HUBER+SUHNER
Excellence in Connectivity Solutions

Formulas (IEC 60096-0-1 and general formulas in physics)

Attenuation, cable only	$\alpha(T)=(A\times\sqrt{f}+B\times f)\times(1+\frac{J}{100}\times(T-25°))\times l$ (dB)
Attenuation, including connectors	$\alpha(T)=(A\times\sqrt{f}+B\times f)\times(1+\frac{J}{100}\times(T-25°))\times l+(C_1+C_2)\sqrt{f}$ (dB)
Wave length	$\lambda=\frac{c}{f\times\sqrt{\varepsilon_r}}$ (m)
Signal delay	$t=\frac{l\times\sqrt{\varepsilon_r}}{c}$ (s)
Velocity of propagation	$v=\frac{1}{\sqrt{\varepsilon_r}}\times 100$ (%)
Velocity of propagation	$v=\frac{c}{\sqrt{\varepsilon_r}}$ (m/s)
Nominal phase	$\Phi_{25}=\frac{f\times\sqrt{\varepsilon_r}\times l\times 360°}{c}$ (DEG)
Reflection factor	$\Gamma=\frac{VSWR-1}{VSWR+1}$, $\Gamma=\frac{U_{reflected}}{U_{forward}}$
Retum loss	$RL=20LOG\frac{U_{reflected}}{U_{forward}}$ (dB), $RL=20LOG\left(\frac{1}{\Gamma}\right)$ (dB)
Reflection loss	$RL=-10LOG(1-\Gamma^2)$ (dB)
Voltage standing wave ratio	$VSWR=\frac{U_{forward}+U_{reflected}}{U_{forward}-U_{reflected}}$
Characteristic impedance	$Z_o=\frac{138\times LOG\left(\frac{D}{d}\right)}{\sqrt{\varepsilon_r}}$ (Ω)
Cut-off frequency	$f_G=\frac{2\times c}{(D+d)\times\pi\times\sqrt{\varepsilon_r}}$ (Hz)
Capacitance per unit length	$C=\frac{2\times\pi\times\varepsilon_r\times\varepsilon_o}{\ln\left(\frac{D}{d}\right)}$ (F/m)

A,B = Characteristic cable coefficients
C_1, C_2 = Characteristic connector coefficients
J = Temperature coefficient for attenuation (e.g. 0.002)
ε_o = 8.854×10^{-12} (C/Vm)
ε_r = Relative dielectric constant
c = 300'000 km/s
D,d = See diagram
l = Length of cable/assembly
T = Ambient temerature
f = Frequency
v = Velocity