$$a_k = \frac{1}{T_s}\int_0^{T_s} \frac{1}{T_p} e^{-2\pi t k j / T_s}$$

$$= \frac{1}{T_s T_p}\left(\frac{T_s}{2\pi k j}\right)\left[e^{-2\pi T_p k j / T_s} - 1\right]$$

$$= \frac{1}{T_p}\frac{1}{j2\pi k}\left[e^{2\pi T_p k j / T_s} - 1\right]$$

Thus $P(f) = \sum_{k=-\infty}^{\infty} a_k \delta\left(f - \frac{k}{T_s}\right)$

$$= \sum_{-\infty}^{\infty} \frac{1}{2\pi}\left[e^{2\pi T_p k / T_s} - 1\right] \delta\left(f - \frac{k}{T_s}\right)$$

Thus $P(\omega) = \sum_{-\infty}^{\infty} \frac{2\pi}{T_p} a_k \delta\left(f - \frac{2\pi}{T_s} k\right)$

$$= \sum_{-\infty}^{\infty} \frac{j\left[e^{2\pi T_p k / T_s} - 1\right]}{k T_p} \delta\left(f - \frac{2\pi}{T_s} k\right)$$