Summary of Basic Formulas

Term	Formula
Reactance	$X_L = 6.28 f_{GHz} L_{nH}$ and $X_C = \frac{159}{f_{GHz} C_{pF}}$
Conductance	$G = \frac{1}{R}$ and $g = \frac{1}{r}$
Susceptance	$B = \frac{1}{X}$ and $b = \frac{1}{x}$
Impedance (Z_0 is the Characteristic Impedance)	$Z = R \pm jX = \frac{1}{Y} = Z_0 \left(\frac{1 + \Gamma}{1 - \Gamma} \right)$ and $z = \frac{Z}{Z_0}$
Admittance (Y_0 is the Characteristic Admittance)	$Y = G \pm jB = \frac{1}{Z} = Y_0 \left(\frac{1 - \Gamma}{1 + \Gamma} \right)$ and $y = \frac{Y}{Y_0}$
Reflection Coefficient	$\Gamma = \frac{Z - Z_0}{Z + Z_0} = \frac{Y_0 - Y}{Y_0 + Y} = \frac{VSWR - 1}{VSWR + 1} = \frac{z - 1}{z + 1}$
Voltage Standing Wave Ratio	$VSWR = \frac{1 + \lvert\Gamma\rvert}{1 - \lvert\Gamma\rvert} = \frac{R_{LARGER}}{R_{SMALLER}}$
Return Loss	$RL = -20\log\lvert\Gamma\rvert = -20\log\left\lvert \frac{Z - Z_0}{Z + Z_0} \right\rvert$
Mismatch Loss ($G_S \neq 0$, $G_L \neq 0$)	$ML = -10\log\left[\frac{(1 - \lvert\Gamma_S\rvert^2)(1 - \lvert\Gamma_L\rvert^2)}{\lvert 1 - \Gamma_L \Gamma_S \rvert^2} \right]$
Wavelength	$\lambda = \frac{c}{f\sqrt{\varepsilon_r \mu_r}} = \frac{3 \cdot 10^8 m}{f_{Hz}\sqrt{\varepsilon_r \mu_r}} = \frac{30cm}{f_{GHz}\sqrt{\varepsilon_r \mu_r}}$
Conversion to dB	$dB = 20\log\frac{v_2}{v_1} = 20\log\frac{i_2}{i_1} = 10\log\frac{p_2}{p_1}$

COMDEL

11 Kondelin Road, Gloucester, MA 01930
Phone: 978-282-0620 Fax: 978-282-4980
Email: info@comdel.com Web site: www.comdel.com