2C_5L_2L_5R_2g_m + 4C_2C_5L_2L_5) + s^2(2C_2L_2R_2g_m + 4C_2L_2 + 2C_5L_5R_2g_m + 4C_5L_5) + 4}$$

**10.62 INVALID-ORDER-62**  $Z(s) = \left( \infty, \frac{L_2 s}{C_2 L_2 s^2 + 1} + R_2, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5 + s^4 (C_2 C_5 L_2 L_5 R_2 R_5 g_m - C_2 C_5 L_2 L_5 R_2 + C_2 C_5 L_2 L_5 R_5) + s^3 (-C_2 C_5 L_2 R_2 R_5 + C_5 L_2 L_5 R_5 g_m - C_5 L_2 L_5) + s^2 (C_2 L_2 R_2 R_5 g_m - C_2 L_2 R_2 + C_2 L_2 R_5 - C_5 L_2 R_5 + C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5) + s (-C_5 R_2 R_5 + L_2 R_5 g_m - L_2)}{2 R_2 g_m + s^4 (2 C_2 C_5 L_2 L_5 R_2 g_m + 4 C_2 C_5 L_2 L_5) + s^3 (2 C_2 C_5 L_2 R_2 R_5 g_m + 4 C_2 C_5 L_2 R_5 + 2 C_5 L_2 L_5 g_m) + s^2 (2 C_2 L_2 R_2 g_m + 4 C_2 L_2 + 2 C_5 L_2 R_5 g_m + 2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + s (2 C_5 R_2 R_5 g_m + 4 C_5 R_5 + 2 L_2 g_m) + 4}$$

**10.63 INVALID-ORDER-63**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 R_2 s^3 + R_2 g_m + s^2 (C_2 L_2 R_2 g_m + C_2 L_2) + s (C_2 R_2 - C_5 R_2) + 1}{4 C_2 C_5 R_2 s^2 + s^3 (2 C_2 C_5 L_2 R_2 g_m + 4 C_2 C_5 L_2) + s (2 C_5 R_2 g_m + 4 C_5)}$$

**10.64 INVALID-ORDER-64**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 R_2 R_5 s^3 + R_2 R_5 g_m - R_2 + R_5 + s^2 (C_2 L_2 R_2 R_5 g_m - C_2 L_2 R_2 + C_2 L_2 R_5) + s (C_2 R_2 R_5 - C_5 R_2 R_5)}{2 R_2 g_m + s^3 (2 C_2 C_5 L_2 R_2 R_5 g_m + 4 C_2 C_5 L_2 R_5) + s^2 (4 C_2 C_5 R_2 R_5 + 2 C_2 L_2 R_2 g_m + 4 C_2 L_2) + s (4 C_2 R_2 + 2 C_5 R_2 R_5 g_m + 4 C_5 R_5) + 4}$$

**10.65 INVALID-ORDER-65**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^3 (C_2 C_5 L_2 R_2 R_5 g_m - C_2 C_5 L_2 R_2 + C_2 C_5 L_2 R_5) + s^2 (C_2 C_5 R_2 R_5 + C_2 L_2 R_2 g_m + C_2 L_2) + s (C_2 R_2 + C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{4 C_2 C_5 R_2 s^2 + s^3 (2 C_2 C_5 L_2 R_2 g_m + 4 C_2 C_5 L_2) + s (2 C_5 R_2 g_m + 4 C_5)}$$

**10.66 INVALID-ORDER-66**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^4 (C_2 C_5 L_2 L_5 R_2 g_m + C_2 C_5 L_2 L_5) + s^3 (-C_2 C_5 L_2 R_2 + C_2 C_5 L_5 R_2) + s^2 (C_2 L_2 R_2 g_m + C_2 L_2 + C_5 L_5 R_2 g_m + C_5 L_5) + s (C_2 R_2 - C_5 R_2) + 1}{4 C_2 C_5 R_2 s^2 + s^3 (2 C_2 C_5 L_2 R_2 g_m + 4 C_2 C_5 L_2) + s (2 C_5 R_2 g_m + 4 C_5)}$$

**10.67 INVALID-ORDER-67**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 L_5 R_2 s^4 - R_2 + s^3 (C_2 L_2 L_5 R_2 g_m + C_2 L_2 L_5) + s^2 (-C_2 L_2 R_2 + C_2 L_5 R_2 - C_5 L_5 R_2) + s (L_5 R_2 g_m + L_5)}{4 C_2 C_5 L_5 R_2 s^3 + 4 C_2 R_2 s + 2 R_2 g_m + s^4 (2 C_2 C_5 L_2 L_5 R_2 g_m + 4 C_2 C_5 L_2 L_5) + s^2 (2 C_2 L_2 R_2 g_m + 4 C_2 L_2 + 2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + 4}$$

**10.68 INVALID-ORDER-68**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{R_2 g_m + s^4 (C_2 C_5 L_2 L_5 R_2 g_m + C_2 C_5 L_2 L_5) + s^3 (C_2 C_5 L_2 R_2 R_5 g_m - C_2 C_5 L_2 R_2 + C_2 C_5 L_2 R_5 + C_2 C_5 L_5 R_2) + s^2 (C_2 C_5 R_2 R_5 + C_2 L_2 R_2 g_m + C_2 L_2 + C_5 L_5 R_2 g_m + C_5 L_5) + s (C_2 R_2 + C_5 R_2 R_5 g_m - C_5 R_2 + C_5 R_5) + 1}{4 C_2 C_5 R_2 s^2 + s^3 (2 C_2 C_5 L_2 R_2 g_m + 4 C_2 C_5 L_2) + s (2 C_5 R_2 g_m + 4 C_5)}$$

**10.69 INVALID-ORDER-69**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$

$$H(s) = \frac{-C_2 C_5 L_2 L_5 R_2 R_5 s^4 - R_2 R_5 + s^3 (C_2 L_2 L_5 R_2 R_5 g_m - C_2 L_2 L_5 R_2 + C_2 L_2 L_5 R_5) + s^2 (-C_2 L_2 R_2 R_5 + C_2 L_5 R_2 R_5 - C_5 L_5 R_2 R_5) + s (L_5 R_2 R_5 g_m - L_5 R_2 + L_5 R_5)}{2 R_2 R_5 g_m + 4 R_5 + s^4 (2 C_2 C_5 L_2 L_5 R_2 R_5 g_m + 4 C_2 C_5 L_2 L_5 R_5) + s^3 (4 C_2 C_5 L_5 R_2 R_5 + 2 C_2 L_2 L_5 R_2 g_m + 4 C_2 L_2 L_5) + s^2 (2 C_2 L_2 R_2 R_5 g_m + 4 C_2 L_2 R_5 + 4 C_2 L_5 R_2 + 2 C_5 L_5 R_2 R_5 g_m + 4 C_5 L_5 R_5) + s (4 C_2 R_2 R_5 + 2 L_5 R_2 g_m + 4 L_5)}$$

**10.70 INVALID-ORDER-70**  $Z(s) = \left( \infty, \frac{R_2 (C_2 L_2 s^2 + 1)}{C_2 L_2 s^2 + C_2 R_2 s + 1}, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$

$$H(s) = \frac{R_2 R_5 g_m - R_2 + R_5 + s^4 (C_2 C_5 L_2 L_5 R_2 R_5 g_m - C_2 C_5 L_2 L_5 R_2 + C_2 C_5 L_2 L_5 R_5) + s^3 (C_2 C_5 L_5 R_2 R_5 + C_2 L_2 L_5 R_2 g_m + C_2 L_2 L_5) + s^2 (C_2 L_2 R_2 R_5 g_m - C_2 L_2 R_2 + C_2 L_2 R_5 + C_2 L_5 R_2 + C_5 L_5 R_2 R_5 g_m - C_5 L_5 R_2 + C_5 L_5 R_5) + s (C_2 R_2 R_5 + L_5 R_2 g_m + L_5)}{4 C_2 C_5 L_5 R_2 s^3 + 4 C_2 R_2 s + 2 R_2 g_m + s^4 (2 C_2 C_5 L_2 L_5 R_2 g_m + 4 C_2 C_5 L_2 L_5) + s^2 (2 C_2 L_2 R_2 g_m + 4 C_2 L_2 + 2 C_5 L_5 R_2 g_m + 4 C_5 L_5) + 4}$$

10.71    INVALID-ORDER-71

$$Z(s) = \left( \infty, \frac{R_2(C_2L_2s^2+1)}{C_2L_2s^2+C_2R_2s+1}, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$$

$$H(s) = \frac{R_2R_5g_m - R_2 + R_5 + s^4(C_2C_5L_2L_5R_2R_5g_m - C_2C_5L_2L_5R_2 + C_2C_5L_2L_5R_5) + s^3(-C_2C_5L_2R_2R_5 + C_2C_5L_5R_2R_5) + s^2(C_2L_2R_2R_5g_m - C_2L_2R_2 + C_2L_2R_5 + C_5L_5R_2R_5g_m - C_5L_5R_2 + C_5L_5R_5) + s(C_2R_2R_5 - C_5R_2R_5)}{2R_2g_m + s^4(2C_2C_5L_2L_5R_2g_m + 4C_2C_5L_2L_5) + s^3(2C_2C_5L_2R_2R_5g_m + 4C_2C_5L_2R_5 + 4C_2C_5L_5R_2) + s^2(4C_2C_5R_2R_5 + 2C_2L_2R_2g_m + 4C_2L_2 + 2C_5L_5R_2g_m + 4C_5L_5) + s(4C_2R_2 + 2C_5R_2R_5g_m + 4C_5R_5) + 4}$$

11    PolynomialError