

Filter Summary Report: TIA,simple,Z5

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

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

2 HP

3 BP

4 LP

5 BS

6 GE

6.1 GE-1

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

Parameters:

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

6.2 GE-2

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

Parameters:

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

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

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

7 AP

8 INVALID-NUMER

9 INVALID-WZ

10 INVALID-ORDER

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

