Filter Summary Report: CG,TIA,simple,Z5

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Contents

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

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

2 HP

3 BP

4 LP

5 BS

6 GE

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

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

Parameters:

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

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

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

Parameters:

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

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

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

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

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

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

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

11 PolynomialError