

Draft.

$$P_0 = 0.1 \times 100 = 10\%$$

$$\text{Damping ratio} = 0.5912$$

$$PM = 58.5147$$

$$\sigma = 12.58$$

$$\frac{1}{\sqrt{\sigma}} = 0.292 = |G_{jw}|$$

$$w = 7.7$$

$$z = \frac{2.7}{3.547} = 2.18$$

$$p = 0.58 \times 2.18 = 16.75$$

$$K_{lead} = \frac{5 \pm 2.18}{5 \pm 16.75} \times 7.16$$

$$58.51 - 6.28 = 52.23$$

$$\sqrt{\sigma} = 3.547$$

$$\alpha_z = \frac{1 + \sin \phi}{1 - \sin \phi} = 8.55$$

$$\sqrt{\alpha} = 2.92$$

$$\frac{1}{\sqrt{\alpha}} = 0.34$$

$$w = 15.6$$

$$z_1 = \frac{w}{\sqrt{\alpha}} = \frac{15.6}{2.92} = 5.34$$

$$p = z \cdot \alpha = 5.34 \times 2.92 = 15.6$$

$$\frac{1}{\sqrt{20}}$$

$$\sigma = \frac{z}{p} \quad \frac{1}{\sigma}$$

$$58.51 \approx 60$$

$$\sigma = 20 \quad \frac{1}{\sqrt{\sigma}} = 0.223$$

$$z = \frac{w}{\sqrt{\sigma}} = \frac{2.45}{4.47} = 1.666$$

$$p = \sigma z = 20 \times 1.66 = 33.3$$

$$PM = 3.64$$



$$\sigma = 10$$

$$K_{lead2} = \underline{\hspace{2cm}}$$

$$-13.03 \text{ dB}$$

$$w = 14$$

$$z = \frac{14}{\sqrt{4.47}} = 3.13$$

$$p = 3.13 \times 20 = 62.6$$

$$PM = 25.1$$

$$60 - 25.1 = 34.9$$

$$\sigma = \frac{1}{0.3} = 3.33$$

$$\sqrt{\sigma} = 1.83 \quad \frac{1}{\sqrt{\sigma}} = 0.548 \Rightarrow -5.22$$

$$w = 19.1$$

$$z = \frac{19.1}{\sqrt{1.83}} = 14.12$$

$$p = 14.12 \times 3.33$$

$$\frac{1}{p_0} = K_n = \frac{1}{1.28} = 0.84$$

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