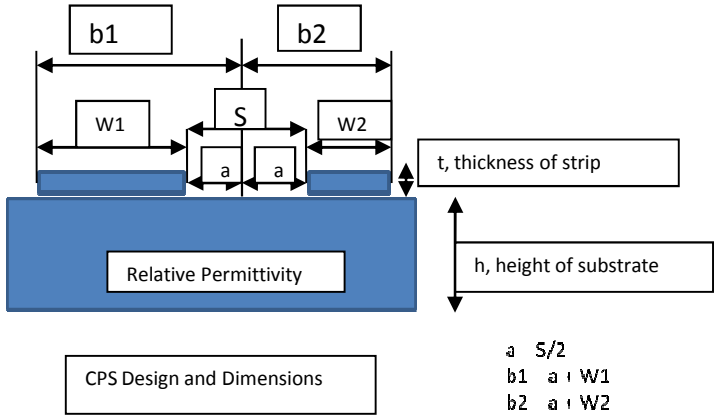
Coplanar Striplines (CPS)

- Consists of a dielectric substrate with two parallel strip conductors separated by a narrow gap.
- Absence of ground plane causes parasitic modes of TE0 and TM0 dielectric slab modes that have no cutoff frequency.
- In actuality, the width of the CPS strips are asymmetric (ACPS)



For the equally wide strips, b1 = b2

For the case of infinitely thick substrate : $\varepsilon_{eff}^{ACPS} = \left(\frac{\varepsilon_r + 1}{2}\right)$

For the finite thickness of the substrate : $\varepsilon_{eff}^{ACPS} = 1 + \left(\frac{\varepsilon_r - 1}{2}\right)\frac{K(k)}{K(k')}\frac{K(k_2')}{K(k_2)}$

$$Z_0^{ACPS} = \frac{60\pi}{\sqrt{\varepsilon_{eff}^{ACPS}}}\frac{K(k)}{K(k')}$$

where

$$k = \sqrt{\frac{(2a)(b_1 + b_2)}{(a + b_1)(a + b_2)}}; k' = \sqrt{1 - k^2} = \sqrt{\frac{(b_1 - a)(b_2 - a)}{(a + b_1)(a + b_2)}}$$

K is the complete elliptic integral of the first kind.

ε_r is the relative permittivity of the dielectric substrate

$$k_2 = \sqrt{\frac{\{\exp[2\pi(b_1 + a)/h] - \exp[2\pi(b_1 - a)/h]\}\{\exp[2\pi(b_1 + b_2)/h] - 1\}}{\{\exp[2\pi(b_1 + b_2)/h] - \exp[2\pi(b_1 - a)/h]\}\{\exp[2\pi(b_1 + a)/h] - 1\}}}$$

$$k_2' = \sqrt{1 - k_2^2}$$

where *h* is the substrate thickness