ECUACIONES DE DISEÑO DE MICROTIRAS

		Hammerstad	Wheeler
1	*Para W/H ≤ 1 ⇒ W ≤ H*	$Z_0 = \frac{60}{\sqrt{\varepsilon_r'}} \cdot \ln\left(\frac{8H}{W} + \frac{W}{4H}\right)$	$Z_0 = \frac{60}{\sqrt{\varepsilon_r'}} \cdot \ln\left(\frac{8H}{W} + \frac{W}{4H}\right)$
2		$\varepsilon_r' = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2} \cdot \left[\frac{1}{\sqrt{1 + \frac{12H}{W}}} + 0.04 \cdot \left(1 - \frac{W}{H}\right)^2\right]$	$\varepsilon_r' = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2} \cdot \left[\frac{1}{\sqrt{1 + \frac{12H}{W}}} + 0.04 \cdot \left(1 - \frac{W}{H}\right)^2\right]$
3	*Para W/H ≥ 1 ⇒ W ≥ H*	$Z_0 = \frac{\frac{120\pi}{\sqrt{\varepsilon_r'}}}{\frac{W}{H} + 1.393 + 0.667 \cdot \ln\left(\frac{W}{H} + 1.444\right)}$	$Z_0 = \frac{\frac{120\pi}{\sqrt{\varepsilon_r'}}}{\frac{W}{H} + 2.46 - 0.49\frac{H}{W} + \left(1 - \frac{H}{W}\right)^6}$
4		$\varepsilon_r' = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2} \cdot \frac{1}{\sqrt{1 + \frac{12H}{W}}}$	$\varepsilon_r' = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2} \cdot \frac{1}{\sqrt{1 + \frac{12H}{W}}}$
5	*Para W/H ≤ 2 ⇒ W ≤ 2H*	$\frac{W}{H} = \frac{8 \cdot e^A}{e^{2A} - 2}$	$\frac{W}{H} = \frac{8 \cdot e^A}{e^{2A} - 2}$
6	*Para W/H ≥ 2 ⇒ W ≥ 2H*	$\frac{W}{H} = \frac{2}{\pi}\left\{B - 1 - \ln(2B-1) + \frac{\varepsilon_r - 1}{2\varepsilon_r}\left[\ln(B-1) + 0.39 - \frac{0.61}{\varepsilon_r}\right]\right\}$	$\frac{W}{H} = \frac{\varepsilon_r - 1}{\pi \cdot \varepsilon_r}\left[\ln(B-1) + 0.293 - \frac{0.517}{\varepsilon_r}\right] + \frac{2}{\pi}\left[B - 1 - \ln(2B-1)\right]$
7	*Donde*	$A = \frac{Z_0}{60}\sqrt{\frac{\varepsilon_r + 1}{2}} + \frac{\varepsilon_r - 1}{\varepsilon_r + 1}\left(0.23 + \frac{0.11}{\varepsilon_r}\right)$	$A = \frac{Z_0}{60}\sqrt{\frac{\varepsilon_r + 1}{2}} + \frac{\varepsilon_r - 1}{\varepsilon_r + 1}\left(0.226 + \frac{0.121}{\varepsilon_r}\right)$
8	*Donde*	$B = \frac{377 \cdot \pi}{2 \cdot Z_0 \cdot \sqrt{\varepsilon_r}}$	$B = \frac{377 \cdot \pi}{2 \cdot Z_0 \cdot \sqrt{\varepsilon_r}}$
9	*Para W/H ≤ 1/2π ⇒ H ≥ 2πW*	$W_e = W + \frac{t}{\pi} \cdot \left[1 + \ln\left(\frac{4\pi W}{t}\right)\right]$	$W_e = W + \frac{t}{\pi} \cdot \left[1 + \ln\left(\frac{4\pi \cdot W}{t}\right)\right]$
10	*Para W/H ≥ 1/2π ⇒ H ≤ 2πW*	$W_e = W + \frac{t}{\pi} \cdot \left[1 + \ln\left(\frac{2H}{t}\right)\right]$	$W_e = W + \frac{t}{\pi} \cdot \left[1 + \ln\left(\frac{2H}{t}\right)\right]$