HANDY MICROWAVE EQUATIONS

Legend:

RL	=	Return Loss
SM	=	Source Match
PP	=	Peak-to-Peak Ripple in dB
D	=	Outer Conductor Diameter
d	=	Inner Conductor Diameter
ML	=	Mismatch Loss
$|\Gamma|$	=	Magnitude of Gamma

ℓ	=	Mechanical Length of Line
π	=	3.14159265359
μ_0	=	$1.25663706144*10^{-6}$
ε_0	=	$8.85418781762*10^{-12}$
$\varepsilon_{r(air)}$	=	1.000649
c	=	$2.99792458*10^{10}\,cm/sec$

$$RL = -20\,Log_{10}|\Gamma|$$

$$RL = -20\,Log_{10}\frac{VSWR-1}{VSWR+1}$$

$$VSWR = \frac{1 + 10^{\frac{-RL}{20}}}{1 - 10^{\frac{-RL}{20}}}$$

$$SM = -20\,Log_{10}\,(1 - 10^{\frac{-PP}{40}}\,)$$

$$PP = -40\,Log_{10}\,(1 - 10^{\frac{-SM}{20}}\,)$$

$$\Gamma = \frac{Z - Z_0}{Z + Z_0}$$

$$|\Gamma| = \frac{VSWR-1}{VSWR+1}$$

$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

$$VSWR_{Total} = VSWR_1 * VSWR_2$$

$$Z_{Airline} = 138.01475 Log_{10}\frac{D}{d}$$

$$\frac{D}{d} = 10^{\frac{Z_{Airline}}{138.01475}}$$

$$Z_{DielectricLine} = \frac{1}{\sqrt{\varepsilon_r}}\,138.059528957 Log_{10}\frac{D}{d}$$

$$VSWR = \frac{Z_{Max}}{Z_{Min}}$$

$$ML = -10\,Log_{10}\,(1 - \Gamma^2)$$

$$Electrical\ Delay = \frac{\ell\sqrt{\varepsilon_r}}{c}$$

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE